



Rayat Shikshan Sanstha's

Estd : June 1986

S.M. JOSHI COLLEGE

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ISO 9001 : 2015 Certified

Affiliated to Savitribai Phule Pune University ID No. (PU/PN/SC/069/1986)

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Ref. No.

Date :

External Assessment Pattern (2019 Pattern)

Savitribai Phule Pune University

RULES AND REGULATIONS

for

PG Choice Based Credit System for Science Programme of Affiliated Colleges

Under Faculty of Science and Technology

Effective from June 2019



Prof. S. D. Dhole
Chairman
UG/PG Rule & Regulation committee,
SPPU, Pune



Prof. A. D. Shaligram
Dean,
Faculty of Science & Technology
SPPU, Pune



PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar, Pune- 28.

1. Background/Preamble:

Education plays enormously significant role in building of a nation. There are quite a large number of educational institutions, engaged in imparting education in our country. Majority of them have entered recently into semester system to match with international educational pattern. However, our present education system is churning out youth who have to compete locally, regionally, nationally as well as globally. The present alarming situation necessitates transformation and/or redesigning of system, not only by introducing innovations but developing "learner-centric approach.

Majority of Indian higher education institutions have been following the system which obstructs the flexibility for the students to study the subjects/courses of their choice and their mobility to different institutions. There is need to allow the flexibility in education system, so that students depending upon their interests can choose inter-disciplinary, intra-disciplinary and skill-based courses. This can only be possible when choice based credit system (CBCS), an internationally acknowledged system, is adopted. The choice based credit system not only offers opportunities and avenues to learn core subjects but also explore additional avenues of learning beyond the core subjects for holistic development of an individual. The CBCS will undoubtedly facilitate benchmarking of our courses with best international academic practices.

1.1 Preface

In a bid to fine tune our scientific education system to the global standards & practices, the Credit-Grade based performance and assessment system will be implemented with effect from June 2019 onwards for all the Post Graduate Programmes (PG) of affiliated colleges under the Faculty of Science, Savitribai Phule Pune University, Pune, starting with First Year.

With the advent of frontier science, technology and ever-changing expectations from the Industry and Society, it has become imperative to relook at the structure and subject contents of various PG courses to make it contemporary and relevant.

As per the decision by the authorities of Savitribai Phule Pune University, the faculty of Science has prepared the choice based credit system and its structure. The revised course is of 80 credits and 1 credit is equivalent to 15 hours of teaching in a semester. Assessments in credit system consist of A) In-semester continuous assessment and B) End-semester assessment for the Theory head and Term Work/ Practical / Oral / Presentation at the end of the semester for Practical, Oral, Seminar and Project Head.

The faculty of Science has shouldered the idea of incorporating latest advances in Science and technology and equips the subject/syllabus contents with latest and relevant topics and know-hows. Accordingly the new structure and syllabi are being introduced, to be implemented from the academic year 2019-20 from First Year and it will continue for subsequent years. The rules governing the programmes shall be as given below with suffix R, followed by the rule number.

- R.1. All PG programmes, under Faculty of Science shall be offered with credit system.
- R.2. All the M.Sc programmes running under the Faculty of Science will be of two years duration.
- R.3. The M.Sc. degree will be awarded to students who complete a total of 80 credits (120 credits) in a minimum of two (three) years by completing on an average 20 credits per semester. .



- R.4. Each theory credit is equivalent to 15 clock hours of teaching and Each practical credit is equivalent to 30 clock hours of teaching in a semester
- R.5. A student is required to earn 80 credits in a minimum period of four semesters.
- R.6. Final CGPA will be calculated on the basis of 80 credits.
- R.7. There is 15 weeks teaching during the semester.
- R.8. Except practical credits wherever applicable, students may be allowed to complete less courses per semester on a condition they complete the two-year degree course in a maximum of four years and a three-year degree course in a maximum of five years. This facility will be available subject to the availability of concerned courses in a given semester and with a maximum variation of 25 per cent credits (in case of fresh credits) per semester.
- R.9. A student may opt for courses equivalent to 25 percent credits from any other department than the one where he/she is registered. In case a student wishes to take all courses from the parent department he/she can also do so.
- R.10. Regular students can take extra credit courses from their own department or from other departments. In such cases, students shall specify the extra credits and this will be so noted on their Grade sheets. The CGPA of a student will be computed on the basis of
 - a. his/her performance in the core courses from parent Department
 - b. best performance of the required number of credits from all elective courses opted by him/her.

1.2 Advantages of the choice based credit system:

- 1. Shift in focus from the teacher-centric to student-centric education.
- 2. Student may undertake as many credits as they can cope with (without repeating all courses in a given semester if they fail in one/more courses).
- 3. CBCS allows students to choose inter-disciplinary, intra-disciplinary courses, skill oriented papers (even from other disciplines according to their learning needs, interests and aptitude) and more flexibility for students.
- 4. CBCS makes education broad-based and at par with global standards. One can take credits by combining unique combinations. For example, Physics with Economics, Microbiology with Chemistry or Environment Science etc.
- 5. CBCS offers flexibility for students to study at different times and at different institutions to complete one course (ease mobility of students). Credits earned at one institution can be transferred to another institution.

1.3 Implementation of PG course structure:

- 1. For the purpose of computation of work-load the following mechanism may be adopted as per UGC guidelines:
 - i) 1 Credit = 1 Theory period of one hour duration per week
 - ii) 1 Credit = 1 Tutorial period of one hour duration per week
 - iii) 1 Credit = 1 Practical period of two hour duration per week
- 2. Each theory Lecture time is of 1 hour = 60 min
- 3. Each practical session time for Compulsory Practical Paper is of 8 hour = 480 min
- 4. Each practical session time Choice Based Optional Paper is of 4 hour = 240 min

5. Exam pattern: University assessment 70 % and continuous internal assessment 30%.

2. PG Programme Structure:

2.1 Each M.Sc. programme is of 2 years duration. The minimum total no. of credits requirement for each programme is 80. In the structure, the credits are distributed over 4 semesters. The open elective included, gives the student a wide choice of subjects from other programmes. The Credit structure for M.Sc. programme is given below in Table 1.

Table 1

Structure of Choice Based Credit System for Postgraduate Science Programme

M.Sc. (Semester - 1)

Sr. No.	Core Compulsory Theory Paper (CCTP)	Choice Based Optional Paper (CBOP)	Theory/ practical	Core Compulsory Practical Paper (CCPP)	Credit
1	CCTP – 1	-		-	4
2	CCTP – 2	-		-	4
3	CCTP – 3	-		-	4
4	-	CBOP - 1	Theory	-	2
			Practical	-	2
5	-	-		CCPP - 1	4
Total Credit of Semester 1					20

M.Sc. (Semester - 2)

	Core Compulsory Theory Paper (CCTP)	Choice Based Optional Paper (CBOP)	Theory/ practical Credit	Core Compulsory Practical Paper (CCPP)	Credit
1	CCTP – 4	-		-	4
2	CCTP – 5	-		-	4
3	CCTP – 6	-		-	4
4	-	CBOP - 2	Theory	-	2
			Practical	-	2
5	-	-		CCPP - 2	4
Total Credit of Semester 2					20

M.Sc. (Semester - 3)

	Core Compulsory Theory Paper (CCTP)	Choice Based Optional Paper (CBOP)	Theory/ practical Credit	Core Compulsory Practical Paper (CCPP)	Credit
1	CCTP – 7	-		-	4
2	CCTP – 8	-		-	4
3	CCTP – 9	-		-	4
4	-	CBOP -3	Theory Practical	-	2 2
5	-	-		CCPP - 3	4
Total Credit of Semester 3					20

M.Sc. (Semester - 2)

	Core Compulsory Theory Paper (CCTP)	Choice Based Optional Paper (CBOP)	Theory/ practical Credit	Core Compulsory Practical Paper (CCPP)	Credit
1	CCTP – 10	-		-	4
2	CCTP – 11	-		-	4
3	-	CBOP – 4	Theory Practical	-	2 2
4	-	CBOP – 5	Theory Practical	-	2 2
5	-		Practical Credit 2	-	
5	-	-		CCPP - 4 (Project)	4
Total Credit of Semester 4					20

Note: i) Each credit will be equivalent to 15 clock hours of teaching

ii) 75% of the credits (60) is compulsory from the core subject and 25% i.e. 20 credits from any other department than the one where he/she is registered. In case student wishes to take all courses from the department he/ she can also do so.

iii) Credit: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.



iv) Refer detailed rules and regulations for credit and semester system in postgraduate department/centers of the university with effect from academic year 2018-19 which displayed on the website of the university.

v) Choice Based Optional Papers (CBOP) means elective course (departmental course) to be offered along with practical i.e. theory (2 credit) + practical (2 credit) = 4 credit OR those boards feel that they cannot have practical for the CBOP, then they can offer different 4 credit full theory courses and choice be given to the students.

vi) Core Compulsory Practical Paper (CCPP) means the practical to be given to the student based on the Core Compulsory Theory Paper (CCTP) taught in the respective semester.

3. Eligibility for Admission:

- Eligibility to take admission for M.Sc. program is the student has to complete Bachelor degree in specific subject.
- Admissions will be given as per the selection procedure / policies adopted by the respective college keeping in accordance with conditions laid down by the Savitribai Phule Pune University of Pune.
- Reservation and relaxation will be as per the Government rules.

3.2 Medium of Instruction: English

3.3 Award of Credits:

- Each course having 4 credits shall be evaluated out of 100 marks and student should secure at least 40 marks (40%) to earn full credits of that course.
- Each course having 3 credits shall be evaluated out of 75 marks as students should secure at least 30 marks (40%) to earn full credits of that course.
- Each course having 2 credits shall be evaluated out of 50 marks and student should secure at least 20 marks (40%) to earn full credits of that course.
- Each course having 1 credit shall be evaluated out of 25 marks as student shall secure 10 marks (40%) to earn full credits of that course.
- GPA shall be calculated based on the marks obtained in the respective subject provided that student should have obtained credits for that course. Structure of marks scheme for choice based credit system program is given in Table 2.

Table 2:

Structure of Examination Mark Scheme of Choice Based Credit System for Postgraduate Science Programme

Semester	Course Name	Subject Name	Credit	Maximum Internal Marks	Maximum External Marks
I	CCTP – 1		4	30	70
	CCTP – 2		4	30	70
	CCTP – 3		4	30	70
	CBOP – 1 (Theory)		2	15	35
	CBOP – 1 (Practical)		2	15	35
	CCPP – 1		4	30	70
II	CCTP – 4		4	30	70
	CCTP – 5		4	30	70
	CCTP – 6		4	30	70
	CBOP – 2 (Theory)		2	15	35
	CBOP – 3 (Practical)		2	15	35
	CCPP – 2		4	30	70
III	CCTP – 7		4	30	70
	CCTP – 8		4	30	70
	CCTP – 9		4	30	70
	CBOP – 3 (Theory)		2	15	35
	CBOP – 3 (Practical)		2	15	35
	CCPP – 3		4	30	70
IV	CCTP – 10		4	30	70
	CCTP – 11		4	30	70
	CBOP – 4 (Theory)		2	15	35
	CBOP – 4 (Practical)		2	15	35
	CBOP – 5 (Theory)		2	15	35
	CBOP – 5 (Practical)		2	15	35
	CCPP – 4		4	30	70

Core Compulsory Theory Paper (CCTP)

Choice Based Optional Paper (CBOP)

Core Compulsory Practical Paper (CCPP)



4. Evaluation Pattern:

Examination Rules

- 4.1 A student cannot appear for semester end examination unless he/she has maintained 75% attendance during the teaching period of that course. If a student fails to maintain attendance up to 75%, at the time of filling of examination forms, an undertaking from the student should be taken stating that he/she will be allowed to appear for examination subject to fulfillment of required attendance criteria during the remaining period of teaching of the course.
- 4.2 Each course carrying 100 marks shall be evaluated with Continuous Assessment (CA) and University Evaluation (UE) mechanism.
- 4.3 Continuous assessment shall be of 30 marks (30%) while University Evaluation shall be of 70 marks (70%). To pass in a course, a student has to secure minimum 40 marks (40%) provided that he should secure minimum 28 marks (40%) in University Evaluation (UE) and 12 marks (40%) in continuous assessment.
- 4.4 Each credit will have an internal (continuous) assessment of 30% of marks and a teacher must select a variety of procedures for examination such as:
 - a) Written Test and/or Mid Term Test (not more than one for each course)
 - b) Term Paper;
 - c) Viva-voce,
 - d) Projects / Surveys / Field visits,
 - e) Tutorials,
 - f) Group Discussion
 - g) Journal/Lecture/Library notes;
 - h) Seminar presentation;
 - i) Short Quizzes;
 - j) Assignments;
 - k) Extension Work;
 - l) Research Project by individual students or group of students; or
 - m) An Open Book Test (with the concerned teacher deciding what books are to be allowed for this purpose.)etc (on approval of the head of the centre)
- 4.5 If a student misses an internal assessment examination, he/she will have a second chance with the permission of the teacher concerned. Such a second chance shall not be the right of the student; it will be the discretion of the teacher concerned to give or not to give second chance to a student to appear for internal assessment.
- 4.6 Students who have failed semester-end exam may reappear for the semester-end exam in the subsequent period. The student will be finally declared as failed if he/she does not pass in all credits within a total period of four years in case of two year courses and five years in case of three year courses. After that, such students will have to seek fresh admission as per the admission rules prevailing at that time.
- 4.7 Internal marks will not change. A student cannot repeat internal assessment. In case he/she wants to reappear for the internal assessment he/she can do so only by registering for the said courses during the semesters in which the courses are being conducted.



- 4.8 There shall be revaluation of the answer scripts of semester-end examination of theory papers only but not of internal assessment papers as per Ordinance no 134 A and B.
- 4.9 While marks will be given for all examinations, they will be converted into grades. The semester end and final grade sheets and transcripts will have only grades and grade points average.
- 4.10 Except for the technology faculty, in subjects or departments where project work is part of the credits, the project will consist of not more than ten percent of the total credits for the degree course.

5. ATKT Rules:

- 5.1 Minimum number of credits required to take admission to Second Year: 20 [50% of total credit in first year]
- 5.2 A student cannot register for the third semester, if he/she fails to complete 50% credits of the total credits expected to be ordinarily completed within two semesters. In this case, a student can seek admission to first or second semester in order to complete the requisite number of credits and to be able to seek admission in the third semester.

6. Completion of Degree Course:

- 6.1 A student, who earns 80 credits, shall be considered to have completed the requirements of the M. Sc. degree program and CGPA will be calculated for such student.
- 6.2 The following percentage to grade and grade point is given in Table-3 and respected example of CGPA calculated is given in Table-4.

Table - 3
Percentage to Grades and Grade Points

Sr. No.	Grade Letter	Grade Point	Marks
1	O (Outstanding)	10	$90 \leq \text{Marks} \leq 100$
2	A+ (Excellent)	9	$75 \leq \text{Marks} \leq 89$
3	A (Very Good)	8	$60 \leq \text{Marks} \leq 74$
4	B+ (Good)	7	$55 \leq \text{Marks} \leq 59$
5	B (Above Average)	6	$50 \leq \text{Marks} \leq 54$
6	C (Average)	5	$45 \leq \text{Marks} \leq 49$
7	D (Pass)	4	$40 \leq \text{Marks} \leq 44$
8	F (Fail)	0	$\text{Marks} < 40$
9	Ab (Absent)	0	

Table-4

**Structure of CGPA and Mark Scheme of Choice Based Credit System for
Postgraduate Science Programme (An Example)**

Semester	Course Name	Subject Name	Credit	Maximum Internal Marks	Maximum External Marks	Grade Letter (F-O)	Grade point (0 - 10)	Credit Point = (Credit x Grade point)
I	CCTP – 1		4	30	70	A	8	32
	CCTP – 2		4	30	70	O	10	40
	CCTP – 3		4	30	70	A+	9	36
	CBOP – 1 (Theory)		2	15	35	B+	7	14
	CBOP – 1 (Practical)		2	15	35	A+	9	18
	CCPP – 1		4	30	70	O	10	40
			20	150	350			180
				SGPA	Total Credit point / Total credit for the semester			9.00
II	CCTP – 4		4	30	70	O	10	40
	CCTP – 5		4	30	70	O	10	40
	CCTP – 6		4	30	70	A+	9	36
	CBOP – 2 (Theory)		2	15	35	A	8	16
	CBOP – 3 (Practical)		2	15	35	A+	9	18
	CCPP – 2		4	30	70	O	10	40
			20	150	350			190
				SGPA	Total Credit point / Total credit for the semester			9.50
III	CCTP – 7		4	30	70	A	8	32
	CCTP – 8		4	30	70	O	10	40
	CCTP – 9		4	30	70	A+	9	36
	CBOP – 3 (Theory)		2	15	35	B+	7	14
	CBOP – 3 (Practical)		2	15	35	A+	9	18
	CCPP – 3		4	30	70	O	10	40
			20	150	350			180
				SGPA	Total Credit point / Total credit for the semester			9.00

IV	CCTP – 10		4	30	70	C	5	20
	CCTP – 11		4	30	70	D	4	16
	CBOP – 4 (Theory)		2	15	35	A+	9	18
	CBOP – 4 (Practical)		2	15	35	B+	7	14
	CBOP – 5 (Theory)		2	15	35	A+	9	18
	CBOP – 5 (Practical)		2	15	35	O	10	20
	CCPP – 4		4	30	70	O	10	40
			20	150	350			146
			SGPA		Total Credit point / Total credit for the semester			7.30
			CGPA		Total Credit point / Total credit for the course			= 8.70
			Final Grade					A+ (Excellent)
			% of Marks					82 %

7. PERFORMANCE INDICES:

The semester end grade sheet will contain grades for the courses along with titles and SGPA. Final grade sheet and transcript shall contain CGPA.

7.1 Semester Grade Point Average (SGPA) -The performance of a student in a semester is indicated by a number called the Semester Grade Point Average (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses, seminars and projects registered by the student during the semester.

$$SGPA = \frac{\sum_{i=1}^p C_i G_i}{\sum_{i=1}^p C_i}$$

$$SGPA = \frac{\sum \text{Grade Points Earned} \times \text{Credits for each course}}{\text{Total Credits}}$$

For Example: suppose in a given semester a student has registered for five courses having credits C₁, C₂, C₃, C₄, C₅ and his / her grade points in those courses are G₁, G₂, G₃, G₄, G₅ respectively.

Then students

$$SGPA = \frac{C_1 G_1 + C_2 G_2 + C_3 G_3 + C_4 G_4 + C_5 G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

SGPA is calculated up to two decimal places by rounding off.



7.2 Course Grade Point Average (CGPA)- The CGPA is the weighted average of the grade points obtained in all the courses (Theory/term work/practical/oral/presentation) of first semester to sixth semester for the students admitted in the First year and third to sixth semester for the students directly admitted at Second year. It is calculated in the same manner as the SGPA.

In case of a student passing a failed course or in case of improvement, the earlier grade would be replaced by the new grade in calculation of the SGPA and CGPA.

8. RESULT:

Based on the performance of the student in the semester examinations, the Savitribai Phule Pune University will declare the results and issue the Semester Grade sheets.

The class shall be awarded to a student on the CGPA calculated as mentioned in Rule no. 6.1. The award of the class shall be as per Table 5 and corresponding percentage calculation for the CGPA is given in Table 6 along with all details and examples.

Table 5
CGPA distribution and corresponding class of the degree awarded

Sr. No	CGPA	Class of the Degree awarded
1	9.50 or More than 9.50	Outstanding (O)
2	8.25 or more but less than 9.50	Excellent (A+)
3	6.75 or more but less than 8.25	Very Good (A)
4	5.75 or more but less than 6.75	Good (B+)
5	5.25 or more but less than 5.75	Above Average (B)
6	4.75 or more but less than 5.25	Average (C)
7	4.00 or more but less than 4.75	Pass (D)

Table 6
Percentage calculation of a corresponding CGPA

For the calculation of Percentage from CGPA following equation can be used.

$$\% \text{ of Marks} = \begin{cases} \text{if O grade then } 20 \times \text{CGPA} - 100 \\ \text{if A+ grade then } 12 \times \text{CGPA} - 25 \\ \text{if A grade then } 10 \times \text{CGPA} - 7.5 \\ \text{if B+ grade then } 5 \times \text{CGPA} + 26.25 \\ \text{if B grade then } 10 \times \text{CGPA} - 2.5 \\ \text{if C grade then } 10 \times \text{CGPA} - 2.50 \\ \text{if D grade then } 6.6 \times \text{CGPA} + 13.6 \end{cases}$$

The factors considered in the above equations are evaluated from the grade point and marks distribution given in Table 3. The examples of the calculation of percentage are given in the Table 7.



Table 7

Some examples of CGPA to percentage calculations

Obtained CGPA	Equation	Percentage (%)	Grade
10	$20 \times 10 - 100 = 100$	100	O
9.75	$20 \times 9.75 - 100 = 95$	95	O
9.5	$20 \times 9.5 - 100 = 90$	90	O
9.0	$12 \times 9 - 24 = 84$	84	A+
8.25	$12 \times 8.25 - 24 = 75$	75	A+
8.0	$10 \times 8.0 - 7.5 = 72.5$	72.5	A
7.0	$10 \times 7.0 - 7.5 = 62.5$	62.5	A
6.75	$10 \times 6.75 - 7.5 = 60.0$	60.0	A
6.25	$5 \times 6.25 + 26.25 = 57.5$	57.5	B+
5.75	$5 \times 5.75 + 26.25 = 55$	55	B+
5.5	$10 \times 5.5 - 2.5 = 52.5$	52.5	B
5.25	$10 \times 5.25 - 2.5 = 50$	50	B
4.75	$10 \times 4.75 - 2.50 = 45$	45	C
4.0	$6.6 \times 4.0 + 13.6 = 40$	40	D

While declaring the result, the existing relevant ordinances are applicable. There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. The revaluation result will be adopted if there is a change of at least 10% marks and in the grade of the course.

For grade improvement a student will have to take minimum 30% of the requisite number of credits for the concerned degree. These courses will be theory courses from the parent department. Grade improvement programme will be implemented at the end of the academic year. A student can opt for the grade improvement programme only after the declaration of the result for his/her final semester exam, i.e., at the end of the next academic year after passing the final examination and within two years of completion of the degree and only once.



Table 2

Grade conversion of CGPA to percentage calculation

Grade	Percentage (%)	Equivalent	Standard CGPA
D	10	50-59.99	1.0
D	15	60-69.99	1.5
D	20	70-79.99	2.0
A+	25	80-84.99	2.5
A+	30	85-89.99	3.0
A	35	90-94.99	3.5
A	40	95-99.99	4.0
B+	45	50-59.99	4.5
B+	50	60-69.99	5.0
B	55	70-79.99	5.5
B	60	80-84.99	6.0
C	65	85-89.99	6.5
D	70	90-94.99	7.0

While releasing the result, the existing behavior assessment is applicable. There is also a provision for revision and re-evaluation. In case of verification, the existing rules will be applicable. The verification result will be adopted if there is a change of at least 10% marks and in the grade of the course.

For grade improvement a student will have to take minimum 50% of the requisite number of credits in the concerned degree. These courses will be strictly courses from the parent department. Grade improvement programme will be implemented at the end of the academic year. A student can opt for the grade improvement programme only after the declaration of the result for higher level semester exam, i.e., at the end of the next academic year after passing the final examination and within two years of completion of the degree and only once.



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 Hadapsar, Pune- 28.

प्रथम वर्ष कला/वाणिज्य
प्रथम अयन एवं द्वितीय अयन

कोर्स न.	प्रथम अयन/द्वितीय अयन
प्रथम वर्ष कला (F.Y.B.A.) (सामान्य)	
1 A	प्रयोजनमूलक हिंदी
1 B	प्रयोजनमूलक हिंदी
प्रथम वर्ष कला (F.Y.B.A.) (सामान्य)	
1 A	वैकल्पिक हिंदी प्रश्नपत्र
1 B	वैकल्पिक हिंदी प्रश्नपत्र
प्रथम वर्ष वाणिज्य (F.Y.B.com) (सामान्य)	
1 A	वैकल्पिक हिंदी प्रश्नपत्र
1 B	वैकल्पिक हिंदी प्रश्नपत्र

प्रथम वर्ष कला (F.Y.B.A.) (सामान्य)

(प्रथम अयन)

पाठ्यचर्या : प्रयोजनमूलक हिंदी – 1 A

3 कर्मांक

उद्देश्य :

1. छात्रों को हिंदी काव्य साहित्य से परिचित कराना।
2. हिंदी कहानी साहित्य का परिचय देना।
3. हिंदी भाषा में संप्रेषण कौशल विकसित करना।
4. हिंदी भाषा द्वारा संवाद कौशल का विकास करना।
5. मौलिक लेखन की ओर रुझान बढ़ाना।
6. विज्ञापन लेखन की कला अवगत कराना।
7. हिंदी भाषा का विशुद्ध लेखन कौशल विकसित करना।
8. हिंदी कंप्यूटिंग का सामान्य परिचय देना।

	प्रथम सत्र/प्रथम अयन
इकाई – I	प्रयोजनमूलक हिंदी : अर्थ, परिभाषा, स्वरूपगत विशेषताएँ। प्रयोजनमूलक हिंदी और सामान्य हिंदी में अंतर।
इकाई – II	प्रयोजनमूलक हिंदी व्यवहार क्षेत्र : बैंक, बीमा, सूचना एवं प्रौद्योगिकी, जनसंचार माध्यम। हिंदी भाषा के विविध रूप : बोली भाषा, राजभाषा,
इकाई – III	हिंदी भाषा के विविध रूप : संपर्क भाषा, राष्ट्रभाषा। कार्यालयी हिंदी (राजभाषा) के प्रमुख कार्य : प्रारूपण, संक्षेपण, टिप्पण, प्रतिवेदन।

(उपर्युक्त सभी इकाइयों से आलोचनात्मक प्रश्न पूछे जाएँगे।)

अंक विभाजन – पूर्णांक : 100

आंतरिक मूल्यांकन – 30 (लघुत्तरी परीक्षा – 15, शोध परियोजना – 10, प्रस्तुतिकरण – 05)

सत्रांत परीक्षा – 70

आलोचनात्मक प्रश्न : 4 x 15 = 60

टिप्पणी : 2 x 05 = 10

संदर्भ ग्रंथ सूची :

1. प्रयोजनमूलक हिंदी : विविध आयाम – संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, पुणे, परिदृश्य प्रकाशन, मुंबई
2. प्रयोजनमूलक हिंदी अधुनातन आयाम – डॉ. अंबादास देशमुख,
3. प्रयोजनमूलक हिंदी – विनोद गोदरे
4. सामयिक प्रयोजनमूलक हिंदी – पृथ्वीनाथ पाण्डेय
5. प्रयोजनमूलक हिंदी – डॉ. गोरख थोरात
6. पत्रकारिता : मिशन से मीडिया तक – अखिलेश मिश्र
7. चौथा खम्भा प्राइवेट लिमिटेड – दिलीप मंडल
8. प्रयोजनमूलक हिंदी – डॉ. रवींद्रनाथ श्रीवास्तव
9. राजभाषा हिंदी – कैलाशचंद्र भाटिया
10. राजभाषा के संदर्भ में हिंदी में आंदोलन का इतिहास – डॉ. उद्यनारायण दूबे

प्रथम वर्ष कला (F.Y.B.A.) (सामान्य)
(द्वितीय अयन)

पाठ्यचर्या : प्रयोजनमूलक हिंदी – 1 B

3 कर्मांक

1. छात्रों को विज्ञापन लेखन से परिचित कराना।
2. दृश्य श्रव्य की संकल्पना से अवगत कराना।
3. हिंदी भाषा में संप्रेषण कौशल विकसित करना।
4. हिंदी कंप्यूटिंग से अवगत कराना।

	द्वितीय सत्र/द्वितीय अयन
इकाई-I	विज्ञापन लेखन : विज्ञापन का स्वरूप, विज्ञापन के प्रकार, विज्ञापन के माध्यम, विज्ञापन का महत्व।
इकाई -II	दृश्य श्रव्य : रेडियो- विज्ञापन का स्वरूप, शैली एवं विशेषताएँ, निर्माण प्रक्रिया। अनुवाद : स्वरूप, परिभाषा एवं महत्व, अनुवाद के गुण। अंक तथा गणितीय चिह्नों का देवनागरी में लेखन।
इकाई -III	पारिभाषिक शब्दावली (कार्यालयीन) 100 शब्द। हिंदी कंप्यूटिंग : यूनिकोड (Unicode) की जानकारी। इंटरनेट की सामान्य जानकारी। हिंदी सॉफ्टवेयर की जानकारी।

(उपर्युक्त सभी इकाइयों से आलोचनात्मक प्रश्न पूछे जाएँगे।

अंक विभाजन – पूर्णांक : 100

आंतरिक मूल्यांकन – 30 (लघुत्तरी परीक्षा – 15, शोध परियोजना – 10, प्रस्तुतिकरण – 05)

सत्रांत परीक्षा – 70

आलोचनात्मक प्रश्न	: 4 x 15 = 60
टिप्पणी	: 2 x 05 = 10

संदर्भ ग्रंथ सूची :

1. प्रयोजनमूलक हिंदी : विविध आयाम – संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, पुणे, परिदृश्य प्रकाशन, मुंबई
2. प्रयोजनमूलक हिंदी अधुनातन आयाम – डॉ. अंबादास देशमुख, शैलजा प्रकाशन, कानपुर
3. प्रयोजनमूलक हिंदी (भाषिक संरचना, व्याकरण एवं अनुवाद) – डॉ. माधव सोनटक्के, लोकभारती प्रकाशन, इलाहाबाद।
4. प्रयोजनमूलक हिंदी – डॉ. पुरुषोत्तम वाजपेयी, चन्द्रलोक प्रकाशन, कानपुर
5. नये जनसंचार माध्यम और हिंदी – संपा. सुधीश पचौरी, अचला शर्मा
6. हिंदी व्याकरण – पं. कामताप्रसाद गुरु
7. प्रयोजनमूलक हिंदी की नयी भूमिका – कैलाशनाथ पांडेय
8. अनुवाद : स्वरूप और क्षेत्र – डॉ. गोपाल राय
9. राजभाषा हिंदी – कैलाशचंद्र भाटिया
10. भाषा और प्रौद्योगिकी – डॉ. विनोद कुमार प्रसाद
11. प्रयोजनमूलक हिंदी – डॉ. गोरख थोरात
12. अनुवाद विज्ञान – डॉ. भोलानाथ तिवारी
13. रेडियो लेखन – मधुकर गंगाधर
14. प्रिंट मीडिया लेखन – हरीश हरोड़ा
15. कथा विवेचना और गद्यशिल्प – रामविलास शर्मा

प्रथम वर्ष कला (F.Y.B.A.) (सामान्य)
(प्रथम अयन)

पाठ्यचर्या : वैकल्पिक हिंदी प्रश्नपत्र – 1 A

3 कर्मांक

उद्देश्य :

1. छात्रों को हिंदी काव्य साहित्य का परिचय देना।
2. हिंदी कहानी साहित्य से अवगत कराना।
3. हिंदी भाषा द्वारा संवाद कौशल विकसित करना।
4. मौलिक लेखन की ओर रुझान बढ़ाना।
5. विज्ञापन लेखन कौशल विकसित करना।
6. अनुवाद संबंधी जानकारी देना।
7. हिंदी कंप्यूटिंग का परिचय देना।

	प्रथम सत्र/प्रथम अयन
इकाई – I	कहानी साहित्य : एक टोकरी भर मिट्टी – माधवराव सप्रे ईदगाह – प्रेमचंद जिंदगी और गुलाब के फूल – उषा प्रियंवदा युद्ध – शानी मिसेस डिसूजा के नाम पत्र – अलका सरावगी
इकाई – II	काव्य साहित्य : जुही की कली – निराला मैं नीर भरी दुख की बदली – महादेवी वर्मा कालिदास – नागार्जुन रोटी और संसद – धूमिल धार – अरुण कमल
इकाई – III	साहित्येतर पाठ्यक्रम : संवाद कौशल, सूत्रसंचालन, समूह चर्चा हिंदी कंप्यूटिंग : यूनिकोड (Unicode) की जानकारी। इंटरनेट की सामान्य जानकारी हिंदी सॉफ्टवेयर की जानकारी।

(उपर्युक्त सभी इकाइयों से आलोचनात्मक प्रश्न पूछे जाएँगे। पाँचवा प्रश्न ससंदर्भ व्याख्या का पूछा जाएगा जिसमें प्रथम दो इकाइयों से ससंदर्भ व्याख्या के लिए प्रश्न पूछा जाएगा।)

अंक विभाजन – पूर्णांक : 100

आंतरिक मूल्यांकन – 30 (लघुत्तरी परीक्षा – 15, शोध परियोजना – 10, प्रस्तुतिकरण – 05)

सत्रांत परीक्षा – 70

आलोचनात्मक प्रश्न : 4 x 15 = 60

ससंदर्भ व्याख्या : 2 x 05 = 10

संदर्भ ग्रंथ सूची :

1. साहित्य विविधा – संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, पुणे, परिदृश्य प्रकाशन, मुंबई
2. कंप्यूटर व सूचना प्रौद्योगिकी शब्दकोश – विनोद कुमार मिश्र
3. समाचार एवं प्रारूप लेखन – डॉ. रामप्रकाश, डॉ. दिनेशकुमार गुप्त
4. प्रयोजनमूलक हिंदी अधुनातन आयाम – डॉ. अंबादास देशमुख
5. कविता की संगत – विजय कुमार

प्रथम वर्ष कला (F.Y.B.A.) (सामान्य)

(द्वितीय अयन)

पाठ्यचर्या : वैकल्पिक हिंदी प्रश्नपत्र – 1 B

3 कर्मांक

उद्देश्य :

1. छात्रों को हिंदी काव्य साहित्य का परिचय देना।
2. हिंदी कहानी साहित्य से अवगत कराना।
3. निबंध लेखन कौशल को विकसित करना।
4. छात्रों को विज्ञापन लेखन से अवगत करना।

	द्वितीय सत्र/द्वितीय अयन
इकाई- I	काव्य साहित्य : आदमी को प्यास लगती है – ज्ञानेंद्रपति रोशनी के उस पार – ओमप्रकाश वाल्मीकि उतनी दूर मत ब्याहना बाबा – निर्मला पुत्तुल किताबें झाँकती हैं – गुलज़ार नींव की ईंट हो तुम दीदी – उदयप्रकाश
इकाई –II	गद्य विधा : सरजू भैया – रामवृक्ष बेनीपुरी (रेखाचित्र) भय – आ. रामचंद्र शुक्ल (निबंध) एक बूंद सहसा उछली – अज्ञेय (यात्रा वर्णन) अकबरी लौटा – अन्नपूर्णानंद वर्मा (व्यंग्य) प्रतिशोध – डॉ. रामकुमार वर्मा (एकांकी)
इकाई –III	एकांकी तथा साहित्येतर पाठ्यक्रम : लेखन कौशल : स्ववृत्त लेखन निबंध लेखन विज्ञापन लेखन : (दैनिक पत्र-पत्रिकाओं के लिए) वाक्य शुद्धिकरण (संज्ञा, सर्वनाम, विशेषण क्रिया के संबंध में)

(उपर्युक्त सभी इकाइयों से आलोचनात्मक प्रश्न पूछे जाएँगे। पाँचवा प्रश्न ससंदर्भ व्याख्या का पूछा जाएगा जिसमें प्रथम दो इकाइयों से ससंदर्भ व्याख्या के लिए प्रश्न पूछा जाएगा।)

अंक विभाजन – पूर्णांक : 100

आंतरिक मूल्यांकन – 30 (लघुत्तरी परीक्षा – 15, शोध परियोजना – 10, प्रस्तुतिकरण – 05)

सत्रांत परीक्षा – 70

आलोचनात्मक प्रश्न : 4 x 15 = 60

ससंदर्भ व्याख्या : 2 x 05 = 10

संदर्भ ग्रंथ ग्रंथ :

1. साहित्य विविधा – संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, पुणे, परिदृश्य प्रकाशन, मुंबई
2. चौथा खम्भा प्राइवेट लिमिटेड – दिलीप मंडल
3. प्रयोजनमूलक हिंदी – डॉ. रवींद्रनाथ श्रीवास्तव
4. प्रयोजनमूलक हिंदी अधुनातन आयाम – डॉ. अंबादास देशमुख
5. विशुद्ध हिंदी भाषा – डॉ. सदानंद भोसले
6. देवनागरी लिपि – संपा. डॉ. शहाबुद्दीन शेख

प्रथम वर्ष वाणिज्य (F.Y.B.com) (सामान्य)

(प्रथम अयन)

पाठ्यचर्या : वैकल्पिक हिंदी प्रश्नपत्र – 1 A

3 कर्मांक

उद्देश्य :

1. छात्रों को हिंदी काव्य साहित्य का परिचय देना।
2. हिंदी कहानी साहित्य से अवगत कराना।
3. हिंदी भाषा द्वारा संवाद कौशल विकसित करना।
4. मौलिक लेखन की ओर रुझान बढ़ाना।
5. विज्ञापन लेखन कौशल विकसित करना।
6. हिंदी कंप्यूटिंग का परिचय देना।

	प्रथम सत्र/प्रथम अयन
इकाई – I	काव्य साहित्य : स्वदेश के प्रति – सुभद्राकुमारी चौहान हो गई पीर – दुष्यंत कुमार पिता के जूते – अशोक वाजपेयी पेड़ की पुकार – शंभुनाथ सिंह उदास तुम – धर्मवीर भारती
इकाई – II	कहानी साहित्य : भोलराम का जीव – हरिशंकर परसाई उसने कहा था – चंद्रधर शर्मा गुलेरी व्यथा का सरगम् – अमृतराय जंगल दाह – स्वयंप्रकाश सबसे कठिन काम – मधु कांकरिया
इकाई – III	साहित्येतर पाठ्यक्रम : अंक तथा गणितीय चिह्नों का देवनागरी में लेखन हिंदी कंप्यूटिंग : यूनिकोड (Unicode) की जानकारी। इंटरनेट की सामान्य जानकारी हिंदी सॉफ्टवेयर की जानकारी।

(उपर्युक्त सभी इकाइयों से आलोचनात्मक प्रश्न पूछे जाएंगे। पाँचवा प्रश्न ससंदर्भ व्याख्या का पूछा जाएगा जिसमें प्रथम दो इकाइयों से ससंदर्भ व्याख्या के लिए प्रश्न पूछा जाएगा।)

अंक विभाजन – पूर्णांक : 100

आंतरिक मूल्यांकन – 30 (लघुत्तरी परीक्षा – 15, शोध परियोजना – 10, प्रस्तुतिकरण – 05)

सत्रांत परीक्षा – 70

आलोचनात्मक प्रश्न : 4 x 15 = 60

ससंदर्भ व्याख्या : 2 x 05 = 10

संदर्भ ग्रंथ सूची :

1. साहित्य सौरभ – संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, पुणे, परिदृश्य प्रकाशन, मुंबई
2. कंप्यूटर व सूचना प्रौद्योगिकी शब्दकोश – विनोद कुमार मिश्र
3. हिंदी कहानी का विकास – मधुरेश
4. आधुनिक कविता यात्रा – रामस्वरूप चतुर्वेदी
5. कम्प्यूटरी सूचना प्रणाली विकास – राम बन्सल
6. जनसंचारिकी सिद्धांत और अनुप्रयोग – डॉ. राम लखन मीणा

प्रथम वर्ष वाणिज्य (F.Y.B.com) (सामान्य)
(द्वितीय अयन)

पाठ्यचर्या : वैकल्पिक हिंदी प्रश्नपत्र – 1 B

3 कर्मांक

1. छात्रों को हिंदी काव्य साहित्य का परिचय देना।
2. हिंदी कहानी साहित्य से अवगत कराना।
3. हिंदी भाषा द्वारा संवाद कौशल विकसित करना।
4. विज्ञापन लेखन के प्रकारों को अवगत करना।
5. अनुवाद का स्वरूप से अवगत करना।
6. पारिभाषिक शब्दावली से अवगत कराना।

	द्वितीय सत्र/द्वितीय अयन
इकाई – I	काव्य साहित्य : अब की लौटा तो – कुंवरनारायण कलगी बाजरे की – अज्ञेय माँझी का पूल – केदारनाथ सिंह बापू के प्रति – सुमित्रानंदन पंत माँ के लिए एक कविता – कात्यायनी
इकाई – II	कहानी साहित्य : पहलवान की ढोलक – फणीश्वरनाथ रेणु सलाम – ओमप्रकाश वाल्मीकि बच्चे का सपना – शेखर जोशी बोलनेवाली औरत – ममता कालिया चिट्ठी – अखिलेश
इकाई – III	साहित्येतर पाठ्यक्रम : संवाद कौशल अनुवाद: स्वरूप, परिभाषा, व्यावहारिक पक्ष पारिभाषिक (कार्यालयीन) 100 शब्दावली।

(उपर्युक्त सभी इकाइयों से आलोचनात्मक प्रश्न पूछे जाएँगे। पाँचवा प्रश्न ससंदर्भ व्याख्या का पूछा जाएगा जिसमें प्रथम दो इकाइयों से ससंदर्भ व्याख्या के लिए प्रश्न पूछा जाएगा।)

अंक विभाजन – पूर्णांक : 100

आंतरिक मूल्यांकन – 30 (लघुत्तरी परीक्षा – 15, शोध परियोजना – 10, प्रस्तुतिकरण – 05)

सत्रांत परीक्षा – 70

आलोचनात्मक प्रश्न : 4 x 15 = 60

ससंदर्भ व्याख्या : 2 x 05 = 10

संदर्भ ग्रंथ सूची :

1. साहित्य सौरभ – संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, पुणे, परिदृश्य प्रकाशन, मुंबई
2. अनुवाद : स्वरूप और क्षेत्र – डॉ. गोपाल राय
3. प्रिंट मीडिया लेखन – हरीश हरोड़ा
4. राजभाषा विविधा – डॉ. माणिक मृगेश
5. व्यावहारिक हिंदी – रविन्द्रनाथ श्रीवास्तव, भोलानाथ तिवारी
6. भाषा शिक्षण – डॉ. रवीन्द्रनाथ श्रीवास्तव
7. फणीश्वरनाथ रेणु के कालजयी चरित्र : मनोविश्लेषण – विजय अवस्थी

Faculty of Science

Revised Syllabus

For

B. Sc.
(Physics)

From Academic Year 2013-2014

Structure of Syllabus

UNIVERSITY OF PUNE

Proposed Structure of B.Sc. (Physics) Syllabus

1) Preamble:

The systematic and planned curricula from first year to the third year shall motivate and encourage the students for pursuing higher studies in Physics and for becoming an entrepreneur.

Objectives:

- To provide in depth knowledge of scientific and technological aspects of Physics
- To familiarize with current and recent scientific and technological developments
- To enrich knowledge through problem solving, hand on activities, study visits, projects etc.
- To train students in skills related to research, education, industry, and market.
- To create foundation for research and development in Electronics
- To develop analytical abilities towards real world problems
- To help students build-up a progressive and successful career in Physics

2) Eligibility:

- 1 **First Year B.Sc.:** Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc.:** Keeping terms of First Year of B. Sc. with Physics as one of the subjects. Other students if they fulfil the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.
- 3 **Third Year B. Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with Physics as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

F.Y. B. Sc.

(From Academic Year 2013-2014)

(To be implemented from Academic Year 2013-14)

Paper	Title
Paper I	Section I (For Term 1): Mechanics
	Section II (For Term 2): Heat and Thermodynamics
Paper II	Section I (For Term 1): Physics Principles and Applications
	Section II (For Term 2): Electromagnetics
Paper III	(For Term1 and Term 2): Practical

For each theory course: 36 Lectures per term/2 Credits per term

For practical course: 20 practicals/4Credits

S. Y. B. Sc.
(Semester Pattern)
(From Academic Year 2014-2015)

Semester I

Paper	Title
Paper I (PHY211)	Mathematical Methods in Physics I
Paper II (PHY 212)	Electronics I /Instrumentation

Semester II

Paper	Title
Paper I (PHY221)	Oscillations, Waves and Sound
Paper II (PHY 222)	Optics

Practical Course (Annual)

Paper III (PHY 223) (Annual)	Practical

T. Y. B. Sc. (Physics)
(Semester Pattern)

(From Academic Year 2015-2016)

Theory Courses (Semester)	
Semester III	Semester IV
PH331: Mathematical Methods in Physics II	PH341: Solid State Physics
PH332: Classical Electrodynamics	PH342: Quantum Mechanics
PH333: Classical Mechanics	PH343: Thermodynamics and Statistical Physics
PH334: Atomic and Molecular Physics	PH344: Nuclear Physics
PH335: Computational Physics	PH345: Electronics II /A

PH336: Elective I (Select any One)	PH346: Elective II (Select any One)
A: Astronomy and Astrophysics	F: Renewable Energy Sources
B: Elements of Materials Science	G: Physics of Nano materials
C: Motion Picture Physics	H: Microcontrollers
D: Biophysics	I: Electro Acoustics and Entertainment Electronics
E: Medical Electronics	J: Lasers
	K: Methods of Experimental Physics
Practical Courses (Annual)	
PH347: Laboratory Course I	
Phy348: Laboratory Course II	
PH349: Laboratory Course III (Project)	

Examination:

A) Pattern of Examination:

i) F. Y. B. Sc.

- There shall be university examination at the end of the academic year for 80 marks for each theory paper.
- 20 marks for each paper are allotted to the comprehensive internal assessment of the student by the respective teacher, teaching the course. The teacher shall evaluate the performance of the student for 10 marks in each term; on the basis of written tests. Ordinarily written tests shall consist of (i) multiple choice questions, (ii) True/False, (iii) basic definitions, (iv) tricky computational problems involving minimal calculations. Student is asked to answer 20 questions in 40 minutes. Each question will be of $\frac{1}{2}$ marks. In the same classroom setup, different set of equivalent sets of question papers may be experimented. It will be preferred to have two such tests in each term, per course (one at the middle of the term and one at the end of the term) and average (or best of the two tests) be considered as internal marks out of 10 for that term. Internal Test shall cover the entire syllabus. If teacher prefers to have one test only, it shall be at the end of the term covering the entire syllabus).
- Practical examination be conducted by respective colleges at the end of the academic year 80 marks be assigned to practicals and 20 marks for internal examination, journal attendance (Journal 10 marks, Oral 10 marks).

ii) S. Y. B. Sc. and T. Y. B. Sc.

- (a) There shall be university examination at the end of semester for 40 marks for each theory paper.
- (b) 10 marks for each paper are allotted to the comprehensive internal assessment of the student by the respective teacher, teaching the course. Pattern of internal assessment shall be on the lines of F.Y.B. Sc.
- (c) University Practical examination be conducted at the end of the academic year 80 marks be assigned to practicals and 20 marks for internal examination, journal attendance (Journal 10 marks, Oral 10 marks).

For practical examination:

- (1) At least one examiner should be external
- (2) Certified journals be compulsory
- (3) There shall be two experts for all subjects.
- (4) (a) At T. Y. B. Sc. level, it is preferred to have project work in lieu of one of the practical course.
(b) Blue print for Model Question Paper: Each Board of Studies shall frame at least 5 sets of model theory papers and 10 sets of model question set for internal assessment.

II) Pattern of the Question paper:

For theory paper (University examination) shall be as follows.

F. Y. B. Sc. (80 Marks) (Time Allotted: 3 hrs)

- Q1. 16 marks for 8 sub-questions, each sub-question for two marks. Sub-questions shall be answerable in two to four lines and shall be based on complete syllabus.
- Q2. and Q3. Student shall attempt four out of six questions. Each short answer type question shall carry four marks and be answerable in 6 to 8 lines.
- Q4. Student shall attempt 2 out of 4 long answer type questions. Each question will be for 8 marks and be answerable in 12 to 16 lines.
- Q5. Long easy type question for 16 marks. Student shall attempt one out of two questions.

OR

Q5. Shall be on the pattern of question 4.

(Question paper of a particular course should contain minimum of 30% weightage to problems)

S. Y. B. Sc. and T. Y. B. Sc. (Theory) University Question Paper Pattern:

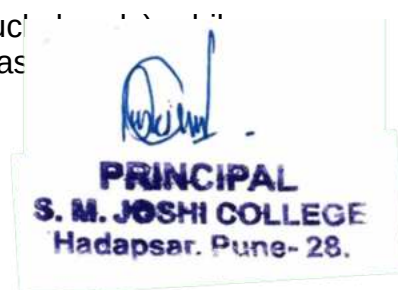
(40 marks, Time allotted: 2 hrs)

- Q1. 10 sub-question each for 1 mark. Sub-questions be answerable within 2 to 4 lines and shall be based on complete syllabus. All sub-questions are compulsory.
- Q2 and Q3: (10 Marks for each questions) Three sub questions. Students have to attempt any two questions.
- Q4. Long Essay type question for 8 marks and one question of two marks.

B) Standard of Passing: 40 % marks

C) ATKT Rules

- (i) Students shall clear 8 heads of passing (out of 12 subjects) going from F. Y. B. Sc. to S.Y.B.Sc. However he must pass 2 Sc. subjects while going to T. Y. B. Sc.



- (ii) Student shall clear 12 heads of passing (out of 20 such heads) while going from S. Y. B. Sc. to T. Y. B. Sc. (Practical course of S. Y. B. Sc. will be equivalent to 2 heads of passing)
- D) Award of Class: As per University norms.
- E) External Students: Not applicable
- F) Setting of question paper/Pattern of Question paper: As mentioned above
- 6) Structure of the Course:
- a) Compulsory paper: a) At F.Y.B.Sc. and S.Y.B.Sc. all papers are compulsory and at T.Y.B.Sc. 8 papers are compulsory and one paper is optional.
 - b) Optional papers: At T.Y.B.Sc. one paper per semester is optional.
 - c) Question papers and papers etc.: As mentioned above
 - d) Medium of Instructions: English
- 7) Equivalence of previous syllabus along with propose syllabus: The papers are similar so no equivalence is required at B. Sc. level.
- 8) University terms: 6 terms
- 9) Subject-wise detailed syllabus: Attached with this format.
- 10) Recommended books: Given in the syllabus at the end of each course.
- 11) Qualification of teachers: As per UGC regulations.

**F. Y. B. Sc.
Term -I**

Physics Paper I: Section I: Mechanics

Lectures: 36

Credits: 2

Learning Outcomes:

On successful completion of this course students will be able to do the following:

1. Demonstrate an understanding of Newton's laws and applying them in calculations of the motion of simple systems.
2. Use the free body diagrams to analyse the forces on the object.
3. Understand the concepts of energy, work, power, the concepts of conservation of energy and be able to perform calculations using them.
4. Understand the concepts of elasticity and be able to perform calculations using them.
5. Understand the concepts of surface tension and viscosity and be able to perform calculations using them.
6. Use of Bernoulli's theorem in real life problems.
7. Demonstrate quantitative problem solving skills in all the topics covered.

Syllabus:

1. Newton's laws of motion

(6 Lectures)

- 1.1 Newton's First and Second Law and their explanation
- 1.2 Working with Newton's First and Second Law
- 1.3 Newton's Third Law of motion and its explanation
- 1.4 Various types of forces in nature (explanation) and concept of field
- 1.5 Frame of reference (Inertial, Non-inertial)
- 1.6 Pseudo Forces (e.g. Centrifugal Force)

2. Work and Energy

(8 Lectures)

- 2.1 Kinetic Energy
- 2.2 Work and Work-Energy Theorem
- 2.3 Calculation of Work done with
 - i) Constant Force
 - ii) Variable ForceIllustration
- 2.4 Conservative and Non-conservative Forces
- 2.5 Potential energy and conservation of Mechanical energy
- 2.6 Change in potential energy in rigid body motion
Mass-energy equivalence

3. Elasticity

(8 Lectures)

- 3.1 Hook's law and coefficient of elasticity
- 3.2 Young's modulus, Bulk modulus and Modulus of rigidity
- 3.3 Work done during longitudinal strain, volume strain, and shearing strain
- 3.4 Poisson's ratio
- 3.5 Relation between three elastic moduli (Y , η , K)
- 3.6 Determination of Y of rectangular thin bar loaded at the centre
- 3.7 Torsional oscillations
Torsional rigidity of a wire, to determine η by torsional oscillations

4. Surface Tension

(5 Lectures)

- 4.1 Surface Tension, Angle of Contact, Capillary Rise Method
- 4.2 Rise of liquid in a conical capillary tube
- 4.3 Energy required to raise a liquid in capillary tube



- 4.4 Factors affecting surface tension
- 4.5 Jeager's Method for Determination of surface tension
- 4.6 Applications of Surface Tension

5. Viscosity and Fluid Mechanics

(9 Lectures)

- 5.1 Concept of Viscous Forces and Viscosity
- 5.2 Pressure in a fluid and buoyancy
- 5.3 Pascal's law
- 5.4 Atmospheric Pressure and Barometer
- 5.5 Pressure difference and Buoyant Force in accelerating fluids
- 5.6 Steady and Turbulent Flow, Reynolds's number
- 5.8 Equation of continuity
- 5.9 Bernoulli's Principle
- 5.10 Application of Bernoulli's equation
 - i) Speed of Efflux
 - ii) Ventury meter
 - iii) Aspirator Pump
 - iv) Change of plane of motion of a spinning ball.

Reference Books:

1. University Physics: Sears and Zeemansky, XIth edition, Pearson education
2. Concepts of Physics: H.C. Varma, Bharati Bhavan Publishers
3. Problems in Physics: P.K. Srivastava, Wiley Eastern Ltd.
4. Applied Fluid Mechanics: Mott Robert, Pearson Benjamin Cummir, VI Edition, Pearson Education/Prentice Hall International, New Delhi
5. Properties of Matter: D. S. Mathur, Shamlal Chritable Trust New Delhi
6. Mechanics: D.S Mathur, S Chand and Company New Delhi-5.



F. Y. B. Sc.
Term –II

Physics Paper I: Section II: Heat and Thermodynamics

Lectures: 36

Credits: 2

Learning Outcomes:

After successfully completing this course, the student will be able to do the following:

1. Describe the properties of and relationships between the thermodynamic properties of a pure substance.
2. Describe the ideal gas equation and its limitations.
3. Describe the real gas equation.
4. Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process.
5. Analyse the heat engines and calculate thermal efficiency.
6. Analyze the refrigerators, heat pumps and calculate coefficient of performance.
7. Understand property 'entropy' and derive some thermo dynamical relations using entropy concept.
8. Understand the types of thermometers and their usage.

Syllabus

1. Equation of state

(8 lectures)

- 1.1 Equations of state
- 1.2 Andrew's experiment
- 1.3 Amagat's experiment
- 1.4 Van der Waals' equation of state
- 1.5 Critical constants
- 1.6 Reduced equation of state
- 1.7 Joule-Thomson porous plug experiment

2. Concepts of Thermodynamics

(8 lectures)

- 2.1 Thermodynamic state of a system and Zeroth law of Thermodynamics
- 2.2 Thermodynamic Equilibrium
- 2.3 Adiabatic and isothermal changes
- 2.4 Work done during isothermal changes
- 2.5 Adiabatic relations for perfect gas
- 2.6 Work done during adiabatic change
- 2.7 Indicator Diagram
- 2.8 First law of Thermodynamics
- 2.9 Reversible and Irreversible processes

3. Applied Thermodynamics

(8 lectures)

- 3.1 Conversion of Heat into Work and its converse
- 3.2 Carnot's Cycle and Carnot's Heat Engine and its efficiency
- 3.3 Second law of Thermodynamics
- 3.4 Concept of Entropy
- 3.5 Temperature-Entropy Diagram
- 3.6 T-dS Equation
- 3.7 Clausius-Clapeyron Latent heat equations

4. Heat Transfer Mechanisms

(8 lectures)

- 4.1 Heat Engines
 - i. Otto cycle and its efficiency
 - ii. Diesel cycle and its efficiency



4.2 Refrigerators:

- i. General Principle and Coefficient of performance of refrigerator
- ii. The Carnot Refrigerator
- iii. Simple structure of vapour compression refrigerator

4.3 Air conditioning: principle and its applications

5. Thermometry

(4 lectures)

5.1 Temperature Scales: Centigrade, Fahrenheit and Kelvin scale

5.2 Principle, construction and working of following thermometers

- i. Liquid and Gas Thermometers
- ii. Resistive Type Thermometer
- iii. Thermocouple as thermometer
- iv. Pyre heliometer

Reference Books:

1. Physics: 4th Edition, Volume I, Resnick/Halliday/Krane JOHN WILEY & SONS (SEA) PTE LTD
2. Concept of Physics: H.C. Verma, Bharati Bhavan Publishers
3. Heat and Thermodynamics: Brijlal, N. Subrahmanyam, S. Chand & Company Ltd, New Delhi
4. Heat and Thermodynamics: Mark. W. Zemansky, Richard H. Dittman, Seventh Edition, McGraw-Hill International Editions
5. Thermodynamics and Statistical Physics: J.K. Sharma, K.K. Sarkar, Himalaya Publishing House
6. Thermal Physics (Heat & Thermodynamics): A.B. Gupta, H.P. Roy Books and Allied (P) Ltd, Calcutta.

F. Y. B. Sc.

Term I

Physics Paper II: Section I: Physics Principles and Applications

Lectures: 36

Credits: 2

Learning Outcomes:

On successful completion of this course students will be able to do the following:

1. To demonstrate an understanding of electromagnetic waves and its spectrum.
2. Understand the types and sources of electromagnetic waves and applications.
3. To understand the general structure of atom, spectrum of hydrogen atom.
4. To understand the atomic excitation and LASER principles.
5. To understand the bonding mechanism in molecules and rotational and vibrational energy levels of diatomic molecules.
6. To demonstrate quantitative problem solving skills in all the topics covered.

Syllabus:

1. Physics of Atoms (12 Lectures)

1. The concept of atom (Atomic Models: Thompson and Rutherford)
2. Atomic Spectra
3. Bohr Theory
4. Hydrogen atom Spectra
5. Frank Hertz experiment
6. The LASER
Absorption, Spontaneous Emission, and Stimulated Emission, Population Inversion and Laser Action, Applications of Lasers

2. Physics of Molecules (10 Lectures)

1. Bonding Mechanisms: A Survey
 - i. Ionic Bonds
 - ii. Covalent Bonds
 - iii. Van der Waals Bonds
 - iv. The Hydrogen Bond
 - v. Metallic Bond
2. Variation of potential energy with inter-atomic distance
3. Concept of Rotational and vibrational energy levels of diatomic molecule

3. Electromagnetic Waves (14 Lectures)

1. Historical Perspective of Electromagnetic Waves
2. Production of electromagnetic waves : Hertz experiment
3. Electromagnetic spectrum
4. Planck hypothesis of photons (Concept only)
5. Sources of electromagnetic waves : Radio waves, Microwaves, Infrared, Visible light, Ultraviolet, X-rays, Gamma rays
6. Applications
 - i. microwave oven
 - ii. RADAR
 - iii. Pyro electric thermometer
 - iv. X-ray radiography and CT Scan
 - v. Solar cell

References

1. Concepts of Modern Physics: A Beiser (6th ed., McGraw Hill, 2003)
2. Modern Physics: Raymond A. Serway, Clement J. Moses, Curt A. Moyer
3. Sears and Zemansky's University Physics: H.D. Young R. A. Freedman, Sandin (11th Ed. Pearson Education)
4. Nanotechnology : Principles and Practices: S. K. Kulkarni, Capital Publishing Company.



**F. Y. B. Sc.
Term II**

Physics Paper II: Section II: Electromagnetics

Lectures: 36

Credits: 2

Learning Outcomes:

On successful completion of this course students will be able to do the following:

1. Demonstrate an understanding of the electric force, field and potential, and related concepts, for stationary charges.
2. Calculate electrostatic field and potential of simple charge distributions using Coulomb's law and Gauss's law.
3. Demonstrate an understanding of the dielectric and effect on dielectric due to electric field.
4. Demonstrate an understanding of the magnetic field for steady currents using Biot-Savart and Ampere's laws.
5. Demonstrate an understanding of magnetization of materials.
6. Demonstrate quantitative problem solving skills in all the topics covered.

Syllabus

1. Electrostatics

(9 Lectures)

1. Revision of Coulomb's law
2. Superposition principle
3. Electric field due to an electric dipole, line and disc
4. Revision of Gauss's law
5. Coulomb's law from Gauss's law
6. Gauss's law applications in Cylindrical, planar and spherical symmetry

2. Dielectrics

(9 Lectures)

1. Electric Dipole
2. Electric dipole and dipole moment
3. Electric potential and intensity at any point due to dipole
4. Torque on a dipole placed in an electric field
5. Polar and non-polar molecules
6. Electric polarization of dielectric material
7. Gauss' law in dielectric
8. Electric vectors and relation between them

3. Magneto statics

(9 Lectures)

1. Revision of Biot-Savart's law with examples
2. Amperes' law, e.g. Solenoid and Toroid
3. Gauss law for magnetism

4. Magnetic properties of materials

(9 Lectures)

1. Magnetic materials and Bohr magneton
2. Magnetization (M), magnetic intensity (H), magnetic induction (B), magnetic susceptibility and permeability
3. Relation between B, M and H
4. Hysteresis

References:

1. Fundamentals of Physics: 8th Edition, Halliday Resnik and Walker
2. Electromagnetics: B. B. Laud



**F. Y. B. Sc.
Term I and II**

Physics paper III: Practical

Total Practicals: 20

Credits: 4

Learning Outcomes:

After successfully completing this laboratory course, the students will be able to do the following:

1. Acquire technical and manipulative skills in using laboratory equipment, tools, and materials.
2. Demonstrate an ability to collect data through observation and/or experimentation and interpreting data.
3. Demonstrate an understanding of laboratory procedures including safety, and scientific methods.
4. Demonstrate a deeper understanding of abstract concepts and theories gained by experiencing and visualizing them as authentic phenomena.
5. Acquire the complementary skills of collaborative learning and teamwork in laboratory settings.

Syllabus:

1. Mechanics

1. Range and Least Count of Instruments, Measurements using various instruments and error analysis (Vernier caliper, screw gauge, travelling microscope, spectrometer etc.)
2. Determination MI of disc using ring
3. MI of Flywheel
4. Determination of coefficient of viscosity by Poiseulli's method
5. Determination of γ and n by flat spiral spring
6. Determination of γ by bending
7. Surface Tension by Jeager's method.

2. Heat and Thermodynamics

1. Interpretation of isothermal and adiabatic curves on PV diagrams (Theoretical). Theoretical study of Carnot's cycle by drawing graphs of isothermal and adiabatic curves.
2. Temperature coefficient of resistance
3. Study of thermocouple and determination of inversion temperature
4. Thermal conductivity by Lee's method
5. Specific heat of graphite

3. Light

1. Study of spectrometer and determination of angle of prism
2. Spectrometer calibration. Determination of refractive indices of different colours and plotting the graph of refractive index vs wavelength.
3. Study of total internal reflection using LASER
4. Study of polarization of light by reflection
5. Determination of wavelength of LASER light by plane diffraction grating or cylindrical obstacle.

4. Electricity and magnetism

1. Charging and discharging of a capacitor



2. Study of LR circuit
3. Study of LCR series circuit
4. Study of Kirchhoff's laws
5. Diode characteristics
6. Study of millimetres (all AC, DC ranges, Least Count)
7. Determination of frequency of AC mains

Students have to perform minimum three experiments from each section and total sixteen experiments. Students can perform any two experiments from Computer Aided experiments in place of any two experiments in above four sections.

Additional Activities

1. Demonstrations (Any four demonstrations equivalent to two experiments)
 1. Magnet –magnet interaction
 2. Collision by using balls
 3. Study of Signal generator using CRO (Sine, square wave signal, measurement of AC voltage, frequency)
 4. Demonstration of action potential
 5. Measurement of sound pressure level
2. Computer aided demonstrations (Using computer simulations or animations) (Any two demonstrations equivalent to two experiments)
 1. Coulomb's law
 2. Vectors : visualization of vectors
 3. Bohr's model
 4. Carnot engine, diesel engine
 5. Graphs and their slopes, and Kinematics graphs (using computer simulations)
3. Mini projects/Hand on activities (Any one equivalent to two experiments)
 1. Students should collect the information of at least five Physicists with their work.
 2. Students should carry out mini projects
4. Study tour (Equivalent to two experiments)
Students participated in study tour must submit a study tour report.

Students have to perform at least two additional activities out of four activities in addition to sixteen experiments mentioned above. Total Laboratory work with additional activities should be equivalent to twenty experiments.

University of Pune

**Three Year B. Sc. Degree Course in
Chemistry**



PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar. Pune- 28.

Title of the Course : B. Sc. Chemistry

F.Y.B.Sc. Chemistry

(To be implemented from Academic Year 2013-14)

AIMS AND OBJECTIVES

- F.Y. B. Sc. Chemistry syllabus has been revised as per BCUD directives.
- The content of the syllabus have been framed as per UGC norms.
- The students are expected to understand the fundamentals, principles, mathematical concepts and recent developments in the subject area.
- The practical course is in relevance to the theory courses to improve the understanding of the concepts.
- It would help in development of practical skills of the students.
- It is expected to inspire and boost interest of the students towards chemistry as the main subject.
- It would enable to develop interdisciplinary approach of the subjects for students opting for specialization in other subjects at latter stages of graduation.

2) Preamble:

The systematic and planned curricula from first year to the third year shall motivate and encourage the students for pursuing higher studies in various disciplines of Chemistry such as Physical, Inorganic, Organic, Analytical, Drug and Biochemistry. This curriculum also enable student to shoulder the responsibility as Chemist in chemical industry.

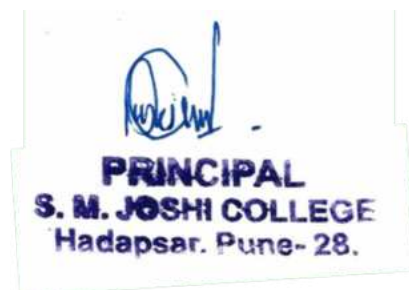
3) Introduction:

At **first year of under-graduation** The basic topics related to the fundamentals of chemistry covered. Since chemistry is an experimental subject, practical courses is intended to achieve the basic skills required for understanding the concepts and authenticating the basic laws and principles of Chemistry.

At **second year under-graduation**: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. Courses based on content of first year shall be introduced. For the development of vertical growth in the subject, advanced level topics are introduced so as to make the student mature enough to pursue the career in Chemistry.

At **third year under-graduation**: Theory papers in each semester deal with the further detailed studies of the various branches of Chemistry as well as some specialized topics like Industrial and Environmental Chemistry. Such a designing of course structure enables the student to understand fundamental as well as applied components that are pertinent to Chemistry. Also, practical courses are framed towards development of synthetic as well as analytical skills that are essential for academic and professional life.

Objectives:



- To provide indepth knowledge of scientific and technological aspects of Chemistry
- To familiarize with current and recent developments in Chemistry
- To enrich knowledge through programmes such as industrial visits, projects etc.
- To train students in skills related to Chemistry for academic and industrial requirement.
- To creat foundation for research and development in Chemistry
- To develop analytical abilities for independent thinking
- To help students build-up a progressive and successful career in Chemistry

4) Eligibility:

- 1 **First Year B.Sc.:** Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc.:** Keeping terms of First Year of B. Sc. with Chemistry as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.
- 3 **Third Year B. Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with Chemistry as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B. Sc. Chemistry

Pattern of Examination: Annual

Theory courses C-1: Chemistry Paper I: Annual
 C-2: Chemistry Paper II: Annual

Practical Course C-3: Chemistry Paper III: Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Paper-I (First term)	Physical and Inorganic Chemistry	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Paper -I (Second term)	Physical and Inorganic Chemistry	Three lectures/Week (Total 36 lectures per term)			


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Paper - II (First term)	Organic and Inorganic Chemistry	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Paper -II (Second term)	Organic and Inorganic Chemistry	Three lectures/Week (Total 36 lectures per term)			
Paper -III (First & Second Term)	Practical	10 Practicals of 4 lectures in each term (20 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2, 3 and 4	4 out of 6– short answer type questions; answerable in 8 – 10 lines
Question 5	4 out of 6 – problem type question; answerable in numerical or analytical fashion

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions.

Practical: one internal assessment test + marks for journals + attendance + activity.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 6 hours duration (2-Sessions). Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)


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- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed.

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III, papers shall be set by the University of Pune and assessment done at the respective colleges.

5G) Verification and Revaluation Rules:

As per university Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Chemistry Degree Program shall be three years.

a) Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 1 Practical (Annual)

b) Question Papers :

F.Y.B.Sc.Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

F.Y. B.Sc.Practical Paper:



University Examination	– 80 marks (at the end of 2 nd term)
Internal Examination	– 20 marks

c) **Medium of Instruction:** The medium of instruction for the course shall be **English**.

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Physical and Inorganic Chemistry	Paper I: Physical and Inorganic Chemistry
Paper II: Organic and Inorganic Chemistry	Paper II: Organic and Inorganic Chemistry
PaperIII: Practical	PaperIII: Practical

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Chemistry or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.


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Chemistry Paper - I
Physical and Inorganic Chemistry
Term - I

Chapter 1	States of Matter	08
Chapter 2	Surface Chemistry	08
Chapter 3	Chemical Mathematics	08
Chapter 4	Mole Concept, Stoichiometric and Numerical, Oxidation- reduction	12

Term - II

Chapter 4	Atomic Structure	12
Chapter 5	Chemical Thermodynamics	12
Chapter 6	Chemical Bonding	12


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Chemistry Paper - II

Organic and Inorganic Chemistry

Term - I

Chapter 1	Chemical Bonding in Organic Molecules	12
Chapter 2	Chemistry of Hydrocarbons	12
Chapter 3	Chemistry of s-block elements	12

Term - II

Chapter 4	Chemistry of Functional Groups	12
Chapter 5	Stereochemistry	12
Chapter 6	Chemistry of p-block elements	12



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Chemistry Paper - III

Practical Course

1. Physical Chemistry : 7 experiments
2. Inorganic Chemistry: 7 experiments
3. Organic Chemistry : 7 experiments



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PAPER - I: PHYSICAL & INORGANIC CHEMISTRY

TERM - I

Chapter 1: States of Matter

(08)

Introduction: States of matter and their properties.

Gaseous states: Significance of ideal and kinetic gas equation (no derivation), Real gases- Compressibility factor, van der Waal's equation of state, Isotherms of CO₂, critical constants, correlation between critical constants and van der Waal's constants.

Liquid state – Properties of liquids , Comparison between gaseous and solid state – Experimental determination of vapor pressure by isoteniscopic method and viscosity by Ostwald method, liquid crystals and their applications.

Aims & Objectives:

- I) This topic makes understanding of behavior of gases, ideal gas as a model system and its extension to real gases. The dependence of physical state on pressure, volume and temperature is being realized.
- II) The existence of liquid state, comparison of its properties with other states is to be perceived. Liquid crystal are essentials in all common and research devices and instruments hence they are introduced briefly.
- III) Student should be able to solve problems regarding van der Waal's and Critical constant and regarding P-V-T relations.
- IV)

Chapter 2: Surface Chemistry

(08)

Adsorption: Types of adsorption, adsorption isotherms, Freundlich isotherm, Langmuir isotherm, adsorption of gases on solids, adsorption of solutes on solids, applications of adsorption,

Catalysis : Phenomena of catalysis, types of catalysis-homogeneous and heterogeneous catalysis, gaseous reactions on solid surfaces.

Colloids: Definition and classification, preparation of emulsions, gels and sols, properties of suspensoids.

Aims & Objectives:

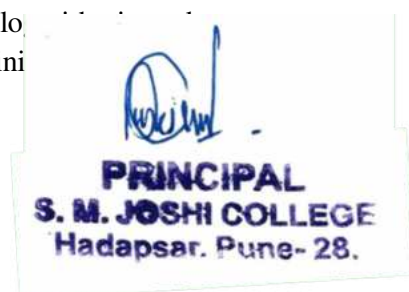
Theoretical basis of adsorption phenomena is integrated. Understanding dynamic nature of surface and its applications in catalysis and in dispersed phases will lead to new area of nanoscience.

Chapter 3: Chemical Mathematics

(08)

Functions and variables: Variables as function , variables used in chemistry

Derivative: Rules of differentiation, examples on derivatives of algebraic, logarithmic, exponential functions, partial differentiation, conditions for maxima and minima related to chemistry,



Integration: Rules of integration (algebraic, exponential and logarithmic functions), Integration –definite and indefinite, problems related to chemistry.

Graph: Plotting graphs of linear, exponential and logarithmic functions and their characteristics, sketching of s and p orbitals.

Aims & Objectives:

Mathematical background required for derivations, depictions and problem solving. This chapter strengthens these aspects.

Chapter 4: Mole Concept and Oxidation-reduction

(12)

Mole concept-Determination of mol. Weight by gram molecular volume relationship, problems based on mole concept. Methods of expressing concentrations, strength, normality, molarity, molality, %w/v, %v/v, ppm, standardization of solutions, primary & secondary standard substances, Preparation of standard solution of acids & bases, problems related to acid base titrations only.

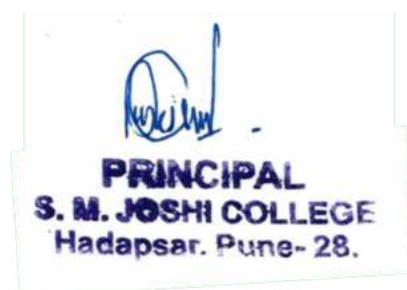
Oxidation & reduction-Definitions to related terms like oxidation, reduction, oxidizing agent, reducing agent, oxidation number, Balancing of redox reactions using oxidation number method & ion electron method, problems based one equivalent weight of oxidant & reductants.

Ref: 8, 9, 10 & 11

Aims and objectives-

Students should know

- 1) Mole concept
- 2) GMV relationship
- 3) Student should be able to solve problems based on GMV relationship.
- 4) Normality, Molarity, Normal solution, Molar solution, equivalent weight, ppm, %w/v, %v/v & related problems.
- 5) Standard solution, primary & secondary standard substances, standerdisation of solution & related problems.
- 6) Understand the concept of oxidation & reduction, oxidizing agent, reducing agent, redox reaction, oxidation number, Balance the equation by ion electron method & oxidation number method.
- 8) Calculation of Equivalent weight of oxidant & reductant.



Term - II

Chapter 4: Atomic Structure

(12)

Introduction, atomic spectrum of hydrogen, Bohr model of hydrogen atom-derivation of atomic radius and energy, energy level diagram of hydrogen atom, Failure of Classical mechanics- black body radiation, photoelectric effect, electron diffraction, atomic spectra, quantization of energy, de Broglie's hypothesis, Heisenberg's uncertainty principle (without proof), wave equation, time independent Schrödinger equation, hydrogen atom (expressions only), wave functions for s and p atomic orbitals,

Aims & Objective

Atom being most important micro particle in construction of matter, modern developments of its structure is presented. The quantization of energy and duality of matter in this context is elaborated. Schrodinger equation is the basis of quantum chemistry that has been introduced for simplest system hydrogen atom.

Chapter 5: Chemical Thermodynamics

(12)

Introduction, first law of thermodynamics and its limitations, Carnot cycle and efficiency, Entropy and second law of thermodynamics, entropy as a state function, Entropy change in isolated system, reversible and irreversible process, entropy change in ideal gases – isothermal, isobaric, isochoric processes, entropy change in physical transitions, entropy change in chemical reactions, statistical definition of entropy, absolute entropy, third law of thermodynamics

Aims & Objectives:

Natural changes are understood with the help of second and third laws of thermodynamics. These laws are presented with the help of state function entropy. Entropy changes in various processes and under various conditions have been discussed.

Chemical bonding

(12)

Attainment of stable configuration, Types of bonds ionic, covalent, co-ordinate & metallic, Types of overlaps: s-s, p-p, s-p, p-d, d-d and their examples, Formation of sigma & pi bonds, Theories of bonding- a) valence bond theory, b) Heitler London theory and c) Pauling Slater theory, Concept of hybridization: Definition & need of hybridization, steps involved in hybridization, explanation of covalency of atoms in the moles based on hybridization, types of hybridization involving s, p, & d orbitals.

Applications of hybridization geometries of molecules like

- i) BeH_2 ii) BF_3 iii) $[\text{MnCl}_4]^{2-}$ iv) $[\text{Ni}(\text{CN})_4]^{2-}$ v) $\text{Fe}(\text{CO})_5$
vi) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ vii) IF_7



VSEPR theory: Assumptions, need of theory, application of theory to explain geometry of irregular molecules

i) ClF_3 ii) Cl_2O iii) BrF_5 iii) TeCl_4 iv) XeO_3 v) XeOF_4

Ref. 12, 13, 14 & 15

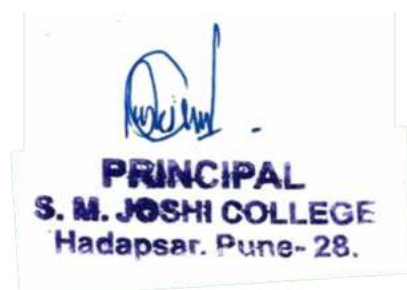
Aims and objectives:

Student should understand:

1. Basic principle of overlapping of atomic orbital with specific shapes and sizes
2. Fundamental concepts of theories of overlapping of atomic orbitals
3. Concept of hybridization and differentiation with overlap
4. Concept of different types valence shell electron pairs and their contribution in bonding
5. Application of non-bonded lone pairs in shape of molecule
6. Basic understanding of geometry and effect of lone pairs with examples

References books for Physical Chemistry

1. Physical Chemistry-P.W. Atkins ELBS, 5th edition
2. Principles of Physical Chemistry By S. H. Maron and C. F. Prutton ,4th edition
3. Physical Chemistry by S. Glasstone.
4. Physical Chemistry – Silbey Alberty, Bawendi, Wielely India .
5. Quantum Chemistry – I. Levine, Fifth edition, Prentice Hall-1999
6. Essentials of Physical Chemistry – Bahl, Tuli., S. Chand and Company Ltd.
7. Physical Chemistry of Surfaces – A. W. Adamson, John Wiley and sons , 5th edition.
8. Mathematical preparation of Physical Chemistry by F. Daniel, Mc Graw Hill Publication



PAPER - II: ORGANIC & INORGANIC CHEMISTRY

TERM - I

Chapter 1: Chemical Bonding, structure and reactivity of Organic Molecules (14)

Covalent bond, Hybridization - sp , sp^2 and sp^3 hybridization, Bond length, Bond angle, Bond energy, Inter and Intra molecular forces and their effects, Drawing organic molecules, zig-zag structures, Lewis structure and formal charge, Arrow pushing concept, Structural effects - Inductive effect, Steric effect, Resonance effect, Hyper-conjugation, Tautomerism, Applications of structural effects - Strength of acids and bases, pK_a and pK_b values of common organic acids and bases.

Ref. 1, 2, 3 & 4

Covalent bond, Hybridization - sp , sp^2 and sp^3 hybridization, Bond length, Bond angle, Bond energy, Inter and Intra molecular forces and their effects

Ref. 2: Pages 9 - 17, 20 - 29

Drawing organic molecules, zig-zag structures, Lewis structure and formal charge

Ref. 1: Pages 31 - 36, 116 - 127

Arrow pushing concept, Structural effects - Inductive effect, Steric effect, Resonance effect, Hyper-conjugation, Tautomerism, Applications of structural effects - Strength of acids and bases, pK_a and pK_b values of common organic acids and bases

Ref. 1: Relevant Pages between 181 - 201

Ref. 2: Pages 33 - 35, 200, 406 - 407

Ref. 3: Pages 20 - 28

Aims and Objectives:-

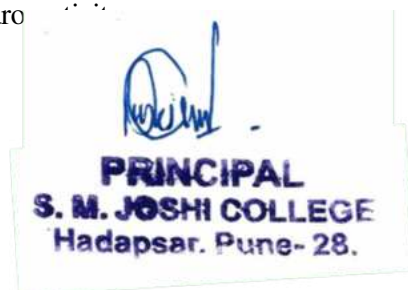
The student is expected to know:

1. The fundamental concepts which govern the structure, bonding, properties and reactivities of organic molecules such as covalent character, hybridization, bond angles, bond energies, bond polarities and shapes of molecules.
2. Drawing of organic molecules and arrow pushing concept.
3. Acid-base theories, pK_a / pK_b values for common organic acids and bases and factors affecting strength of acids and bases.
4. Structural effects and their applications in determining strength of acids and bases.

Chapter 2: Chemistry of Hydrocarbons (10)

Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions of-Alkanes, alkenes, alkynes and introduction to homocyclic and polycyclic aromatic hydrocarbons (benzene, naphthalene, anthracene), Huckel's rule of aromaticity.

Ref. 1, 2, 3 & 4



Alkanes - Introduction, Nomenclature, Physical properties, Preparations, Reactions of alkanes, Analysis of Alkanes

Ref. 2: Sec. 2.1 – 2.3, Sec. 3.6 – 3.12, Sec. 3.15 – 3.17, Sec. 3.18, 3.19, 3.30, 3.32, Sec. 3.34

Pages: 39 – 41, 86 – 94, 97 – 106, 118, 120, 122

Alkenes - Introduction, higher alkenes, Nomenclature, Physical properties, Preparations, Reactions of alkenes, Analysis of Alkenes

Ref. 2: Sec. 8.7 to 8.9, 8.11 to 8.13, Sec. 9.1, 9.2, 9.27

Pages: 282 – 285, 287 – 293, 309, 317 – 323, 360 - 362

Dienes - Structure & Properties, Conjugated dienes, Reactions of dienes, Analysis of dienes

Ref. 2: Sec. 11.17, 11.19, 11.21, 11.22, 11.26

Pages: 409 – 417, 421, 422

Alkynes: Introduction, Nomenclature, Physical properties, Preparation, Reactions & analysis of alkynes

Ref. 2: Sec. 12.1 - 12.8, 12.14

Pages: 425 – 434, 440

Introduction to homocyclic and polycyclic aromatic hydrocarbons (benzene, naphthalene, anthracene), Huckel's rule of aromaticity, Reactions of benzene, Naphthalene and Anthracene – Sulphonation, Nitration, Halogenation, Friedle Craft reactions

Ref. 2: Sec. 14.1 - 14.5, 14.10, 14.11, 14.12, Relevant pages from 15.1 – 15.21

Pages: 493 – 499, 504, 508 – 511, Relevant pages from 517 - 546

Aims and Objectives:-

The student is expected to know

1. The common and IUPAC names of alkanes, alkenes, alkynes and homocyclic, polycyclic aromatic hydrocarbons.
2. Methods of preparation and chemical reactions of alkanes, alkenes, alkynes and homocyclic, polycyclic aromatic hydrocarbons.
3. Application of Huckel's rule to different organic compounds to find out aromatic /non aromatic characters.
- 4.

Chapter 3: Chemistry of s-block Elements

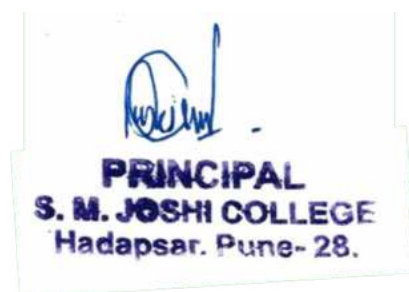
(12)

Recapitulation of periodic table, special position of hydrogen in the long form of the periodic table, properties of s-block elements w.r.t. electronic configuration, extraction, trends and properties, Introduction to crown ethers and cryptans, separation of s-block elements using crown ethers, Compounds of s-block elements: oxides, hydroxides, peroxides, superoxides, Application of s-block elements in industrial, biological and agricultural fields.

Ref. 6 & 9

Aims and objectives:

Student should learn



1. Skeleton of long form of periodic table
2. Quantum numbers
3. Shells, sub-shells, types of orbital and their shapes
4. Aufbau, Paulin's exclusion principle and Hund's rule
5. Block, group, periodic law and periodicity
6. Name, symbol, electronic configuration, trends and properties
7. Crown ether and cryptans
8. Separation of s-block elements with crown ethers
9. Compounds of s-block elements: oxides, hydroxides, peroxides and superoxides
10. Application of s-block elements: Industrial, biological and agricultural field

TERM - II

Chapter 4: Chemistry of functional groups

(14)

Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions of: Alkyl halides, alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids, amines.

Ref. 1, 2, 3 & 4

Alkyl halides: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of alkyl halides

Ref. 2: 5.3 – 5.7, 5.24

Pages: 167 – 174, 211

Alcohols: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of alcohols

Ref. 2: 6.1 – 6.5, 6.10, 6.11, 6.22

Pages: 211 – 218, 222 – 226, 243 – 244

Ethers: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of ethers

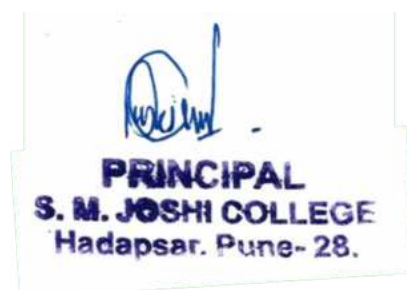
Ref. 2: 6.16 – 6.21, 6.23

Pages: 237 – 242, 244 - 245

Aldehydes and ketones: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of aldehydes and ketones

Ref. 2: 18.1 – 18.7, 18.20

Pages: 657 – 675, 697



Carboxylic acids: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of carboxylic acids

Ref. 2: 19.1 – 19.4, 19.6, 19.9, 19.21

Pages: 713 – 722, 725 – 728, 744 - 745

Amines: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of amines

Ref. 2: 22.1 – 22.5, 22.8, 23.1 – 23.3, 23.12, 23.19

Pages: 821 – 825, 828 – 830, 845 – 849, 866 – 869, 876 - 877

Phenols: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of phenols

Ref. 2: 24.1 – 24.3, 24.7, 24.8, 24.16

Pages: 889 – 893, 898 – 902, 912

Aims and Objectives:-

The student is expected to know

1. Structure, nomenclature, preparation and reactions of organic compounds.
2. The characteristic reactions of each functional group which can be used to identify and distinguish that compound from other compounds.
3. Predict the conversion of one functional group into other functional group involving one or more number of steps.
4. Conversion of the given compound into other compound containing more or less number of carbon atoms.
5. Prediction of possible products when reactants are given. In case there are more than one possible products, identify the major and minor products.
6. Suggest the possible reagents to bring about the given conversion.

Chapter 5: Stereochemistry

(10)

Concept of isomerism, types of isomers, representation of organic molecules (Projection formulae), conformational isomerism in alkanes (Ethane, propane and n-butane) with energy profile diagrams, Geometrical isomerism - Definition, conditions for geometrical isomers, physical and chemical properties, E/Z nomenclature of geometrical isomers, Optical isomers – Isomer number and tetrahedral carbon atom, chirality, optical isomerism with one asymmetric carbon atom, specific rotation, enantiomerism, R/S nomenclature

Ref. 1, 2, 3, 4, 11 and 12

Ref. 2: Relevant pages from Sec. 3.2 – 3.5, Sec.4.1 – 4.20, Sec. 8.6



Ref. 4: Relevant pages from Sec. 12.1 – 12.2 (Pages 318 – 321)

Ref. 11: Relevant pages from Sec. 1.1 – 1.3, 1.5 – 1.6, 1.8, 1.10 (Pages 1 – 51)

Aims and Objectives:-

The student is expected to know

1. Concept of isomerism, types of isomers and representation of organic molecules.
2. Conformational isomerism in alkanes with energy profile diagram.
3. Concept of geometrical isomerism with E/Z nomenclature.
4. Understanding of optical activity, isomer number, tetrahedral carbon atom, concept of chirality, enantiomerism, R/S nomenclature for single chiral centre.

Ref. 1, 2, 3 & 4

Chapter 6: Chemistry of p-block elements

(12)

Position of elements in periodic table, electronic configuration of elements trends in properties like atomic size, ionization potential, electronegativity, electron affinity, reactivity, oxidation states, anomalous behaviour of first member of each group.

Structure and properties of:

1. Borate
2. Halides of aluminum
3. Allotropes of carbon
4. Classification of silicates
5. Oxyacids of phosphorous and sulphur
6. Inter-halogen compounds

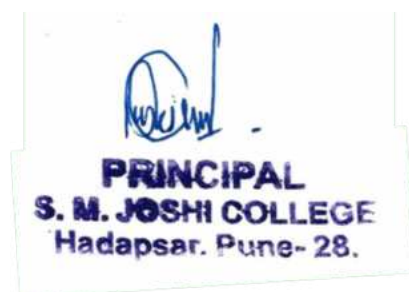
Ref. 6 – 359 to 633 (relevant pages)

A student know

- i) To write electronic configuration of any element.
- ii) To give reasons for anomalous behavior of first element of IIIA to VII A groups with other elements in the same group.
- iii) To know the exact position p-block elements in the long form of the periodic table.
- iv) To know the allotropes of carbon.
- v) Basic compounds of boron, aluminum, silicon
- vi) Concept of oxyanions, different than mineral acids, oxyacids of phosphorous & sulphur
- vii) Overlapping of atomic orbitals of halogens, interhalogen compounds

References

1. Organic Chemistry-Clayden, Oxford Uni. Press



2. Organic Chemistry-Morrison and Boyd, 6th Edn.
3. A guide book to Mechanism in Organic Chemistry-Peter Syke, 6th Edn.
4. Stereochemistry of Organic Compounds-Eliel Tata Mc Graw Hill 1989
5. Principles of Physical Chemistry by S.H. Marron & C.F. Pruton, 4th Edn.
6. Concise Inorganic Chemistry-J.D. Lee, 2nd Edition-Relevant pages.
7. Concept & model of Inorganic Chemistry-Douglas Mc Doniels, 3rd Edn.
8. New guide to Modern Valance Theory-G.I. Brown, 3rd Edn.
9. Inorganic Chemistry-James Hughey
10. General Chemistry - Raymand Chang



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F.Y.B. Sc.
Chemistry Paper - III
Practical Course

1. Physical Chemistry :	7 experiments
2. Inorganic Chemistry:	7 experiments
3. Organic Chemistry :	7 experiments

Physical Chemistry (minimum 7 experiments)

1. A) Preparation of lyophobic and lyophilic sols, B) purification of prepared sols by hydrolysis
2. To study the role of emulsifying agents in stabilizing the emulsion of different oils
3. Sketch the polar plots of s and p orbitals.
4. Plot the graph of following functions using excel a) exponential function b) logarithmic function c) linear functions
5. To determine the gas constant R in different units by eudiometer method.
6. To determine relative viscosity of given organic liquids by viscometer. (four liquids)
7. Investigate the adsorption of acetic acid by activated charcoal and test the validity of Freundlich /Langmuir adsorption isotherm.
8. To determine ΔH and ΔS for the following chemical reactions
 - i) $\text{Zn(s)} + \text{CuSO}_4 \text{ (aq)} \rightarrow \text{Cu(s)} + \text{ZnSO}_4 \text{ (aq)}$
 - ii) $3\text{Mg(s)} + 2\text{FeCl}_3 \text{ (aq)} \rightarrow 2\text{Fe(s)} + 3\text{MgCl}_2 \text{ (aq)}$

Inorganic Chemistry (minimum 7 experiments)

A. Compulsory experiments

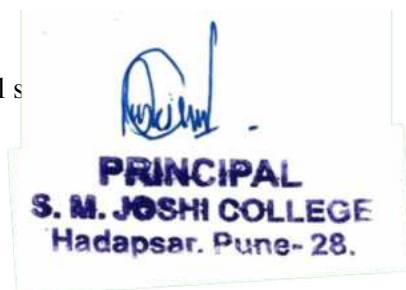
9. Determination of hardness of water from a given sample of water by EDTA method.
10. Analysis of alkali mixture by volumetric method.

B. Any Three Inorganic qualitative analyses without phosphate and borate removal.

- 11) Mixture-1 (water soluble)
- 12) Mixture-2 (water insoluble)
- 13) Mixture-3 (water insoluble)

C-Any one of the following

- 14) To standardize NaOH solution & hence find the strength of given HCl solution



15) To standardize KMnO_4 soln. & hence find strength of the given solution

D Any One of the following:

16) Estimation of % purity of a given sample of sodium chloride.

17) Analysis of brass

Organic Chemistry (Minimum 7 experiments)

18. Techniques (**any two**) - To be carried out on micro-scale

- i. Thin layer chromatography
- ii. Crystallization with M.P. and % yield of purified compound
- iii. Distillation with B.P. and % yield of purified compound
- iv. Sublimation with M.P. and % yield of purified compound

19. Estimations (**any one**)

- i. To determine amount of acetic acid in commercial vinegar
- ii. To determine amount of aspirin in APC tablets

20. Organic qualitative analysis of single organic compound at least one belonging from each type (**any four**)

Type, Preliminary tests, elements, functional group, physical constants

- a. Benzoic acid, Salicylic acid, Cinnamic acid, Phthalic acid, oxalic acid
 - b. β -Naphthol, α -naphthol
 - c. Aniline, N,N-Dimethyl aniline
 - d. Naphthalene, Thiourea, Urea, m-Dinitrobenzene, chloroform, ethyl methyl ketone, ethyl acetate, chlorobenzene
-

Pattern for F.Y.B.Sc. Practical Examination

Sr. No.	Experiment	Marks
1	Physical chemistry OR Inorganic Volumetric OR Organic Estimation	35
2	Inorganic Qualitative Analysis OR Organic Qualitative Analysis and Technique	35
3	Oral	10
4	Internal marks for Journal and Oral	20

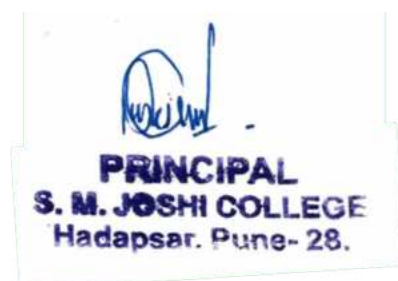
Note:-

1. At the time of Practical examination in a batch 50 % students must be given Physical Experiments.
3. For Organic Qualitative Analysis 20 marks & for technique 15 marks.
4. For Volumetric Analysis students must prepare standard solutions.
5. External printed material or practical book/ text book is allowed during the practical examination.


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University of Pune
Three Year B. Sc. Degree Course in
Botany

Principal Dr. Balkrishna N. Zaware
Chairman,
Board of Studies in Botany
University of Pune, Pune 411 007.



1) Title of the Course : B. Sc. Botany

F. Y. B. Sc. Botany

(To be implemented from Academic Year 2013-14)

2) Preamble:

The well organized curricula including basic as well as advanced concepts in the plant sciences from first year to the third year shall inspire the students for pursuing higher studies in Botany and for becoming an enterprenur and also enanble students to get employed in the Botany subject based indutries.

3) Introduction:

At **first year of under-graduation** the topics related to the fundamentals of Botany, including exposure to diversity in plant groups and industries related to plant sciences are covered. The practical course is aimed to equipe the students with skills required for plant identification, description, classification and also applications of these plants in various industries.

At **second year under-graduation**: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. courses based on content of first year shall be introduced.

At **third year under-graduation**: Theory papers in each semester shall deal with the further detailed studies of the various plant groups and other branches of Botany such as Plant Genetics, Plant Physiology, Molecular biology etc. The students will also learn about use of Statastics in the plant sciences which will be helpful to students during research in the Botany subject.

Objectives:

- To provide thorough knowledge about various plant groups from primitive to highly evolved
- To make the students aware of applications of different plants in various industries
- To highlight the potential of these studies to become an enterpruner
- To equippe the students with skills related to laboratory as well as field based studies
- To make the students aware about conservation and sustainable use of plants
- To creat foundation for further studies in Botany
- To address the socio-economical challenges related to plant



- To facilitate students for taking up and shaping a successful career in Botany

4) Eligibility:

- 1 **First Year B.Sc. :** A student who has passed the Higher Secondary School Certificate (10+2) Science stream with Biology or its equivalent examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc. :** Keeping terms of First Year of B. Sc. with Botany as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.
- 3 **Third Year B.Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with Botany as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B. Sc. Botany

Pattern of Examination: Annual

Theory courses	Botany Theory Paper I : Annual
	Botany Theory Paper II : Annual
Practical Course	Annual



Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Theory Paper I BO 111 (First term)	Plant Diversity	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper I BO 111 (Second term)	Plant Morphology and Anatomy	Three lectures/Week (Total 36 lectures per term)			
Theory Paper II BO 112 (First term)	Industrial Botany I	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper II BO 112 (Second term)	Industrial Botany II	Three lectures/Week (Total 36 lectures per term)			
Practical Paper III BO 113 (First & Second Term)	Practical	10 Practicals of 4 lectures in each term (20 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2 and 3	4 out of 6 - short answer type questions; answerable in 8 – 10 lines
Question 4	2 out of 4 – Descriptive answer type questions, answerable in 15 – 20 lines
Question 5	1 out of 2 – Descriptive answer type questions, answerable in 35 – 40 lines


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Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks in each term. The written test shall comprise objective type questions – Multiple Type Questions, True / False, Definitions, Answer in one or two line questions. There shall be 20 questions.

Practical: Regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Botany

Pattern of examination: Semester

Theory courses BO 211 and BO 212: Semester

BO 221 and BO 222: Semester

Practical Course: Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
BO 211	Theory Paper I	Four lectures/Week (Total 48 per semester)	04	16	20 *
BO 212	Theory Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
BO 221	Theory Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
BO 222	Theory Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Practical paper III (First & Second Semester)	Paper III	12 Practicals of 4 lectures in each Semester (24 practicals / year)	08	32	40**

* Subject to compulsory passing in external examination and get 20 marks out of 50



****Subject to compulsory passing in external examination and getting minimum 40 marks out of 100**

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests.
4. Internal marks for Practical Course should be a regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying equal marks as follows: The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks based on entire syllabus	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10-15 lines	5 marks each
Question 4	1 out of 2 sub-questions, each of 10 marks; long answer type questions (20-25lines)	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question. There shall be 20 questions. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination. One of the examiners will be external.


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Third Year B. Sc. Botany

Pattern of examination: Semester

Theory courses:

(Sem III: BO 331 – BO 336) : Semester

(Sem IV: BO 341 – BO 346) : Semester

Practical Course:

(BO 347 – BO 349) : Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
BO 331	Paper I	48	4	16	20*
BO 332	Paper II	48	4	16	20*
BO 333	Paper III	48	4	16	20*
BO 334	Paper IV	48	4	16	20*
BO 335	Paper V	48	4	16	20*
BO 336	Paper VI	48	4	16	20*
SEM IV					
BO 341	Paper I	48	4	16	20*
BO 342	Paper II	48	4	16	20*
BO 343	Paper III	48	4	16	20*
BO 344	Paper IV	48	4	16	20*
BO 345	Paper V	48	4	16	20*
BO 346	Paper VI	48	4	16	20*
Practical Papers					
BO 347 (Semester III & IV)	Practical Paper I	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
BO 348 (Semester III & IV)	Practical Paper II	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
BO 349 (Semester III & IV)	Project Practical Paper III	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **


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* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

**Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50×6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers be given on the basis of internal assessment tests.
4. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks based on entire syllabus	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines	5 marks each
Question 4	2 out of 3 sub-questions, each of 10 marks; long answer type questions (20 – 25 lines)	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question. There shall be 20 questions. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination. One of the examiners will be external.


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5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc.

While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 20) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F. Y. B. Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical



papers shall be set by the University of Pune and assessment done at the respective colleges.

S. Y. B. Sc. and T. Y. B. Sc.: For theory papers for each semester and also for the annual practical examination, question papers shall be set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5 G) Verification and Revaluation Rules:

As per university Statues and Rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Botany Degree Program shall be three years.

a) Compulsory Papers:

F. Y. B. Sc.: 2 Theory + 1 Practical (Annual)

S. Y. B. Sc.: 2 Theory per semester + 1 Practical (Annual)

T. Y. B. Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :

F. Y. B. Sc. Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S. Y. / T. Y. - B. Sc. Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F. Y. / S. Y. / T. Y. - B. Sc. Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

c) Medium of Instruction: The medium of instruction for the course shall be **English**.

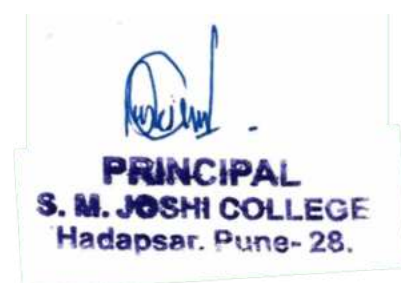


7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Plant Diversity	BO 111: Plant Diversity, Plant Morphology and Anatomy
Paper II: Plant Resources -Utiliation and Management	BO 112: Industrial Botany
Paper III: Practical	BO 113: Practical

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Botany or equivalent master degree in science with class/grades and NET/SET/Ph.D. as per prevailing University/Government /UGC rules.



UNIVERSITY OF PUNE
BOARD OF STUDIES IN BOTANY
Proposed Revised Syllabus for F. Y. B. Sc. (Botany)
To be implemented from June, 2013
F. Y. B. Sc. (Botany) New Syllabus

1. Fundamentals of Botany: PAPER – I

Term- I: Plant Diversity

2. Botany Theory Paper II

Term I – Industrial Botany

3. Fundamentals of Botany: PAPER - I

Term- II: Morphology and Anatomy

4. Botany Theory Paper II

Term- II – Industrial Botany

**5. F. Y. B. Sc. Botany Practical Paper - III based on Theory Paper I
and Paper II**


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UNIVERSITY OF PUNE
BOARD OF STUDIES IN BOTANY
Proposed Revised Syllabus for F. Y. B.Sc. (Botany)
To be implemented from June, 2013

PAPER – I
FUNDAMENTALS OF BOTANY
Term – I: Plant Diversity (36 Lectures)

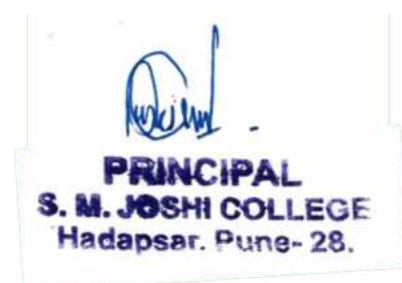
1. **Introduction:** General outline of plant kingdom, Introduction to plant diversity with reference to following groups:-
Cryptogams: Thallophyta (Algae, Fungi, Lichens, And Bacteria), Bryophyta and Pteridophyta, Phanerogams: Gymnosperms and Angiosperms. **3L**
2. **Algae:** General characters, Outline classification according to G.M. Smith (1955) up to classes with reasons. Life cycle of *Spirogyra*. **6L**
3. **Fungi:** General characters, Outline classification according to G.M. Smith (1955) up to classes with reasons. Life cycle of *Cystopus (Albugo)*. **5L**
4. **Lichens:** General characters, Nature of Association, Types of Lichens on the basis of thallus morphology, Economic importance of lichens. **3L**
5. **Bryophytes:** General characters, Outline classification according to G.M. Smith (1955) up to classes with reasons. Life cycle of *Riccia*. **5L**
6. **Pteridophytes:** General characters, Outline classification according to G.M. Smith (1955) up to classes with reasons. Life cycle of *Nephrolepis*. **6L**
7. **Gymnosperms:** General characters, Outline classification according to Chamberlain (1934) up to classes with reasons. Life cycle of *Cycas*. **5L**
8. **Angiosperms:** General characters, Causes of evolutionary success of Angiosperms, comparative account of monocotyledons and dicotyledons. **3L**
(Note: Development of sex organs not expected, for all the above mentioned life cycles)

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PAPER – I
FUNDAMENTALS OF BOTANY
Term – II: Morphology and Anatomy (36 Lectures)

- 1. Morphology:** **4L**
1.1: Introduction, Definition and Scope.
1.2: Descriptive and Interpretative.
1.3: Importance in identification, nomenclature, classification, phylogeny and Plant breeding.
- 2. Morphology of Vegetative Parts:** **8L**
2.1: **Root:** Types of roots, Modifications of roots: Epiphytic, Respiratory (Pneumatophores), Parasitic and Storage roots (conical, fusiform and napiform) with examples; functions of root.
2.2: **Stem:** Modifications of Stem: Phylloclade, Runner, Stolon, Suckers, Offsets, Rhizome, Corm, Tuber and Bulb with examples. Functions of stem.
2.3: **Leaf:** Parts of typical leaf: petiole, lamina; leaf margins and apices. Types of leaves: simple, compound, venation, phyllotaxy. Modifications: tendrils, spines, scale leaves, phyllode, reproductive and trap leaves (mechanism of trapping in *Nepenthes* only) with examples. Functions of leaf.
- 3. Morphology of Reproductive Parts:** **10L**
3.1: **Inflorescence:** Types of inflorescence: Racemose (raceme, spike, corymb, umbel, catkin, spadix and capitulum), Cymose (solitary, monochasial, dichasial, polychasial), Special types (Verticillaster, Cyathium, and Hypanthodium) Significance.
3.2: **Flower:** Parts of typical flower, Types of flower (complete, incomplete), symmetry of flower and insertion of floral whorls. Floral whorls: Calyx, corolla, perianth, aestivation, modifications of calyx (pappus, petaloid, spurred), forms of corolla: polypetalous (cruciform and papilionaceous) gamopetalous (infundibuliform, bilabiate), Androecium: structure of stamen, fixation of anthers, cohesion and adhesion; Gynoecium: structure of carpel. Types of placentations.
3.3: **Fruit:** Types of fruits: Simple and dry: Achene, Cypsela, Legume, Follicle and Capsule, Fleshy: Drupe, berry, Hesperidium and pepo. Aggregate: Etaerio of berries and Etaerio of follicles. Multiple fruits: Syconus and Sorosis.
3.4: **Seed:** Parts, types, structural modifications for seed dispersal.
- 4. Anatomy:** **2L**
Introduction, Definition, Importance in taxonomy, physiology, ecological interpretations, pharmacognosy and wood identification.
- 5. Types of tissues:** Outline with brief description. **6L**
5.1: **Meristmatic tissues:** - Meristem, characters and types based on origin, position and plane of division, functions.
5.2: **Vascular tissues:-** Components of xylem and phloem, types of vascular bundles, functions.
5.3: **Epidermal tissues:-** Epidermis, structure of typical stomata, trichomes, motor cells; functions.
5.4: **Mechanical tissues:-** Collenchyma, sclerenchyma and functions.


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6. Internal Organization of Primary Plant Body:

6L

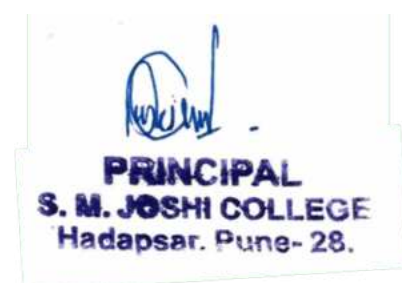
6.1: Internal structure of dicotyledon and monocotyledon root.

6.2: Internal structure of dicotyledon and monocotyledon stem.

6.3: Internal structure of dicotyledon and monocotyledon leaf.

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15. Plant Anatomy, 2006, Pijush Roy. New Central Book Agency (P) Ltd. Kolkata.
16. Plant Anatomy, 1989, Chandurkar, P. J., Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
17. Botany for Degree Students, 2003, A. C. Dutta. Oxford University Press, New Delhi.
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PAPER- II

Term I – INDUSTRIAL BOTANY (36 Lectures)

- 1. Introduction to Industrial Botany** **2L**
 - 1.1 Concept of Industrial Botany.
 - 1.2 Plant resources and industries: Food, fodder, fibers, medicines, timber, dyes, gum, tannins. (Two examples of each resource and the relevant industries with which they are associated).
- 2. Floriculture Industry** **8L**
 - 2.1 Introduction to floriculture.
 - 2.2 Important floricultural crops, open cultivation practices, harvesting and marketing of Tuberose.
 - 2.3 Greenhouse technology: Concept, advantages and limitations.
 - 2.4 Cultivation practices (greenhouse technology), harvesting and marketing of Rose and *Gerbera*.
- 3. Plant Nursery Industry** **8L**
 - 3.1 Concept and types of nurseries: ornamental plant nursery, fruit plant nursery, medicinal plant nursery, vegetable plant nursery, orchid nursery, forest nursery (with reference to infrastructure required, outputs, commercial applications and profitability).
 - 3.2 Propagation methods: Seed propagation, natural vegetative propagation and artificial vegetative propagation (Cutting: Stem, Layering: Air layering, Grafting: Stone grafting and Approach grafting, Budding : T-budding).
- 4. Plant Tissue Culture Industry** **6L**
 - 4.1 Concept of tissue culture.
 - 4.2 Culture techniques: Types of explants, preparation of media, methods of sterilization, inoculation techniques, incubation and hardening.
 - 4.3 Commercial significance
- 5. Agri industries:** **8L**
 - 5.1 Organic Farming: Concept, need of organic farming, types of organic fertilizers, advantages and limitations.



5.2 Seed industries: Importance of seed industries, seed production, seed processing and seed marketing with reference to cotton. Major seed industries and corporations of India.

6. Mushroom Industries:

4L

Mushroom cultivation: Plant resources, cultivation practices of Oyster mushroom, uses of mushrooms, value added products, commercial significance.

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2. Economic Botany in the Tropics, Kochhar, Macmillan Publisher.
3. Economic Botany: Principles and Practices, Gerald E. Wickens, Springer Publication.
4. Floriculture in India, Gurcharan Singh Randhawa and Amitabha Mukhopadhyay, Allied Publishers.
5. Floriculture Marketing in India, Debashish Sengupta and Raj Kamal, Excel Books.
6. Floriculture Hand Book, Eiri, Engineers India Research in Publication.
7. Nursery Management, John Mason, Landlinks Press Publisher.
8. Plant Nursery Management: How to Start and Operate a Plant Nursery, Ray, P.K., Scientific Publishers.
9. Introduction to Plant Tissue Culture (2/e), M. K. Razdan, Science Publishers.
10. Plant Cell and Tissue Culture, Indra K. Vasil, (Eds. - Indra K. Vasil, Trevor A. Thorpe), Springer Publication.
11. The Complete Book on Organic Farming and Production of Organic Compost, NPCS Board of Consultants & Engineers, Asia Pacific Business Press Inc.
12. The Organic Farming Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farm, Ann Larkin Hansen, Storey Publications.
13. Hand Book of Mushroom Cultivation, Processing and Packaging, Engineers India Research In Publishers
14. Growing Gourmet and Medicinal Mushrooms, Paul Stamets, Ten Speed Press Publishers
15. Handbook of Seed Science And Technology: Seed biology, I Technology, Amarjit S. Basra, Food Products Press publishers.


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PAPER- II

Term- II: INDUSTRIAL BOTANY (36 Lectures)

- 1. Bio-fuel Industry** **6L**
 - 1.1 Introduction and advantages.
 - 1.2 Concept of biofuel and its need.
 - 1.3 Plants used for biofuel production.
 - 1.4 Biodiesel production from Caster.
 - 1.5 Commercial significance.
- 2 Bio-pesticide Industry** **6L**
 - 2.1 Concept of bio-control; Integrated Pest Management (IPM).
 - 2.2 Importance of bio pesticides.
 - 2.3 Types of bio pesticides: Indiara, Azadiractin.
 - 2.4 Commercial significance.
- 3. Industrial Mycology** **6L**
 - 3.1 Introduction
 - 3.2 Important genera of fungi used in various industries and their products.
 - 3.3 Products and applications of *Trichoderma*, *Penicillium*, *Aspergillus* and yeast.
 - 3.4 Commercial significance.
- 4. Bio-Fertilizer Industry** **6L**
 - 4.1 Bio fertilizers : concept and need
 - 4.2 Types of bio-fertilizers: Nitrogen fixing bio fertilizer: *Rhizobium*, Blue green algae. *Anabaena* associated with *Azolla*. Phosphate solubilizing bio-fertilizer: Bacteria and Fungi.
 - 4.3 Commercial significance.
- 5 Fruit Processing Industry** **6L**
 - 5.1 Fruit processing: concept and need
 - 5.2 Cold storage.
 - 5.3 Types of fruit processing (canned fruits, dried fruit chips, fruit pulp, squash, jam, jelly, pickle and ketchups).
 - 5.4 Commercial significance.
- 6 Plant Pharmaceutical Industry**



6.1 Concept and advantages.

6.2 Types of pharmaceutical products: Churna, Asava and Arishta.

6.3 Drug plants with reference to botanical source, active principles and medicinal uses of *Adathoda zeylanica*, *Tinospora cordifolia* and *Asperagus racemosus*.

6.4 Manufacture of *Churna* (*Triphala churna*), *Arishta* (*Ashokarishta*) and *Asava* (*Kumariasava*).

6.5 Concept of nutraceuticals and cosmeceuticals.

6.6 Commercial significance of Amla and Aloe.

References:

1. The Complete Book on Organic Farming and Production of Organic Compost, NPCS Board of Consultants & Engineers, Asia Pacific Business Press Inc.
2. The Organic Farming Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farm, Ann Larkin Hansen, Storey Publications.
3. Deore and Laware (2011). Liquid Organic Fertilizer: An Approach towards Organic Vegetable Production. LAP LAMBERT Academic Publishing (2011)
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 23. The Complete Technology Book on Biofertilizer and Organic Farming. NIIR PROJECT CONSULTANCY SERVICES.
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F. Y. B.Sc. BOTANY PRACTICAL PAPER – III

Based on Theory Paper I and Paper II

1. Modifications of root and stem. 1P
2. Study of leaf (parts of leaf, types: simple and compound; sessile and petiolate; venation: parallel and reticulate) (Glossary of terminologies be given with the protocol). 1P
3. Study of Inflorescence. 1P
 - a) Racemose: Raceme, Spike, Spadix, Catkin, Umbel and Capitulum.
 - b) Cymose: Solitary cyme, Uniparous cyme: helicoid and scorpiod, Biparous cyme and Multiparous cyme.
 - c) Special type: Verticillaster, Hypanthodium and Cyathium.
4. Study of flower with respect to Calyx, Corolla and Perianth: (Glossary of terminologies is given with the protocol). 1P
5. Study of flower with respect to Androecium and Gynoecium. 1P
6. Study of fruits and seed with suitable examples. 1P

Simple fruit: fleshy – Berry and Drupe; Dry: Achene, Cypsella and Legume

Aggregate fruit: Etaerio of follicles and Etaerio of Berries.

Multiple fruit: Syconus and Sorosis.

Seed: parts of seed and types of seed (monocotyledonous dicotyledonous, albuminous, exalbuminous)
7. Study of internal primary structure of dicotyledonous root, stem and leaf. 1P

e.g. Sunflower.
8. Study of internal primary structure of monocotyledonous root, stem and leaf. 1P

e.g. Maize.
9. Study of *Spirogyra*. 1P
10. Study of *Cystopus (Albugo)* 1P
11. Study of *Riccia*. 1P
12. Study of *Nephorlepis*. 1P
13. Study of *Cycas*. 1P
14. Study of plant resources in industries: food, fodder, fiber, medicine and gum (one example of each)



15. Study of artificial plant propagation: 1P
Stem cutting (demonstration of three subtypes)
Air Layering, Approach grafting, and T- budding
16. Study of plant tissue culture techniques: Demonstration of various stages. 1P
17. Cultivation of Oyster mushroom and demonstration of value added mushroom products. 1P
18. Study of plant resources used in biopesticides. 1P
(Indiara, Azadiractin)
19. Study of industrially important fungi and their products. 1P
Ganoderma: *Ganoderma* tablets, *Aspergillus*: citric acid; *Yeast*: Bakery products; *Penicillium*: Penicillin and *Trichoderma*.
20. Study of types of Biofertilizers: *Rhizobium*, *Azotobacter*, BGA, *Azolla*.
Phosphate Solubilizing Bacteria. Green manure (preferably *Crotolaria*/
Gliricidia/locally available material). 1P
21. Preparation of Jam and Squash. 1P
22. A) One botanical excursion to study plant diversity.
B) Visit to one of the following industries. (Study/project report is compulsory).
1) Floriculture unit 2) Greenhouse 3) Pharmaceutical industry 4) Nursery and
5) Mushroom cultivation unit.

(Note: Visits mentioned in the practical No. 22 (A & B) are compulsory. It carries 10 marks at the time of annual practical examination.)



University of Pune
Three Year B. Sc. Degree Course in
Zoology

Principal Dr. D. K. Mhaske
Chairman,
Board of Studies in Zoology
University of Pune, Pune 411 007.


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1) Title of the Course : B. Sc. Zoology

F. Y. B. Sc. Zoology

(To be implemented from Academic Year 2013-14)

2) Preamble:

The well organized curricula including basic as well as advanced concepts in the Zoology from first year to the third year shall inspire the students for pursuing higher studies in Zoology and for becoming an entrepreneur and also enable students to get employed in the Biological research Institutes, Industries, Educational Institutes and in the various concerning departments of State and Central Government based on subject Zoology.

3) Introduction:

At **first year of under-graduation** the topics related to the fundamentals of zoology, including exposure to diversity in animal groups and industries based on the zoological areas are covered. The practical course is aimed to equipped the students with skills required for animal identification, morphological, anatomical, technical description, classification and also applications of zoology in the various industries.

At **second year under-graduation**: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. courses based on content of first year shall be introduced.

At **third year under-graduation**: Theory and practical courses in each semester shall deal with the further detailed studies of the various disciplines of the zoology subject and other branches of zoology such as Genetics, Animal Physiology, Molecular biology, Biochemistry, Microtechnique, Nonchordate and Chordate, Developmental Biology, Histology. Cell Biology, Biodiversity, Public health and hygiene, Pathology, Entomology, Biotechnology, etc. The students will also learn about use of various technical skills in the biological sciences to be helpful during research in the zoology subject.

Objectives:

- To provide thorough knowledge about various animal sciences from primitive to highly evolved animal groups
- To make the students aware of applications of Zoology sub industries



- To highlight the potential of various branches to become an entrepreneur
- To equipped the students with skills related to laboratory as well as field based studies
- To make the students aware about conservation and sustainable use of biodiversity
- To inculcates interest and foundation for further studies in Zoology
- To address the socio-economical challenges related to animal sciences
- To facilitate students for taking up and shaping a successful career in Zoology

4) Eligibility:

- 1 **First Year B.Sc. :** A student who has passed the Higher Secondary School Certificate (10+2) Science stream with Biology or its equivalent examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc. :** Keeping terms of First Year of B. Sc. with zoology as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.
- 3 **Third Year B.Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with zoology as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

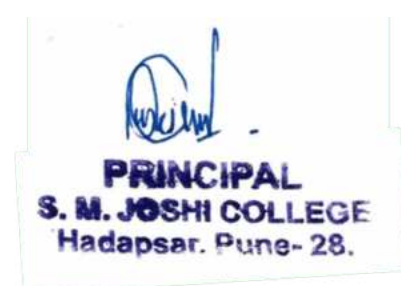
5 A) Examination Pattern:

First Year B. Sc. Zoology

Pattern of Examination: Annual

Theory courses Zoology Theory Paper I : Annual
 Zoology Theory Paper II : Annual

Practical Course Annual



Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Theory Paper I ZY-101 (First term)	Animal Systematics and Diversity -I	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper I ZY-101 (Second term)	Animal Systematics and Diversity -II	Three lectures/Week (Total 36 lectures per term)			
Theory Paper II ZY-102 (First term)	Fundamentals of Cell Biology	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper II ZY-102 (Second term)	Genetics	Three lectures/Week (Total 36 lectures per term)			
Practical Paper III ZY-103 (First & Second Term)	Practical	9 Practicals of 4 lectures in each term (18 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2 and 3	4 out of 6 - short answer type questions; answerable in 8 – 10 lines
Question 4	2 out of 4 – Descriptive answer type questions, answerable in 15 – 20 lines
Question 5	1 out of 2 – Descriptive answer type questions, answerable in 10 – 15 lines


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Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks in each term. The written test shall comprise objective type questions – Multiple Type Questions, True / False, Definitions, Answer in one or two line questions. There shall be 20 questions.

Practical: Regular assessment of each practical for 20 marks each: Marks for journal: 10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Zoology

Pattern of examination: Semester

Theory courses ZY- 211 and ZY- 212: Semester

ZY-211 and ZY-212: Semester

Practical Course: Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
ZY- 211	Animal Systematics and Diversity -III	Four lectures/Week (Total 48 per semester)	04	16	20 *
ZY- 212	Applied Zoology I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
ZY-211	Animal Systematics and Diversity -IV	Four lectures/Week (Total 48 per Semester)	04	16	20 *
ZY-212	Applied Zoology II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
ZY-223 (Semester- I and II)	Paper III Practical course	12 Practicals of 4 lectures in each Semester (24 practicals / year)	08	32	40**


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* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

**Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests.
4. Internal marks for Practical Course should be a regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying equal marks as follows: The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks based on entire syllabus	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10-15 lines	5 marks each
Question 4	1 out of 2 sub-questions, each of 10 marks; long answer type questions (20-25lines)	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question. There shall be 20 questions. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination. One of the examiners will be external.


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Third Year B. Sc. Zoology

Pattern of examination: Semester

Theory courses:

(Sem III: ZY-331 to ZY-336) : Semester

(Sem IV: ZY- 341 to ZY-346) : Semester

Practical Course:(ZY-347-349) : Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
ZY-331	Animal Systematics and Diversity V	48	4	16	20*
ZY-332	Mammalian Histology	48	4	16	20*
ZY-333	Biological Chemistry	48	4	16	20*
ZY-334	Environmental Biology and Toxicology	48	4	16	20*
ZY-335	Parasitology	48	4	16	20*
ZY-336	General Pathology or Cell Biology	48	4	16	20*
SEM IV					
ZY-341	Biological Techniques	48	4	16	20*
ZY-342	Mammalian Physiology and Endocrinology	48	4	16	20*
ZY-343	Genetics and Molecular Biology	48	4	16	20*
ZY-344	Organic Evolution	48	4	16	20*
ZY- 345	General Embryology	48	4	16	20*
ZY-346	Public Health and Hygiene or Medical Entomology	48	4	16	


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Practical Papers					
BO 347 (Semester III & IV)	Practical Paper I	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
BO 348 (Semester III & IV)	Practical Paper II	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
BO 349 (Semester III & IV)	Project Practical Paper III	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

**Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50×6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers be given on the basis of internal assessment tests.
4. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks based on entire syllabus	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines	5 marks each
Question 4	2 out of 3 sub-questions, each of 10 marks; long answer type questions (20 – 25 lines)	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question. There shall be


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Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc.

While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 20) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail


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5 E) External Students:

There shall be no external students.

5 F) Setting of question papers:

F. Y. B. Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III, papers shall be set by the University of Pune and assessment done at the respective colleges.

S. Y. B. Sc. and T. Y. B. Sc.: For theory papers for each semester and also for the annual practical examination, question papers shall be set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5 G) Verification and Revaluation Rules:

As per University Statues and Rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Zoology Degree Program shall be three years.

a) Compulsory Papers:

F. Y. B. Sc.: 2 Theory + 1 Practical (Annual)

S. Y. B. Sc.: 2 Theory per semester + 1 Practical (Annual)

T. Y. B. Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :

F. Y. B. Sc. Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S. Y. / T. Y. - B. Sc. Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F. Y. / S. Y. / T. Y. - B. Sc. Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks



c) **Medium of Instruction:** The medium of instruction for the course shall be **English**.

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Nonchordates and Chordates	Animal Systematics and Diversity –I and II
Paper II: Genetics and Parasitology	Fundamentals of Cell Biology and Genetics
Paper III: Practical course	Paper III: Practical course

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Zoology or equivalent master degree in science with class/grades and NET/SET/Ph.D. as per prevailing University/Government /UGC rules.


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UNIVERSITY OF PUNE
BOARD OF STUDIES IN ZOOLOGY
Proposed Revised Syllabus for F. Y. B. Sc. (Zoology)
To be implemented from June, 2013
F. Y. B. Sc. (Zoology) New Syllabus

1. Zoology: Paper- I

Term- I: Animal Systematics and Diversity –I

2. Zoology Theory Paper II

Term I: Fundamentals of Cell Biology

3. Zoology: Paper- I

Term- II: Animal Systematics and Diversity – II

4. Zoology: Paper- II

Term- II: Genetics

**5. F. Y. B. Sc. Zoology Practical Paper - III based on Theory Paper I
and Paper II**



UNIVERSITY OF PUNE
BOARD OF STUDIES IN ZOOLOGY
COURSE STRUCTURE OF UNDERGRADUATE CLASSES
(To be implemented from June 2013)

Class: F.Y. B. Sc.

Paper	Course No.	Term I	Term II
I	ZY 101	Animal Systematics and Diversity -I	Animal Systematics and Diversity –II
II	ZY 102	Fundamentals of Cell Biology	Genetics
III	ZY 103	Practical course	

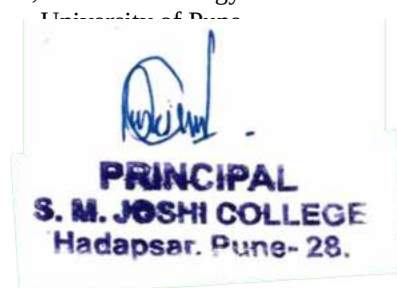
Class: S.Y. B. Sc.

Paper	Course No.	Semester I	Course No.	Semester II
I	ZY.211	Animal Systematics and Diversity -III	ZY. 221	Animal Systematics and Diversity –IV
II	ZY.212	Applied Zoology I	ZY.222	Applied Zoology II
III	ZY.223	Practical course		

Class: T.Y. B. Sc.

Paper	Course	Semester III	Course	Semester IV
I	ZY.331	Animal Systematics and Diversity V	ZY.341	Biological Techniques
II	ZY.332	Mammalian Histology	ZY.342	Mammalian Physiology and Endocrinology
III	ZY.333	Biological Chemistry	ZY.343	Genetics and Molecular Biology
IV	ZY.334	Environmental Biology and Toxicology	ZY.344	Organic Evolution
V	ZY.335	Parasitology	ZY.345	General Embryology
VI	ZY.336	General Pathology or Cell Biology	ZY.346	Public Health and Hygiene or Medical Entomology
VII	ZY.347	Practicals corresponding to ZY 331, ZY 332, ZY 341 & ZY 342		
VIII	ZY.348	Practicals corresponding to ZY 333, ZY 334, ZY 343 & ZY 344		
IX	ZY.349	Practicals corresponding to ZY 335, ZY 336, ZY 345 & ZY 346		

Prin. (Dr) D. K. Mhaske
Chairman, B.O.S. in Zoology
University of Pune



University of Pune

Draft of Syllabus to be implemented from June 2013

F. Y. B. Sc. Zoology

Paper 1- ZY-101:	First term:	Animal Systematics and Diversity - I
	Second term:	Animal Systematics and Diversity - II
Paper II- ZY-102:	First term:	Fundamentals of Cell Biology
	Second term:	Genetics
Paper III ZY-103:		Practical course



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PAPER I: FIRST TERM

ZY-101: ANIMAL SYSTEMATICS AND DIVERSITY -I

- 1. Principles of classification:** 4
 - 1.1 Systematics-Linnaean hierarchy (Phylum, Class, Order, Family, Genus and Species)
 - 1.2 Binomial nomenclature
 - 1.3 Five kingdom classification system
- 2. Salient features and classification upto classes of the following:** (any two examples from each class) 8
 - 2.1 Protozoa
 - 2.2 Porifera
 - 2.3 Coelenterata
 - 2.4 Platyhelminthes
 - 2.5 Aschehelminthes
 - 2.6 Annelida
- 3. Study of *Paramoecium* :** 8
 - 3.1 Systematic position, Habit and habitat
 - 3.2 Structure, nutrition, excretion and reproduction (binary fission and conjugation)
- 4. Study of Earthworm :** 16
 - 4.1 Systematic position, Habit and habitat
 - 4.2 External characters
 - 4.3 Digestive system
 - 4.4 Circulatory system
 - 4.5 Excretory system
 - 4.6 Reproductive system
 - 4.7 Nervous system and sense organs
 - 4.8 Economic importance



PAPER –I: SECOND TERM

ZY-101: ANIMAL SYSTEMATICS AND DIVERSITY – II

1. Salient features and classification upto order with one example of the following:

6

1.1 Hemichordata

1.2 Urochordata

1.3 Cephalochordata

2. Salient features of following classes with two examples of each

4

2.1 Pisces- Cartilaginous and Bony fishes

2.2 Amphibia- Apoda, Urodela and Anura

3. Study of Frog:

20

3.1 Systematic position, Habit and habitat

3.2 External characters and sexual dimorphism

3.3 Digestive system, food, feeding and physiology of digestion

3.4 Circulatory system (lymphatic system not expected)

3.5 Central Nervous system

3.6 Sense organs

3.7 Reproductive systems (male & female)

4. General topics:

6

4.1 Migration in fishes

4.2 Neoteny in amphibia

4.3 Parental care in amphibia



PAPER II-FIRST TERM

ZY 102: FUNDAMENTALS OF CELL BIOLOGY

1. Introduction to cell biology:	4
1.1 Definition and scope	
1.2 Stains: Principle and composition of vital stains, cytoplasmic stains and nuclear stains with two examples of each	
2. Structure of prokaryotic (<i>E.coli</i>) and eukaryotic (Plant and Animal) cell	3
3. Structure and function of cell membrane:	6
3.1 Chemical composition	
3.2 Fluid mosaic model	
3.3 Functions of plasma membrane	
4. Composition of Cytoplasm	1
5. Study of following cell organelles with respect to structure and functions in brief:	10
5.1 Endoplasmic reticulum	
5.2 Golgi complex	
5.3 Lysosomes, peroxisomes and glyoxysomes	
5.4 Ribosomes	
5.5 Mitochondria	
6. Nucleus:	5
6.1 Shape, size, number and position	
6.2 Ultrastructure of nuclear envelope and pore complex	
6.3 Functions	
7. Cell division and their significance:	7
7.1 Cell cycle in brief	
7.2 Mitosis	
7.3 Meiosis	



PAPER II-SECOND TERM

ZY 102: GENETICS

- 1. Introduction to genetics:** 4
- 1.1 Mendelian inheritance: laws of heredity and their practical application
 - 1.2 Test cross and Back cross
- 2. Gene Interaction:** 5
- 2.1 Concept of gene interaction, co-dominance and incomplete dominance
 - 2.2 Complementary factors (9:7)
 - 2.3 Supplementary Factors (9: 3:4)
 - 2.4 Inhibitory factors (13:3)
 - 2.5 Duplicate dominant factors (15:1)
- 3. Lethal genes in *Mus musculus*** 1
- 4. Multiple Alleles:** 4
- 4.1 Concept, characteristics and importance of multiples alleles, ABO & Rh-blood group system and it's medicolegal importance.
 - 4.2 Concept of polygenic inheritance with reference to skin color in man
- 5. Chromosomes:** 5
- 5.1 Introduction to morphology and composition
 - 5.2 Classification based on the centromeric position
 - 5.3 Types of chromosome (autosomes and sex chromosome)
 - 5.2 Chromosomal aberrations: structural changes
- 6. Sex-determination:** 5
- 6.1 Introduction
 - 6.2 Chromosomal theory of sex determination (XX-XY, ZZ-ZW, XX-XO and Haploid-Diploid method)
 - 6.3 Parthenogenesis and Gynandromorphism
- 7. Human genetics:** 4
- 7.1 Study of human karyotype
 - 7.2 Syndromes:
 - a) Autosomal-Down's (Mongolism), Patau's, Edward's and Cri-du



b) Sex chromosomal abnormalities in man: Klinefelter's and Turner's syndrome	
7.3 Inborn errors of metabolism: albinism, phenylketonuria and alkaptonuria	
8. Sex linked inheritance in human:	3
8.1 Colorblindness, haemophilia and hypertrichosis	
9. Cytoplasmic inheritance:	1
9.1 Kappa particles in <i>Paramecium</i>	
10. Application of genetics:	4
10.1 Genetic counseling.	
10.2 Concept of genetic Engineering	
10.3 Eugenics	



ZY-103 PRACTICAL COURSE

- Practical 1. To study the classification with reasons of the following (D)
Phylum Protozoa- *Amoeba*, *Euglena* and *Volvox*
Phylum Porifera- *Sycon*, *Hyalonema* and *Euspogia*
- Practical 2. To study the classification with reasons of the following (D)
Phylum Coelenterata- *Hydra*, *Physalia* and any one coral
Phylum Platyhelminthes- Tapeworm, Planeria and Liverfluke
- Practical 3. To study the classification with reasons of the following (D)
Phylum Aschelminthes- *Ascaris*
Phylum Annelida- *Tubifex*, Leech and *Neries*
- Practical 4. Culturing of *Paramoecium* (E)
- Practical 5. Study of live *Paramoecium* (E)
- Practical 6. Study of external characters, binary fission & conjugation (D)
in *Paramoecium*
- Practical 7. Study of external characters and digestive system of Earthworm (E)
- Practical 8. Study of reproductive (male and female) system of Earthworm (E)
- Practical 9. Study of nervous system of Earthworm (E)
- Practical 10. Earthworm mounting- septal nephridia, setae and spermatheca (E)
- Practical 11. Study of prokaryotic and eukaryotic cell with the help of suitable material (D)
- Practical 12. Study of temporary preparation of different mitotic stages (E)
from onion root tip cells
- Practical 13. To study the classification with reasons of the following (D)
Hemichordata- *Balanoglossus*
Urochordata- *Doliolum/ Salpa*
Cephalochordata- *Amphioxus*
- Practical 14. To study the classification with reasons of the following (D)
Cartilaginous fishes- any two
Bony fishes- any two
Amphibia- any three



- Practical 15. Study of external characters, sexual dimorphism and digestive system of Frog with the help of model/ charts (D)
- Practical 16. Study of brain of Frog with the help of model/ chart (D)
- Practical 17. Study of monohybrid ratio and dihybrid ratio by providing hypothetical data and deducing applicability of Mendelian laws (three examples of each ratio) (E)
- Practical 18. Preparation of culture media and maintenance of *Drosophila* culture (E)
- Practical 19. Study of *Drosophila*: External characters and sexual dimorphism (D)
- Practical 20. Study of *Drosophila* mutants (any two eye and any two wing mutant) (D)
- Practical 21. Study of genetic traits in human beings (tongue rolling, widow's peak, ear lobes, color blindness and PTC tasters/ nontasters) (E)
- Practical 22. Study of normal human karyotype from metaphase chromosomal spread picture (E)
- Practical 23. Study of blood groups in human (ABO and Rh) (E)
- Practical 24. Study of any 3- cell organelles from electron micrographs (D)
- Practical 25. Compulsory visit to vermiculture unit/biodiversity spot/ZSI/large water body (E)

Note: Minimum 18 practical are to be performed by the students.



REFERENCE BOOKS FOR F. Y. B. SC. ZOOLOGY

1. The Frog-its reproduction and development -By Robert Rugh,Tata McGraw Hill Edition,New Delhi
2. Biology of Animals By Ganguly,BB.,Sinha,A.K.,Adhikari,S.,New Central Book Agency,Kolkata
3. Arthropod Phylogeny By Gupta,A.P.,Van Nostrand Co.,New York
4. Introduction to Amphibia By Bhamrah,MS.,Juneja,K.,Amol Publication,Delhi
5. Life of Vertebrates By Young,JZ., III Edition,Clarendon Press,London
6. General Zoology By Goodnight and others IBH Publishing Co.
7. Life of Invertebrates By Prasad,ASN,Vikas Publishing House,New Delhi
8. Textbook of Vertebrate Zoology By Prasad,SN.,Kashyap,V.,New Age India Publishers,New Delhi
9. Modern Textbook of Zoology,Vertebrates By Kotpal,RL.,Rastogi and Co. Meerut
10. Phylum Protozoa to Echinodermata (series) By Kotpal,RL.,Rastogi and Co. Meerut
11. Animal Diversity By Kershaw,DR., Redwood Burn Ltd.,Trowbridge
12. Textbook of Zoology By Parkar J. and Haswell,W.,ELBS Edition
13. Textbook of Zoology By Vidyarthi, Agrasia Publishers, Agra
14. Chordate zoology By Jorden EL.,and Verma PS.,S.Chand and Co.,New Delhi
15. Functional Organization of chordates (part I and II) By Nigam HC. And Sobti,R., S.Chand and Co.,New Delhi
16. Invertebrate zoology By Barnes,Saunders College Publishing Co.,Philadelphia,USA,1987
17. Genetics By Verma,PS. And Agrawal, VK., S.Chand and Co.,New Delhi
18. Principle of Genetics By Sinnott,Dunn and Dobzhansky, Tata McGraw Hill Edition,New Delhi
19. Genetics By Gupta, PK., Rastogi Publication, Meerut
20. Genetics By Sarin,C., Tata McGraw Hill,New Delhi
21. Principles of Genetics By Gardner,EJ.,Simmons,MJ. And Snustad,DP. John Wiley and Sons
22. Cytology and Genetics By Dyanasagar VR., Tata McGraw Hill Pub. Co. New Delhi



23. Cell and Molecular Biology By De Robertis,EDP. And De Robertis EME,Molt
Saunders Inc.
24. Cell Biology By Powar,CB,Himalaya Publication House
25. Cell and Molecular Biology By Dupraw I, Academic Press, New York
26. Cell Biology By avers,CJ.,Addison Wesley Pub. Co. New York and London
27. Cell and Molecular Biology By Carp,G.,John Waley, USA
28. Cell Biology By David,E.,Sadava Johnes and Bartlett Publication,London
29. Cell Structure and Function By Lowey,AG. and Siekevitz,JR.,Menninger and
Gallew,JAN.,Saunder College Publication,Philadelphia



University of Pune

Three Year B. Sc. Degree Course in

MICROBIOLOGY

Syllabus

(To be implemented from Academic Year 2013-14)



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Hadapsar. Pune- 28.

Preamble:

Microbiology is a branch of science that studies “Life” taking an example of microorganisms such as bacteria, protozoa, algae, fungi, bacteria, viruses, etc. These studies integrate cytology, physiology, ecology, genetics and molecular biology, evolution, taxonomy and systematics with a focus on microorganisms; in particular bacteria. The relevance and applications of these microorganisms to the surrounding environment including human life and Mother Nature becomes part of this branch. Since inception of this branch of science, Microbiology has remained a field of actively research and ever expanding in all possible directions; broadly categorized as pure and applied science. Different branches of Pure Microbiology based on taxonomy are Bacteriology, Mycology, Protozoology and Parasitology, Phycology and Virology; with considerable overlap between these specific branches over each other and also with other disciplines of life sciences, like Biochemistry, Botany, Zoology, Cell Biology, Biotechnology, Nanotechnology, Bioinformatics, etc. Areas in the applied Microbial Sciences can be identified as: Medical, Pharmaceutical, Industrial (Fermentation, Pollution Control), Air, Water, Food and Dairy, Agriculture (Plant Pathology and Soil Microbiology), Veterinary, Environmental (Ecology, Geomicrobiology); and the technological aspects of these areas.

Knowledge of different aspects of Microbiology has become crucial and indispensable to everyone in the society. Study of microbes has become an integral part of education and human progress. Building a foundation and a sound knowledge-base of Microbiological principles among the future citizens of the country will lead to an educated, intellectual and scientifically advanced society. Microbiological tools have been extensively used to study different life processes and are cutting edge technologies. There is a continual demand for microbiologists in the work force – education, industry and research. Career opportunities for the graduate students are available in manufacturing industry and research institutes at technical level.

Introduction:

The syllabi till today had been sufficient to cater for the needs of students for building up their careers in industry and research. However, with the changing scenario at local and global level, we feel that the syllabus orientation should be altered to keep pace with developments in the education sector. The need of the hour is proper syllabi that emphasize on teaching of technological as well as the administrative aspects of modern biology. Theory supplemented with extensive laboratory expertise will help these students, to avail these opportunities. Both these aspects i.e. theory and more of practical needs to stressed, such that a graduate student can start work directly in applied fields (industry or institutions), without any additional training.

Thus, the university / college itself will be developing the trained and skilled man-power. We even find a lack of trained teachers who can share their experiences on different aspects in microbiology. And we plan to restructure the syllabus in this viewpoint. The restructured syllabus will combine the principles of chemistry and biological sciences (molecular and cell biology, genetics, immunology and analytical tools) with technological disciplines to provide services and for environmental management.



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Microbiology curricula are operated at two levels viz. undergraduate and postgraduate. The undergraduate curricula are prepared to impart basic knowledge of the respective subject from all possible angles. In addition, students are to be trained to apply this knowledge particularly in day-to-day applications of Microbiology and to get a glimpse of research.

Objectives to be achieved:

- To enrich students' knowledge and train them in the pure microbial sciences
- To introduce the concepts of application and research in Microbiology
- To inculcate sense of scientific responsibilities and social and environment awareness
- To help students build-up a progressive and successful career

Eligibility

1. First Year B.Sc.:

- a. Higher Secondary School Certificate (10+2) or its equivalent Examination with English and Biology; and two of the science subjects such as Physics, Chemistry, Mathematics, Geography, Geology, etc. OR
- b. Three Years Diploma in Pharmacy Course of Board of Technical Education conducted by Government of Maharashtra or its equivalent. OR
- c. Higher Secondary School Certificate (10+2) Examination with English and vocational subject of + 2 level (MCVC) - Medical Lab. Technician (Subject Code = P1/P2/P3)

2. Second Year B.Sc.:

Keeping terms of First Year of B. Sc. with Microbiology as one of the subjects. In addition to the above qualification students who have passed the Diploma course in Pharmacy are eligible however such cases should be approved by equivalence committee of Faculty of Science of the University of Pune.

3. Third Year B. Sc.:

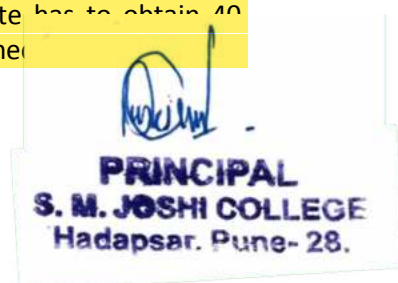
Student shall clear all First Year B. Sc. Microbiology courses and satisfactorily keeping terms of Second Year of B. Sc. with Microbiology as one of the subjects.

Admissions will be given as per the selection procedure / policies adopted by the respective college keeping in accordance with conditions laid down by the University of Pune.

Reservation and relaxation will be as per the Government rules.

Standard of Passing

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks must be obtained in Theory Examination.)



- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks must be obtained in the University Examination.)

Award of Class

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the Principle subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

ATKT Rules

While going from F. Y. B. Sc. to S. Y. B. Sc. at least 8 courses (out of total 12) should be cleared; however all F. Y. B. Sc. courses should be cleared while going to T. Y. B. Sc.

While going from S. Y. B. Sc. to T. Y. B. Sc., at least 12 courses (out of 20) should be cleared (Practical Course at S. Y. B. Sc. will be equivalent to 2 courses).

Equivalence of Previous Syllabus

No equivalence required at F. Y. B. Sc. level, the course titles are same as previous syllabus.

External Students

There shall be no external students.

University Terms

Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 80 percent attendance at theory and practical course and satisfactory performance during the term.



Course Structure:

Duration: The duration of B.Sc. (Microbiology) Degree Program shall be three years.

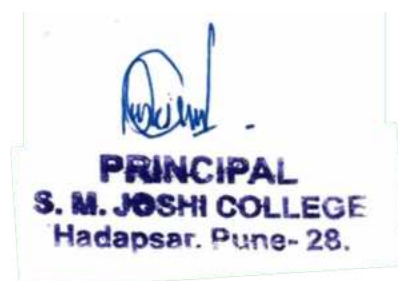
Medium of Instruction: The medium of instruction for the course shall be English.

To accommodate more advanced topics in the syllabi, it is necessary to understand the base science knowledge level of the students that have chosen the Microbiology discipline. Curricula of courses of state and central boards of higher secondary level were reviewed to avoid repetitions of introductory cell biology.

At **first year of under-graduation**, students will be given the basic information that includes – characteristics of microbial world. The microorganisms will be studied for morphological, structural characterization, isolations techniques from natural and extreme environments and their prominent features. The methodology for observation i.e. different microscopy techniques, staining techniques and nutritional requirements will be taught in detail; including these aspects at laboratory level as well. Introduction to biochemical characterization of components of micro-organism e.g. proteins, lipids, nucleic acids and carbohydrates and instrumental techniques to estimate these components qualitatively and quantitatively from micro-organisms or other natural sources will be the focus for second theory paper. Relevant experimentation on these topics will be included in practical course. In practical course, students will be trained in preparing laboratory manuals, standard operating practices and log books.

At **second year under-graduation**, principles of taxonomy and classification of major groups of microorganisms can be studied in one of the papers. This paper will also include the physiological studies on these groups of micro-organisms. Second paper will deal with Air and Water Microbiology; role of micro-organisms in environment in regards to pollution and biodegradation; water and sewage treatment. Practical for the second year students will be less defined i.e. kept more flexible, designed to evolve project themes on environment, agriculture and pollution aspects and acquiring laboratory related skills. Practical at this level will also include application of biostatistics principles and computers for data analysis and interpretation, and introduction to scientific writing and report preparation. These aspects can be practiced better while carrying out the mini-projects.

At **third year under-graduation**, six theory papers deal with broad applied areas of microbiology that are interactive with higher living forms. Five such areas are – medical microbiology, microbial physiology, microbial (prokaryotic and eukaryotic) genetics, immunology and immunopathology, fermentation technology. The sixth course will be Applied Microbiology that will include – Dairy Microbiology, Food Microbiology, Fermentation Technology, Agriculture Biotechnology, Fungal Biotechnology, etc. The practical at third year will be planed more intensively, with exposure to applied fields.



F. Y. B. Sc. Microbiology

Paper	Course Title	Marks	Lectures
Paper - I	Introduction to Microbiology	100	Three Periods/Week per Paper (Total 36/Paper per Term)
Paper - II	Basic Techniques in Microbiology	100	
Practical Course	Practical Course	100	*Four Hours / Week (Total 96 – Term I & II)
*Practical to be conducted as two hours each day on two consecutive days / Batch			

Examination Pattern

Theory paper:	University Examination – 80 marks (at the end 2 nd term) Internal Examination – 20 marks
Practical course:	University Examination – 80 marks (at the end of 2 nd term) Internal Examination – 20 marks

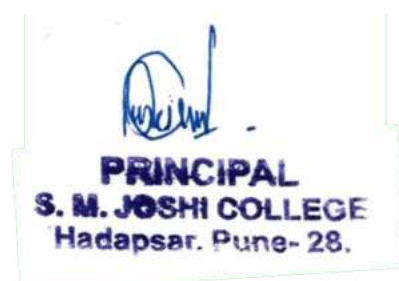
Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 line and based on entire syllabus
Question 2 and 3	4 out of 6– short answer type questions; answerable in 6 – 8 lines
Question 4	2 out of 4 – long answer type questions; answerable in 12 – 16 lines
Question 5	1 out of 2 –essay / long answer type question; answerable in 25 – 30 lines

Internal examination: Internal assessment of the student by respective teacher will be comprehensive and continuous, based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Types Questions, True / False, Definitions, Tricky computational problems with minimum calculations. There shall be 20 questions, each question of 0.5 marks.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of minimum 4 hours duration, carried over on two subsequent days. There shall be 10 marks for laboratory log book and journal, 10 marks for viva-voce and minimum three experiments. Certified journal is compulsory to appear for practical examination. There shall be two experts and two examiners per batch for the practical examination.

Setting question papers: Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject.



S. Y. B. Sc. Microbiology

	Paper	Course Title	Marks	Lectures
Semester I	MB - 211	Bacterial Systematics and Physiology	50	Four Periods/Week per Paper (Total 48/Paper per Semester)
	MB - 212	Microbial Genetics	50	
Semester II	MB – 221	Analytical Microbiology	50	
	MB - 222	Air and Water Microbiology	50	
Semester I & II	Practical Course	Practical Course	100	*Four Hours / Week (Total 96 – Semester I & II)
*Practical to be conducted as two hours each day on two consecutive days / Batch				

Examination Pattern

Theory paper: University Examination – 40 marks (at the end of each semester)

Internal Examination – 10 marks

Practical course: University Examination – 80 marks (at the end of 2nd semester)

Internal Examination – 20 marks

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying equal marks. The pattern of question papers shall be:

Question 1 10 sub-questions, each of 1 marks; objective type and based on entire syllabus

Question 2 and 3 2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines

Question 4 1 out of 2 – long answer type questions; answerable in 20 – 25 lines

Internal examination: Internal assessment of the student by respective teacher will be comprehensive and continuous, based on written test, 10 marks each semester. The written test shall comprise of objective type questions – Multiple Types Questions, True / False, Definitions, Tricky computational problems with minimum calculations. Different sets of question papers may be given in the same class-room. There shall be 20 questions to be answered in 40 minutes, each question of 1mark.

Practical Examination: Practical examination will be of minimum 4 hours duration, carried over on two subsequent days. There shall be 10 marks for laboratory log book and journal, 10 marks for viva-voce and minimum three experiments. Certified journal is compulsory for appearing for practical examination. There shall be two experts and two examiners per batch for the practical examination. One of the examiners will be external.

Setting question papers: Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject.



T. Y. B. Sc. Microbiology

Theory Papers

	Paper	Paper Title	Marks	Lecturers
Semester III	MB 331	Medical Microbiology – I	50	Four Periods/Week per Paper (Total 48/Paper per Semester)
	MB 332	Genetics & Molecular Biology - I	50	
	MB 333	Enzymology	50	
	MB 334	Immunology -I	50	
	MB 335	Fermentation Technology -I	50	
	MB 336	Applied Microbiology - I	50	
Semester IV	MB 341	Medical Microbiology - II	50	
	MB 342	Genetics & Molecular Biology - II	50	
	MB 343	Metabolism	50	
	MB 344	Immunology -II	50	
	MB 345	Fermentation Technology -II	50	
	MB 346	Applied Microbiology - II	50	

Practical Courses

	Course	Course title	Marks	
Semester III & IV	MB 347	Practical course – I Applied Microbiology	100	*Four Hours / Week per course (Total 96/Course per Semester)
	MB 348	Practical course – II Biochemistry & Molecular Biology	100	
	MB 349	Practical course – III Diagnostic Microbiology & Immunology	100	
*Practical to be conducted as four hours each day on three consecutive days / Batch				

Examination Pattern

Theory paper: **University Examination – 40 marks (at the end of each semester)**
Internal Examination – 10 marks

Practical course: **University Examination – 80 marks (at the end of 2nd semester)**
Internal Examination – 20 marks

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying equal marks. The pattern of question papers shall be:

- Question 1 10 sub-questions, each of 1 marks; objective type and based on entire syllabus
- Question 2 and 3 2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines
- Question 4 1 out of 2 – long answer type questions; answerable in 20 – 25 lines

Internal examination: Internal assessment of the student by respective teacher will be comprehensive and continuous, based on written test, 10 marks each semester. The written test shall comprise of objective type questions – Multiple Types Questions, True / Tricky computational problems with minimum calculations. Different sets of qu


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be given in the same class-room. There shall be 20 questions to be answered in 40 minutes, each question of 1mark.

Practical Examination: Practical examination will be of minimum 6 hours duration, carried over on three subsequent days. There shall be 10 marks for laboratory log book and journal, 10 marks for viva-voce and minimum three experiments per practical course. Certified journals are compulsory for appearing for practical examination. There shall be two experts for each practical course and two examiners per batch; one of the examiners will be external.

Setting question papers: Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject.

Qualification of Teachers:

With minimum undergraduate and postgraduate degree in Microbiology (B. Sc. and M. Sc. Microbiology) and qualified as per UGC regulations.



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F. Y. B. Sc. MICROBIOLOGY

THEORY PAPER I: INTRODUCTION TO MICROBIOLOGY

Paper I: Term I

Sr. No.	Topic	Lectures
1.	Frontiers of Microbiology	2
2.	A. History of Microbiology I. Discovery of microscope II. Micrographia of Anton von Leeuwenhoek and Robert Hooke III. Abiogenesis v/s biogenesis • Aristotle's notion about spontaneous generation • Redi's experiment • Louis Pasteur's & Tyndall's experiments	6
	B. Development of Microbiology in 19th century I. Observations and role of microorganisms in transformation of organic matter. • Germ theory of fermentation • Discovery of anaerobic life & physiological significance of fermentation II. Discovery of microbes as pathogens • Surgical antiseptics • Germ theory of disease – Koch's postulates & River's postulates	4 4
	C. Developments in 20th and 21st Centuries with respect to: • Vaccination and Chemotherapy • Contributions of Nobel Laureates in Immunology, Molecular Biology & Biotechnology	4
3.	Morphological and differentiating characters of microorganisms: • Bacteria • Rickettsia • Protozoa • Algae • Fungi (Molds and Yeasts) • Viruses, viroids and prions Principles in classification of Bacteria (Introduction to Bergey's Manual of Determinative and Systemic Bacteriology) and viruses (ICTV)	12
4.	Applications of Microbiology: i. Significance of normal flora and probiotics in human health ii. Microbes as Biofertilizers and Biocontrol Agents (e.g. Nitrogen fixers, Phosphate Solubilizers and <i>Bacillus thuringensis</i>)	4


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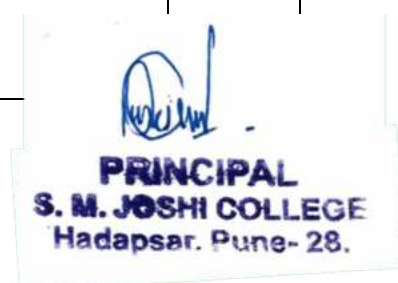
Paper I: Term II

Sr. No.	Topic	Lectures
5.	I. Covalent and non-covalent bonding in biomolecules II. Concepts of pH and redox potential	4
	Chemistry of Biomolecules - Carbohydrates (Starch, Glycogen, Cellulose, Peptidoglycan) - Lipids (Triglycerides and phospholipids) - Structural and Functional Proteins (Hemoglobin, Immunoglobulin; flagellin and cytoskeletal proteins in bacterial cell) - Nucleic acids (DNA and RNA)	16
6.	Bacterial Cytology Studies on structure, chemical composition and functions of the following components in bacterial cell: - Cell wall - Cell membrane - Endospore - Capsule - Flagella - Fimbriae and Pili - Ribosomes - Chromosomal & extra-chromosomal material - Cell inclusions (Gas vesicles, carboxysomes, PHB granules, metachromatic granules and glycogen bodies)	16

THEORY PAPER II: BASIC TECHNIQUES IN MICROBIOLOGY

Paper II: Term I

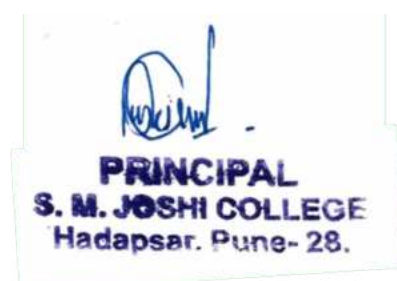
Sr. No.	Topic	Lectures
1.	a. Units of measurement. Modern SI units (Length, volume, Weight) b. Microscopy : - Bright field microscopy: Structure, working of and ray diagram of a compound light microscope; Concepts of magnification, numerical aperture and resolving power. - Types, ray diagram and functions of – condensers, eye-pieces and objectives - Aberrations in lenses - spherical, chromatic, comma and astigmatism - Principles, construction, working and applications of: - Dark field microscopy - Fluorescence microscopy - Confocal microscopy	12



2.	Staining Techniques : - Definitions of Stain; Types of stains (Basic and Acidic), - Properties and role of Fixatives, Mordants, Decolorisers and Accentuators - Principles of staining techniques for following: i. Monochrome staining and Negative (Relief) staining ii. Differential staining - Gram staining and Acid fast staining	8
3.	Sterilization and Disinfection	
	1. Physical Agents - Heat, Radiation, Filtration	6
	2. Chemical agents and their mode of action - Aldehydes, Halogens, Quaternary ammonium compounds, Phenol and phenolic compounds, Heavy metals, Alcohol, Dyes, Detergents and Ethylene oxide.	10
	3. Characteristics of an ideal disinfectant	
	4. Checking of Efficiency of Sterilization – Biological and Chemical Indicators	
	5. Checking of Efficiency of Disinfection - Phenol Coefficient	

Paper II: Term II

Sr. No.	Topic	Lectures
4.	Cultivation of Microorganisms	
	1. Nutritional requirements and nutritional classification	3
	2. Design and preparation of media – Common ingredients of media and types of media	3
	3. Methods for cultivating photosynthetic, extremophilic and chemolithotrophic bacteria.	4
	4. Concept of Pure Culture, Enrichment, Isolation and Preservation techniques. Maintenance of bacterial and fungal cultures	6
	5. Culture collection centers and their role. Requirements and guidelines of National Biodiversity Board for Culture collection centers	2
5.	Bacterial Growth	
	Growth Kinetics and growth curve; definitions of Generation time, Growth rate and specific growth rate	4
	Methods of enumeration: 1. Microscopic methods (Direct Microscopic Count, Counting cells using Neubauer, Petroff and Hausser's chambers) 2. Plate counts (Total Viable Count) 3. Estimation of Biomass (Dry mass, Cell volume) 4. Chemical methods (Cell Carbon and Nitrogen estimation) 5. Turbidometric methods (Nephelometry)	6
	Factors affecting bacterial growth (pH, Temperature, Solute Concentration (Salt and Sugar) and Heavy metals	4
	Diauxic growth	1
	Synchronous culture	3



Practical Course (Term I & II)

BASED ON THEORY PAPER I & II		(96)
Expt. No.	Topic	Hours
1-2	Preparation of Standard Operating Procedures (SOPs) for common microbiology laboratory instruments e.g. Incubator, Hot Air Oven, Autoclave, Colorimeter, pH Meter, Distillation Unit, Chemical Balance, Laminar air flow hood, Clinical Centrifuge	2
3	Construction (mechanical and optical), working and care of bright field microscope	1
4	Observation of microorganisms using bright field microscope - Bacteria, Protozoa, Molds and Yeasts, Algae – from natural habitat	1
5-7	Observation of microorganisms using staining techniques: a. Monochrome staining and b. Negative /Relief staining (Capsule staining) c. Gram staining of bacteria	3
8-9	Observation of motility in bacteria using: a. Hanging drop method and Cragie's tube method b. Swarming growth methods	2
10	Enumeration of yeast cells using a counting chamber	1
11-12	Cultivation of microorganisms: a. Preparation of simple laboratory nutrient media (solid and liquid) and using them to cultivate bacteria. b. Observation of the growth of cultures and reporting of colony and cultural characteristics (Nutrient and MacConkey's agar)	2
13	Isolation of bacteria by streak plate technique	1
14-15	Enumeration of bacteria from fermented food / soil / water by: a. Spread plate method b. Pour plate method	2
16	Aseptic transfer techniques (slant to slant, broth to broth, broth to agar and Agar to Agar)	1
17	Preservation of cultures on slants, soil and on grain surfaces; revival of these cultures and lyophilized cultures.	1
18	Checking sterilization efficiency of autoclave using a biological indicator (<i>B. stearothermophilus</i>)	1
19	Demonstration of checking of efficacy of chemical disinfectant: Phenol Coefficient Rideal Walker method)	1
20	Preparation of Winogradsky column and observation of different types of microorganisms using bright filed microscope.	1
21-22	Study of normal flora of skin: a. Cultivating and observing different morphoforms of bacteria from skin b. Study of effect of washing skin with soap and disinfectant on it's microflora	2
23-24	a. To study the effect of different parameters on growth of <i>E. coli</i> : temperature, sodium chloride concentration b. Study of Oligodynamic action of heavy metal	


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Recommended Books:

1. Daniel Lim, Microbiology, 2nd Edition; McGraw-Hill Publication
2. Ingraham J. L. and Ingraham C.A. (2004). Introduction to Microbiology. 3rd Edition. Thomson Brooks / Cole.
3. Madigan M.T., Martinko J.M. (2006). Brock's Biology of Microorganisms. 11th Edition. Pearson Education Inc.
4. Michael J Pelczar, JR. E.C.S. Chan, Noel R. Krieg. (1993) Microbiology, 5th Edition, Tata MacGraw Hill Press.
5. Prescott L.M., Harley J.P., and Klein D.A. (2005). Microbiology, 6th Edition. MacGraw Hill Companies Inc.
6. Prescott, Lancing. M., John, P. Harley and Donald, A. Klein (2006) Microbiology, 6th Edition, McGraw Hill Higher Education
7. Willey J. M., Sherwood L. M. and Woolverton C. J. (2013) Prescott's Microbiology, 8th Edition, McGraw-Hill Higher Education
8. Salle A.J. (1971) Fundamental Principles of Bacteriology. 7th Edition. Tata MacGraw Hill Publishing Co.
9. Stanier R.Y., Adelberg E.A. and Ingraham J.L. (1987) General Microbiology, 5th Edition. Macmillan Press Ltd.
10. Tortora G.J., Funke B.R., Case C.L. (2006). Microbiology: An Introduction. 8th Edition. Pearson Education Inc
11. Wilson K. and Walker J.M. (2005) Principles and Techniques of Biochemistry and Molecular Biology. 6th Edition. Cambridge University Press.
12. Hans G. Schlegel (1993) General Microbiology, 8th Edition, Cambridge University Press
13. David T. Plummer (1993) An Introduction To Practical Biochemistry, 3rd Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi



University of Pune

**Three Year B. Sc. Degree Course in
Electronic Science**



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1) Title of the Course : B. Sc. Electronic Science

F.Y.B.Sc. Electronic Science Syllabus (To be implemented from Academic Year 2013-14)

2) Preamble:

The systematic and planned curricula from first year to the third year shall motivate and encourage the students for pursuing higher studies in Electronics and for becoming an enterprenur.

3) Introduction:

At **first year of under-graduation** The basic topics related to the fundamentals of electronics are covered. Since electronics is very close to technological advancements, the practical course is intended to achieve the basic skills required for circuit building and testing.

At **second year under-graduation**: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. Courses based on content of first year shall be introduced. Analog and digital circuit design concepts will be introduced at this stage.

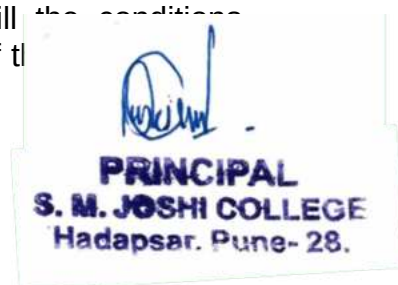
At **third year under-graduation**: Theory papers in each semester deal with the further detailed studies of the branches of Electronics. The first two practical courses shall be based on the theory courses. Third practical course is project course in which student can independently think and carry out the project work.

Objectives:

- To provide indepth knowledge of scientific and technological aspects of electronics
- To familiarize with current and recent technological developments
- To enrich knowledge through programmes such as industrial visits, hobby projects, market survey, projects etc.
- To train students in skills related to electronics industry and market.
- To create foundation for research and development in Electronics
- To develop analytical abilities towards real world problems
- To help students build-up a progressive and successful career in Electronics

4) Eligibility:

- 1 **First Year B.Sc.:** Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc.:** Keeping terms of First Year of B. Sc. with Electronic Science as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.



- 3 **Third Year B. Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with Electronic Science as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B. Sc. Electronic Science

Pattern of Examination: Annual

Theory courses (EL-101): Annual

(EL-102): Annual

Practical Course (EL-103): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Theory Paper I (EL-101) (First term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper I (EL-101) (Second term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)			
Theory Paper II (EL-102) (First term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper II (EL-102) (Second term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)			
Practical Paper III (EL-103) (First & Second Term)	Practical	10 Practicals of 4 lectures in each term (20 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300



3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2, 3 and 4	4 out of 6– short answer type questions; answerable in 8 – 10 lines
Question 5	4 out of 6 – problem type question; answerable in numerical or analytical fashion or circuit/logic diagrams

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions.
Practical: one internal assessment test + marks for journals + attendance + activity.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 6 hours duration (2-Sessions). Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Electronic Science

Pattern of examination: Semester

Theory courses (Sem I: EL211 and EL212): Semester
(Sem II: EL221 and EL222): Semester

Practical Course (EL223): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
Theory Paper I (EL 211)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	


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Theory Paper II (EL 212)	Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper I (EL 221)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (EL 222)	Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Practical paper III (EL 223) (First & Second Semester)	Paper III	12 Practicals of 4 lectures in each Semester (24 practicals / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	4 sub-questions, each of 1 marks and 4 sub-questions, each of 2 marks on entire syllabus	12 marks
Question 2 and 3	2 out of 3 sub-questions, each of 4 marks; short answer type questions; answerable in 8–10 lines	8 marks each
Question 4	2 out of 3 sub-questions, each of 6 marks; long answer type questions (12-16 lines), problems, circuit/logic diagrams and designs	12 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions. Practicals: one internal assessment test + practical journal + attendance


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Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 6 hours (2-Sessions) duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

Third Year B. Sc. Electronic Science

Pattern of examination: Semester

Theory courses:

(Sem III: EL331-EL336): Semester

(Sem IV: EL341-EL346): Semester

Practical Course:

(EL347-EL349): Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
EL-331	Paper I	48	4	16	20*
EL-332	Paper II	48	4	16	20*
EL-333	Paper III	48	4	16	20*
EL-334	Paper IV	48	4	16	20*
EL-335	Paper V	48	4	16	20*
EL-336	Paper VI	48	4	16	20*
SEM IV					
EL-341	Paper I	48	4	16	20*
EL-342	Paper II	48	4	16	20*
EL-343	Paper III	48	4	16	20*
EL-344	Paper IV	48	4	16	20*
EL-345	Paper V	48	4	16	20*
EL-346	Paper VI	48	4	16	20*
Practical Papers					
EL 347 (Semester III & IV)	Practical Paper I	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
EL 348 (Semester III & IV)	Practical Paper II	12 Practicals of 4 lectures in each	08	32	


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		Semester (24 / year)			
EL 349 (Semester III & IV)	Project Practical Paper III	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50×6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	4 sub-questions, each of 1 marks and 4 sub-questions, each of 2 marks; on entire syllabus	12 marks
Question 2 and 3	2 out of 3 sub-questions, each of 4 marks; short answer type questions; answerable in 8–10 lines	8 marks each
Question 4	2 out of 3 sub-questions, each of 6 marks; long answer type questions (12-16 lines), problems, circuit/logic diagrams and designs	12 marks

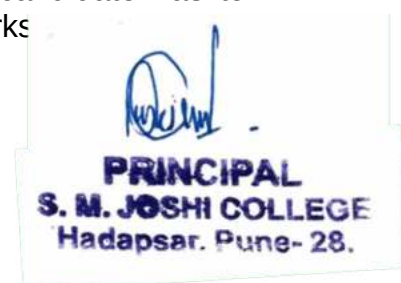
Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: one internal assessment test + practical journals + attendance + activity.

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 6 hours (2-Sessions) duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks be obtained in the University Theory Examination.)



- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc. While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 20) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III, papers shall be set by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc. and T.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.



5G) Verification and Revaluation Rules:

As per university Statutes and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Electronic Science Degree Program shall be three years.

a) Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 1 Practical (Annual)

S .Y.B.Sc.: 2 Theory per semester + 1 Practical (Annual)

T.Y.B.Sc.: 5 Theory per semester + 3 Practical (Annual)

b) Optional Papers:

One theory out of two optional papers per semester for third year only

c) Question Papers**F.Y.B.Sc.Theory paper:**

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y / T.Y. - B.Sc.Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F.Y. / S.Y / T.Y. - B.Sc.Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

d) Medium of Instruction: The medium of instruction for the course shall be English.**7) Equivalence of Previous Syllabus:**

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Principles of Analog Electronics	EL-101: Principles of Analog Electronics
Paper II: Principles of Digital Electronics	EL-102: Principles of Digital Electronics
PaperIII: Practical	EL-103: Practical

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Electronic Science or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.



10) Detail Syllabus with Recommended Books:

F.Y. B. Sc. Electronic Science

Paper I

EL-101: Principles of Analog Electronics

Objectives:

1. To get familiar with basic circuit elements and passive components
2. To understand DC circuit theorems and their use in circuit analysis
3. To study characteristic features of semiconductor devices
4. To study elementary electronic circuits and applications
5. To understand basics of operational amplifiers.

Term I

Unit 1: Passive Components (12)

Study of basic circuit elements and passive components (with special reference to working principle, circuit symbols, types, specifications and applications): Resistor, Capacitor, Inductor, Transformer, Cables, Connectors, Switches, Fuses, Relays, Batteries.

Unit 2: Basic Electrical Circuits and Circuit Theorems (14)

Concept of Ideal Voltage and Current source, internal resistance, dc sources (voltage/current) and sinusoidal ac source (amplitude, wavelength, period, frequency, phase angle), Network terminology, Ohm's law, series and parallel circuits of resistors, capacitors and inductors, voltage and current dividers, Kirchhoff's Laws (KCL, KVL), Superposition theorem, concept of black box, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem (numerical problems with maximum two meshes), Charging-discharging of capacitor, AC applied to R, C and L, concept of impedance, LCR series resonant circuit, concept of phase difference, RC low pass and high pass filter

Unit 3: Semiconductor Diodes and Circuits (10)

Study of semiconductor devices with reference to symbol, working principle, I-V characteristics, parameters, specifications: diode, zener diode, light emitting diode, photo diode, optocoupler, varactor diode, solar cell, clipper and clamper circuits Rectifiers (half and full wave), rectifier with capacitor-filter, Zener regulator, Block diagram of power supply

Term II

Unit 4: Bipolar Junction Transistor and Circuits (14)

Bipolar Junction Transistor (BJT) symbol, types, construction, working principle, I-V characteristics, parameters, specifications. Concept of amplification, voltage and current amplifier. Transistor amplifier configurations - CB, CC and CE, biasing circuits - voltage divider, collector feedback bias and emitter feedback bias (CE), Q point and factors affecting the stability, transistor as a switch

class A, B and class C amplifiers, emitter follower amplifier, Single stage RC coupled CE amplifier, concept of frequency response and bandwidth

Unit-5:UJT,FETs and Applications (10)

Symbol, types, construction, working principle, I-V characteristics, Specifications parameters of:Uni-Junction Transistor (UJT),Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor FET (MOSFET), comparison of JFET, MOSFET and BJT

Applications: JFET as voltage variable resistor, MOSFET as a switch

Unit 6: Operational Amplifier (12)

Symbol, block diagram, Opamp characteristics, basic parameters (ideal and practical) such as input and output impedance, bandwidth, differential and common mode gain, CMRR, slew rate, Concept of virtual ground, concept of feedback, Information about IC741

Opamp as inverting and non-inverting amplifier, voltage follower, adder, subtractor
Opamp as a comparator and Schmitt trigger

Text/ Reference Books:

1. Basic Electronics:Bernard Grob, McGraw Hill Publication, 8th Revised Edition, 2010
2. Electronic Principles:Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
3. Principles of Electronics: V.K. Mehta, S.Chand and Co.
4. A text book of electrical technology: B.L.Theraja, S.Chand and Co.
5. Basic Electronics and Linear Circuits: Bhargava N.N., Kulshreshtha D.C., Gupta S.C., Tata McGraw Hill.
6. A First Course in Electronics: Khan Anwar, K.K.Day, PHI learning Pvt.Ltd.
7. Electronic Devices and Circuits: Bolyestad, Tata McGraw Hill.
8. Electronic Devices and circuits: A. Motorshed, Prentice Hall of India.
9. Basic Electronic Devices and Circuits: R.Y.Borse, 1st Edition 2012, Adhyayan Publishers and Distributors, New Delhi.

Paper II

EL-102: Principles of Digital Electronics

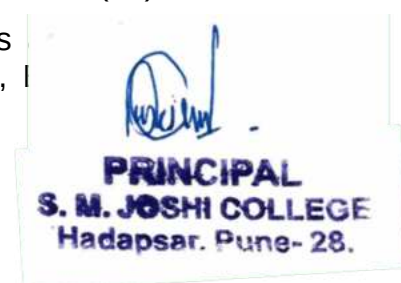
Objectives:

1. To get familiar with concepts of digital electronics
2. To learn number systems and their representation
3. To understand basic logic gates, boolean algebra and k-maps
4. To study arithmetic circuits, combinational circuits and sequential circuits
5. To study comparative aspects of logic families.

Term I

Unit 1: Number Systems and Logic Gates (12)

Introduction to decimal, Binary and hexadecimal number systems conversions, Signed and fractional binary number representations, and Graycodes, Alphanumeric representation in ASCII codes.



Positive and Negative Logic, Basic Logic gates (NOT, OR, AND) & derived gates (NAND, NOR, EX-OR) Symbol and truth table, Applications of Ex-OR gates as parity checker and generator.

Unit 2: Boolean Algebra and Karnaugh maps (12)

Boolean algebra rules and Boolean laws: Commutative, Associative, Distributive, AND, OR and Inversion laws, DeMorgan's theorem, Universal gates.

Min terms, Max terms, Boolean expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form., Simplifications of Logic equations using Boolean algebra rules and Karnaugh map (up to 3 variables).

Unit 3: Arithmetic Circuits (12)

Rules of binary addition and subtraction, subtraction using 1's and 2's complements, half adder, full adder, Half subtractor, Full subtractor, Four bit parallel adder, Universal adder / subtractor, Digital comparator, Introduction to ALU.

Term II

Unit 4: Combinational Circuits (14)

Multiplexer (2:1, 4:1), demultiplexer (1:2, 1:4) and their applications, Code converters - Decimal to binary, Hexadecimal to binary, BCD to decimal, Encoder & decoder 3x4 matrix keyboard encoder, priority encoder, BCD to seven segment decoder.

Unit 5: Sequential Circuits (14)

Flip flops : RS using NAND/NOR, latch, clocked RS, JK, Master slave JK, D and T.

Counters: Ripple Binary counter, up down counter, concept of modulus counters, Decade counter, Counters for high-speed applications (Synchronous counters) with timing diagrams.

Shift registers: SISO, SIPO, PISO, PIPO shift registers, ring counter, universal 4-bit shift register and Applications.

Unit 6: Logic Families (8)

Introduction to Integrated circuit technologies TTL, ECL, CMOS

IC parameters: Logic levels, switching speed, propagation delay, power dissipation, noise margins and fanout of TTL and CMOS.

TTL NAND & NOT gate, Open collector gates, Wired OR operation. CMOS - NOT, NAND, NOR gate, precautions while handling CMOS gates, tri-state logic.

Text/ Reference Books:

1. Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education



Paper III

EL-103: Practical Course

- 1 The practical course consists of 20 experiments.
- 2 Any two of the following activities with proper documentation will be considered as equivalent of 4 experiments weightage in term work.
 - i. Preparatory experiments
 - ii. Hobby projects
 - iii. Internet browsing
 - iv. industrial visit / live work experience
 - v. PCB Making
 - vi. Market Survey of Electronic Systems
 - vii. Circuit Simulations and CAD tools
 - viii. Study Tour and its report writing

These will be evaluated in an oral examination for 20% marks at internal and term end examination.

3. All the students are required to complete a minimum of 16 experiments (four from each group) from the following list.

Group A Any Four

1. Study of forward and Reverse biased characteristics of PN Junction Diode
2. Study of breakdown characteristics and voltage regulation action of Zener diode
3. Study of output characteristics of Bipolar Junction Transistor in CE mode
4. Study of output and transfer characteristics JFET/MOSFET
5. Study of I-V characteristics of UJT and Demonstration of UJT based relaxation oscillator .
6. Study of solar cell.

Group B Any four

1. Verification of network theorems: KCL / KVL, Thevenin, Norton.
2. Verification of network theorems: Maximum Power Transfer, Superposition theorem.
3. Design, build and test Low pass and High pass RC filters.
4. Study of low voltage Half-wave, Full-wave and Bridge rectifier circuits.
5. Study of amplification action of BJT.
6. Study of potential divider biasing of BJT and its use in DC motor driving.
7. Build and test Inverting and non inverting amplifier using OPAMP.
8. Build and test adder and subtractor circuits using OPAMP.
9. Study of clipping and clamping circuits.

Group C Any Four

* Minimum Two experiments may be carriedout with CMOS ICs

1. Basic Logic gates using Diodes and transistors
2. Interconversions and realizations of logic expressions using ICs
3. Study of RS, JK and D flip flops using NAND gates
4. Study of Up/Down Counter



5. Study of decade counter IC circuit configurations
6. Study of 4-bit Shift register IC

Group D Any Four

1. Build and Test 4 bit parity checker/ generator using X-OR gate IC
2. Build and Test Half Adder, Full Adder and Subtractor using basic gate
3. Build and Test 2:1 Multiplexer and 1:2 Demultiplexer using gates
4. Build and Test 3X4 matrix Keyboard Encoder
5. Build and Test a Debounce switch using NAND or NOR gate IC
6. Build and Test Diode matrix ROM
7. Study of Four bit Universal Adder/Subtractor / ALU

Preparatory Experiments

1. Identification of Components / Tools

- Minimum 10 different types of components must be given
- Identification based on visual inspection / data sheets be carried out

2. Use of Multimeters (Analog and Digital)

- Measurement of AC/DC voltage and Current – on different ranges
- Measurement of R & C
- Testing of Diodes & Transistors
- Measurement of h_{fe}
- Use of Multimeter in measurement of Variation of Resistance of LDR.
- Thermister

3. Study of Signal Generator/CRO

- Understand how to use Signal Generator/CRO
- Study of front panel controls
- Measurement of amplitude and frequency of Sine/Square waveform
- Measurement of Phase with the help of RC circuit
- Demonstration of Lissajous figures
- Demonstrate the use of Component testing facility

Hobby Project Examples

Build and Test gadgets like

- Water level Indicator
- Photo relay / smoke detector
- Burglar Alarm
- Fan regulator
- Logic Probe
- Experiments with some software's like PSPICE / LTSPICE



UNIVERSITY OF PUNE, PUNE.

Syllabus for F.Y.B.A.

Subject: MATHEMATICS

(With effect from June 2013)

Introduction:

University of Pune has decided to change the syllabi of various faculties from June, 2013. Taking into consideration the rapid changes and new approaches in different areas of mathematics and related subjects Board of Studies in Mathematics in consultation with teachers of Mathematics from different colleges affiliated to University of Pune has prepared the syllabus of F.Y.B.A. Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

Aims:

- i) Give the students sufficient knowledge of fundamental principles, methods and a clear perception of the power of mathematical ideas and tools and know how to use them by modeling, solving and interpreting.
- ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields.
- iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- iv) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

Objectives:

A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays, state important facts resulting from their studies.

A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved and mathematical reasoning.

A student should get adequate exposure to global and local concerns that explore many aspects of Mathematical Sciences.



A student should be able to apply her skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.

A student should be made aware of history of mathematics and hence of its past, present and future role as a part of our culture.

Eligibility: 12th pass with mathematics or equivalent examination.

Structure of the course:

Sr.No.	Paper	Theory	Term End	Total
1	FMG 1: Industrial Mathematics	80 Marks	20 Marks	100 Marks
2	MG 1 : Mathematics General Paper – I	80 Marks	20 Marks	100 Marks
3	AMG 1: Applied Mathematics General – I	80 Marks	20 Marks	100 Marks

All the above 3 courses are compulsory.

Medium of Instruction: English

Examination:

A) Pattern of examination: Annual.

B) Standard of passing : 40 Marks out of 100 marks for each paper.

But for passing, a student should obtain minimum 32 marks out of 80 in the final theory examination and total marks for theory and term-end examinations should be minimum 40.

C) Pattern of question papers:

- Q1. Attempt any 08 out of 10 questions, each of 02 marks. [16 Marks]
(05 questions from each term)
- Q2. Attempt any 04 out of 06 questions, each of 04 marks. [16 Marks].
(Based on term I)
- Q3. Attempt any 02 out of 03 questions, each of 08 marks. [16 Marks].
(Based on term I)
- Q4. Attempt any 04 out of 06 questions, each of 04 marks. [16 Marks].
(Based on term II)
- Q5. Attempt any 02 out of 03 questions, each of 08 marks. [16 Marks].
(Based on term II)

D) External Students: allowed.

E) Verification/ Revaluation: Allowed.



Equivalence of Previous syllabus along with new syllabus:

Sr.No	New Courses	Old Courses
1	FMG 1: Industrial Mathematics	FMG 1: Industrial Mathematics
2	MG 1 : Mathematics General Paper – I	MG 1 : Mathematics General Paper – I
3	AMG 1: Applied Mathematics General – I	AMG 1: Applied Mathematics General – I

Qualifications for Teacher: M.Sc./M.A. Mathematics (with NET /SET as per existing rules)

Details of Syllabus:**FMG 1: Industrial Mathematics :****FIRST TERM**

Unit 01: Review of Basic Concepts: 7 Lectures

Basic Algebra: Simultaneous Equations. Functions, Graphs, Slopes and Intercepts, Graphs of Non-linear functions.

Unit 02: The Derivative and the rules of differentiation: 12 Lectures

Limits, Continuity, The slope of a curvilinear function, The derivative, Differentiability and continuity, Derivative notation, Rules of Differentiation, Higher order derivatives, Implicit differentiation.

Unit 03: Use of derivative in Mathematics and Economics: 18 Lectures

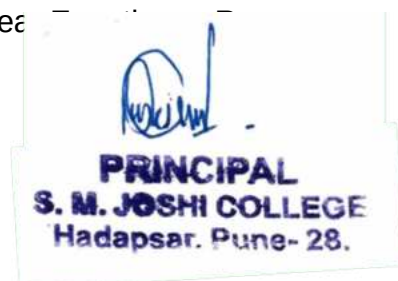
Increasing and Decreasing Functions, Concavity and Convexity, Relative Extrema, Inflection Points, Curve Sketching, Optimization of Functions, Marginal Concepts, Optimizing Economic Functions, Price Elasticity of Demand and Supply, Relationship among Total, Marginal, and Average Concepts.

SECOND TERM

Unit 04: Fundamentals of linear (or matrix) algebra 15 Lectures

The Role of Linear Algebra, Definitions and Terms, Addition and Subtraction of Matrices, Scalar Multiplication, Vector Multiplication, Multiplication of Matrices,

Commutative, Associative, and Distributive Laws in Matrix Algebra, Identity and Null Matrices, Matrix Expression of a System of Linear Equations



Operations, Augmented Matrix, Gaussian Method of Solving Linear Equations

Unit 05: Integral calculus: the indefinite integral

15 Lectures

Integration, Rules of Integration, Initial Conditions and Boundary Conditions, Integration by Substitution, Integration by Parts, Economic Applications

Unit 06: Linear programming: a graphic approach

15 Lectures

Graphic Solutions, The Extreme Point Theorem, Slack and Surplus Variables, The Basic Theorem.

Text Book:

1) Mathematical Economics, 2/ed, Edward T. Dowling,

Schaum's outline series, McGraw Hill International Edition

[Chapter 1 (1.1 to 1.9), Chapter 3 (3.1 to 3.9), Chapter 4 (4.1 to 4.10),

Chapter 10 (10.1 to 10.12), Chapter 13 (13.1 to 13.4), Chapter 16 (16.1 to 16.6).]

MG 1 : Mathematics General Paper – I (Algebra & Geometry)

FIRST TERM (Algebra)

Unit 01: Integers

15 Lectures

1.1 Well Ordering Principle for $\mathbb{N}$. Principle of Mathematical induction (strong form).

1.2 Divisibility in $\mathbb{Z}$: Definition and elementary properties. Division Algorithm, Euclidean Algorithm (Without proof) G.C.D. and L.C.M of integers, Relatively prime integers, Definition Prime numbers, Euclid's lemma, Basic properties of G.C.D., G.C.D of any two integers a and b if it exists is unique and can be expressed in the form $ax + by$, where $x, y \in \mathbb{Z}$.

1.3 Equivalence Relations, Equivalences classes, properties of Equivalences classes, Definition of partition, every partition gives an equivalence relation and vice-versa, Definition of Congruence, Congruence as equivalence relation on $\mathbb{Z}$, Residue classes, Partition of $\mathbb{Z}$, Addition modulo n , Multiplication modulo n .

Unit 02: Polynomials

6 Lectures

2.1 Definition of polynomial, Degree of polynomial, Algebra of polynomials, Division algorithm (without proof). G.C.D of two polynomials (without proof)



2.2 Remainder Theorem, Factor Theorem.

2.3 Relation between the roots and the coefficients of a polynomial, Examples.

Unit 03: Matrices and System of linear equations.

15 Lectures

3.1 Matrices, Echelon and Reduced echelon form of a matrix, Reduction of matrix to its echelon form, Definition of rank of a matrix by using echelon form.

3.2 System of linear equations, Matrix form of system of linear equations, Homogeneous and non-homogeneous system of linear equations, Gauss Elimination and Gauss Jordan Method.

3.3 Consistency of a system of linear equations, condition of consistency (without proof).

3.4 Eigen values, Eigen vectors, characteristic equation of a matrix of order up to 3×3

3.5 Statement of Cayley Hamilton theorem and its use to find the inverse of a matrix.

SECOND TERM (Geometry)

Unit 04: Analytical Geometry of two dimensions:

10 Lectures

4.1) Change of axes, Translation and rotation.

4.2) Conic Section: General equation of second degree in x and y . Centre of conic, Nature of conic, Reduction to standard form.

Unit 05: Planes in 3-dimension:

6 Lectures

Revision: Equations of the first degree in x, y, z , Transformation to the normal form, determination of plane under given conditions, Equations of the plane through three given points.

5.1 Systems of planes, two sides of a plane.

5.2 Length of the perpendicular from a point to a plane, bisectors of angles between two planes.

5.3 Joint equation of two planes, Angle between planes.

Unit 06: Lines in 3-dimension:

6 Lectures

Revision: Equations of a line, equations of a straight line in terms of its direction cosines and the co-ordinates of a point on it, equations of a line through two points, Symmetrical and unsymmetrical forms of the equations of a line. transformation of the equations of a line to the symmetrical form. Angle between a line and a plane.

6.1 The condition that a given line may lie in a given plane, the condition that two given lines are coplanar.



6.2 Number of arbitrary constants in the equations of a straight line, sets of conditions which determine a line.

6.3 The shortest distance between two lines, the length and equations of the line of shortest distance between two straight lines, length of perpendicular from a given point to a given line.

Unit 07: Sphere

8 Lectures

7.1 Definition and equation of the sphere in various forms.

7.2 Plane section of a sphere, intersection of two spheres.

7.3 Equation of a circle, sphere through a given circle, intersection of a sphere and a line.

7.4 Equation of a tangent plane.

Unit 08: Cones and Cylinders:

6 Lectures

8.1 Definition of cone and cylinder.

8.2 Equation of cone and cylinder with vertex at origin and (α, β, γ) .

8.3 The right circular cone, equation of a right circular cone.

8.4 The right circular cylinder, equation of a right circular cylinder.

Text Book: Text book of Algebra & Geometry, Prepared by B.O.S. in Mathematics, University of Pune, Pune.(2013).

Reference Books:

1. Shantinayakan: Analytical Solid Geometry, S. Chand and Company Ltd, New Delhi, 1998.
2. David Burton, Elementary Number Theory, Tata McGraw Hill, Indian Edition.
3. H. Anton and C. Rorres, Elementary Linear Algebra with Applications, Seventh Ed Wiley, (1994).
4. P.K.Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd. 1999.
5. K.B.Datta, Matrix and Linear Algebra, Prentice hall of India Pvt.Ltd, New Delhi 2000.



AMG 1: Applied Mathematics General – I

(Calculus and Differential Equations)

FIRST TERM (Calculus)

Unit 1. The Real Numbers :

8 Lectures

- 1.1 Algebraic properties of $\mathbb{R}$,
- 1.2 Order properties of $\mathbb{R}$, intervals in $\mathbb{R}$, neighborhoods and deleted neighborhoods of a real number, bounded subsets of $\mathbb{R}$.
- 1.3 The Completeness Property of $\mathbb{R}$, denseness of $\mathbb{Q}$ in $\mathbb{R}$.

Unit 2. Limit and Continuity

10 Lectures

- 2.1 $\epsilon - \delta$ definition of limit of a function, Basic properties of limits.
- 2.2 Continuity of function at a point, Types of discontinuity.
- 2.3 Continuous functions on intervals.
- 2.4 Properties of continuous functions on closed and bounded interval.
(i) Boundedness. (ii) Attains its bounds. (iii) Intermediate value theorem

Unit 3. Differentiation

18 Lectures

- 3.1 Definition of derivative of a real valued function at a point, notion of differentiability, geometric interpretation of a derivative of a real valued function at a point.
- 3.2 Differentiability of a function over an interval.
- 3.3 Statement of rules of differentiability, chain rule of finding derivative of composite of differentiable functions (without proof), derivative of an inverse function.
- 3.4. Mean Value Theorems: Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem
- 3.5 Indeterminate forms. L-Hospitals rule.
- 3.6 Higher order derivatives, examples, Leibnitz Theorem and its applications
- 3.7 Taylor's and Maclaurin's Theorem with Lagrange's form of remainder (without proof), Examples with assuming convergence of series.

SECOND TERM (Differential Equations)

Unit 4. Integration

08 Lectures

- 4.1 Integration of rational function by using partial fraction.
- 4.2 Integration of some irrational functions:

i) $\int (ax + b)^{\frac{1}{n}} dx$ where n is a positive integer, ii) $\int \frac{Ax + B}{\sqrt{ax^2 + bx + c}} dx$
iii) $\int (Ax + B)\sqrt{ax^2 + bx + c} dx$

4.3 Reduction formula

i) $\int \frac{x^n}{\sqrt{ax^2 + bx + c}} dx$ ii) $\int \frac{dx}{(x^2 + a^2)^n}$, n is a positive integer iii) $\int (x^2 + a^2)^{n/2} dx$
iv) $\int_0^{\pi/2} \sin^n x dx$ v) $\int_0^{\pi/2} \cos^n x dx$



Unit 5. Differential Equations of first order and first degree: 16 Lectures

5.1 Introduction to function of two, three variables, homogenous functions, Partial derivatives.

5.2 Differential equations, General solution of Differential equations.

5.3 Methods of finding solution of Differential equations of first order and first degree, Variable separable form, Homogenous Differential equations, Differential equations reducible to homogeneous form. Exact Differential equations.

Differential equations reducible to exact Differential equations, Integrating factors, Linear Differential equations. Bernoulli's Differential equations.

Unit 6. Application of Differential Equations :

06 Lectures

6.1 Orthogonal trajectories.

6.2 Kirchhoff's law of electrical circuit (RC & LR Circuit)

Unit 7. Methods of finding general solution of Differential Equations of first order and higher degree: 06 Lectures

7.1 Equations solvable for p .

7.2 Equations solvable for x .

7.3 Equations solvable for y .

7.4 Equation in Clairaut's form.

Text Book: Text book of Calculus and Differential Equations Prepared by B.O.S. in Mathematics, University of Pune, Pune. (2013).

Reference Books:

1. Introduction to Real Analysis by Robert G. Bartle and Donald R. Sherbert, Third Edition, John Wiley and Sons, 2002
2. Integral Calculus, Shantinayakan, S.K.Mittal, S. Chand and Co. Publication 2006.
3. R.Courant and F.John, Introduction to Calculus and Analysis, Vol. 1, Reprint of the first Ed., Springer-Verlag, New York, 1999.
4. Principles of Mathematical Analysis, W. Rudin, Third Edition, McGrawHill, 1976
5. Elementary Differential Equations, Macmillan Publication, by Rainville and Bedient.
6. Ordinary and partial Differential equations, M.D. Raisingania, S. Chand and Company, 2009.



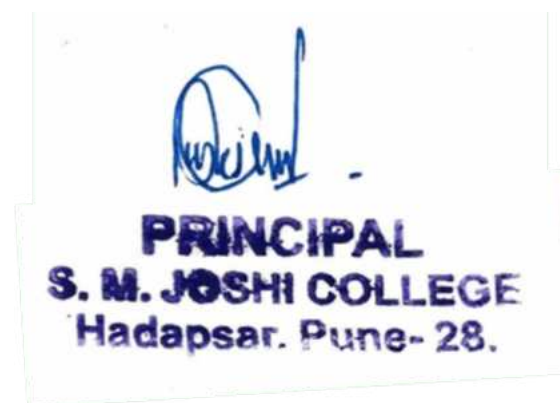
Structure /Pattern of syllabus- F.Y.B.A

1. Title of the course – **Gg- 110- Elements of Geomorphology (G-1)**
2. Preamble of the syllabus
 - i. To introduce the students to the basic concepts in Geomorphology.
 - ii. To introduce latest concepts in Geomorphology.
 - iii. To acquaint the students with the utility and application of Geomorphology in different regions and environment.
 - iv. To make the students aware of the need of protection and conservation of different landforms.
3. Introduction: Pattern –**Annual (20 marks internal -80 marks University)**
4. Eligibility- **12th pass any faculty**
5. Examination-
 - A. Pattern of examination-
 - i **(Internal term end and University exam),**
 - ii. **Pattern of question paper- 20-80**

Internal Exam- 60 Marks = (converted to 20 marks)

University Exam- 80 Marks =

- B. Standard of passing- **Internal -08- University -32= Annual marks 40**
- C. ATKT rules- **No**
- D. Award of class- **F.Y.B.A. Pass**
- E. External students- **F.Y.B.A. Pass**
- F. Setting of question papers / pattern of question paper



Internal Exam- 60 Marks = (converted to 20 marks)

Question 1. Answers in 20 words- 14marks (any 7 out of 10)

Question 2. Answers in 50 words -08 marks (any 2 out of 4)

Question 3. Answers in 150 words- 18 marks (any 3 out of 5)

Question 4. Answers in 300 words- 20 marks (any 1 out of 2)

University Exam- 80 Marks =

Question 1. Answers in 20 words- 20 marks (any 10 out of 15)

Question 2. Answers in 50 words -10 marks (any 2 out of 4)

Question 3. Answers in 150 words- 20 marks (any 2 out of 4)

Question 4. Answers in 300 words- 30 marks (any 2 out of 4)

G. Verification / Revaluation- Yes

6. Structure of the Course
 - a. Compulsory paper- **F.Y.B.A. General**
 - b. Optional paper- **No**
 - c. Question paper and papers etc - **One**
 - d. Medium of instructions- **Marathi and English**
7. Equivalence of previous syllabus along with propose syllabus- **yes**
8. University terms- **Annual**
9. Subject wise detail syllabus – **As per attached sheets**
10. Recommended books- **Mentioned in Syllabus**

Qualification of teacher- **M.A./M.Sc(Geography), as per UGC and University norms**


PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar. Pune- 28.

Equivalence of Syllabus in Geography (F.Y.B.A.) effective from June 2013

Old Syllabus June 2008		New Syllabus June 2013	
Gg-110	Physical Geography	Gg-110	Elements of Geomorphology


PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar. Pune- 28.

Gg- 110 -Elements of Geomorphology (G-1)**Revised Syllabus (from June, 2013)****Objectives:**

- I. 1. To introduce the students to the basic concepts in Geomorphology.
- II. To introduce latest concept in Geomorphology
- III. To acquaint the students with the utility and application of Geomorphology in different regions and environment.
- IV. To make the students aware of the need of protection and conservation of different landforms

Section I			
Unit No.	Unit	Sub Unit	No. of periods
1	Introduction to Geomorphology	a. Introduction to Physical Geography and its branches b. Geomorphology- Definition, Nature and Scope	8
2	Fundamental Concepts of The Earth	a. The Earth Size, Shape, Radius, Circumference, Parallels of Latitudes and Meridians of Longitudes. b. Time: Local time and Standard time, Time Zone and International Date Line.	6
3	The Earth	a. The earth – its Interior, Composition & Structure b. Origin of Continents and Ocean basin i. Wegener's Continental Drift Theory ii. Theory of Plate Tectonics- iii. Theory of Sea Floor Spreading	5 6
4	Rocks	a. Rock- Definition and origin. b. Type of Rocks- Igneous, Sedimentary and Metamorphic rocks	5
5	Crustal Movements	a. Internal Movements- Definition, Causes b. Classification of Movements i. Slow movements- Folding and Faulting ii. Rapid movements – Volcanism and Earthquakes	


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Section II				5
6	Weathering	a. Definition of Weathering, b. Type of Weathering- Mechanical, Chemical, biological and Anthropogenic weathering c. Hydrological cycle		6
7	Agents of Erosions and Depositions	Landforms created by following agents a. Rivers. b. Sea-waves.		6
8	Mass Wasting	Concept – Type – Soil Creep, Landslides, Debris flows, Avalanches, Mud Flow		8
9	Slopes	Meaning & Definition of slopes, Types and slope segments Concave, Convex , Terraced, Rectilinear		6
10	Applications of Geomorphology	a. Human Activity: i. Settlement ii. Transport iii. Landuse iv. Mining v. Resource Evaluation		6
		b.Environmental Hazards & Assessment: i. Landslides ii. Tsunami iii. Soils Degradation iv. Floods		5
		c. Watershed Management:		4
		d. Field Visit (Not more than two days) for observations and identification of landforms.		4


PRINCIPAL
S. M. JOSHI COLLEGE
 Hadapsar. Pune- 28.

Reference Books:

- 1 Physical Geography, Strahler. A.A. and Strahler A.N. 2002
- 2 Morphology and Landscape, H. Robinson, University Tutorial Press Ltd, London
- 3 The Face of Earth, Penguins 1980, Dury G. H.,
- 4 Introduction to Geomorphology, Oxford University Press, Calculatta 2001, Kale V. & Gupta A.
- 5 Geomorphology, Prayag Pustakalay, Alahabad, 1988, Singh Savinder
- 6 Prakrukik Bhuvigyan, Arvind Bhagwat, Shrikant Karlekar
- 7 Sugam Prakrutik Bhuvigyan, Prof. Suresh Date, Mrs. Date
- 8 Prakritik Bhugol, Part 1 & 2, W. R. Ahirrao, T. M. Varat, S. S. Alizad
9. Prakritik Bhugol, A. B. Savadi & P.S. Kolekar, Niralo Prakashan
10. Science and Systems of the Human Environment, John Wiley & Sons INC
11. Siddhartha K, 2001, The Earths Dyanamic Surface- Kisalaya Publication Pvt Ltd New Delhi



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University of Pune
First Year B.A.
History General Paper No. 1
Chh. Shivaji and His Times
(1630 – 1707)

Objectives :

To Introduce innovative study techniques in the study of History of Maratha to make it value based, conceptual and thought provocative. To introduce International elements in the study of Marathas to facilitate comparative analysis of this history. To highlight the importance of past in exploration of present context. To understand the Socio –economic, cultural and political background of 17th century Maharashtra. To increase the spirit of healthy Nationalism & Secularism among the student. To encourage students to for competitive examinations. To promote interest in the discipline of History. Suggesting the Importance of References.

First Term-

1. Sources.

10

A) Literary Sources.

- 1) Sanskrit
- 2) Marathi
- 3) Hindi
- 4) Persian

B) Foreign Sources.

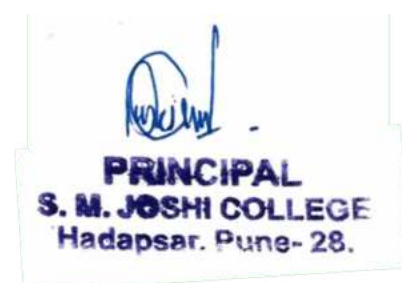
- 1) Portuguese
- 2) Dutch
- 3) French
- 4) English

C) Travellers Accounts.

2. Conceptual study of Chh. Shivaji and his times.

7

1) Bhakti.	2) Watan
3) Saranjam .	4) Mansab
5) Jahagir	6) Jiziya
7) Guerrilla Warfare	8) Maharashtra Dharma



9) Shiledars	10) Swarajya
11) Chauth	12) Inam
13) Baragirs.	14) Sardeshmukhi.

3. Rise and Consolidation of Maratha power.	13
1) Establishment of the Swarajya	
2) Shivaji - Adilashahi Relations	
3) Shivaji - Mughal Relations	
4) Shivaji's Coronation.	
5) Karnataka Expedition.	
4. Administration Under Chh. Shivaji	8
1) Central	
2) Provincial	
3) Military	
4) Judiciary.	
5. Chh. Shivaji & Foreign Powers.	10
1) Portuguese.	
2) Dutch.	
3) French.	
4) British.	

Second Term.

6. Chh. Sambhaji's Achievements	10
1) Consolidation of power.	
2) Relations with Mughals.	
3) Relations with Foreign Powers.	
4) Evaluation.	
7. Maratha War of Independence .	10
1) Chh. Rajaram and his Achievements.	
2) Maharani Tarabai & her Achievements.	
3) Contribution of Santaji Ghorpade, Dhanaji Jadhav & Ramo Amatya.	



8. Social Life.	10
1) Gavgada.	
2) Woman	
3) Religious	
9. Economic Life.	10
1) Agriculture And Revenue System	
2) Sources of income	
3) Trade & Commerce	
4) Currency	
10. Arts & Architecture .(Special Ref. to Temple, Gadhi, and Forts)	8

Books for Study :

1. M.G. Ranade-Rise of the Maratha Power.
2. G.S. Sardesai-New History of the Marathas, Vols. I, II and III.
3. J.N. Sarkar-Shivaji and His Times.
4. S.N. Sen-Administrative System of the Marathas.
5. S.N. Sen-Military System of the Marathas.
6. Nadkarni R. V. –Rise and fall of the Maratha Empire.
7. Sarkar J.N.-House of Shivaji.
8. Dr. Balkrishna – Shivaji the Grate.
9. Pagadi Setu Madhavrao – Chh. Shivaji

मराठी ग्रंथ :

१. अ.रा. कुलकर्णी व ग.ह. खरे (संपा.)—मराठ्यांचा इतिहास, खंड १ त ३.
२. प्र.न. देशपांडे—मराठी सत्तेचा उदय आणि उत्कर्ष.
३. वा.कृ. भावे—शिवराज्य व शिवकाल.
४. बेद्रे, वा.सी. — शिवाजी महाराजांचे विधिचिकित्सक चरित्र.
५. रामचंद्र पंत अमात्य — आज्ञापत्र.



६. सौ.कमल गोखले — शिवपुत्र संभाजी.
 ७. काळे, दि.वि.—छत्रपती शिवाजी महाराज.
 ८. शहा, जी.बी. — उपेक्षित दुर्ग, भाग एक व दोन
 ९. तांबोळी, एन.एस. — मराठ्यांचा इतिहास
 १०. चिटणिस, कृ.ना. — मध्ययुगीन भारतीय संस्था व संकल्पना, खंड १ ते ४.
 ११. पवार जयसिंगराव — मराठी सत्तेचा उदय व उत्कर्ष
 १२. सावंत, व जाधव — मराठ्यांचा प्रशासकिय, सामाजिक व आर्थिक इतिहास
 १३. कदम उमेश — मराठा—फ्रेंच संबंध
 १४. पिसुर्लेकर पांडुरंग — मराठा—पोर्तुगीज संबंध
 १५. बेंद्रे. वा.सी. — छत्रपती संभाजी महाराजांचे विचिकित्सक चरित्र
 १६. पवार जयसिंगराव — महाराणी ताराबाई
 १७. शिवदे सदाशिव — महाराणी ताराबाई
 १८. पवार जयसिंगराव — संताजी घोरपडे स्मारक ग्रंथ
 १९. कुलकर्णी, अ.रा. — शिवकालीन महाराष्ट्र
 २०. माटे, म.श्री. — मराठे कालीन वास्तूकला
 २१. पाटील आर.ए. — मराठ्यांचा इतिहास
 २२. सरदेसाई गो.स. — मराठी रियासत, खंड १ ते ३
 २३. कठारे अनिल व घोडके जयश्री — शिवकालीन महाराष्ट्र
-

University of Pune

First Year B.A.

History of Civilization : Cultural History of Maharashtra (upto 13th century)

Objectives

1. To introduce the student to the culture of Maharashtra from ancient times onwards.
2. To create a sense of pride in the student about his cultural tradition.
3. To highlight how this regional cultural identity forms a part of the main flow of the Indian cultural tradition.
4. To restructure the value based syllabus.
5. To get acquainted with basic concepts, theories and methodology of social philosophy.
6. New thoughts, trends and ideologists should be included and knowledge extension needs to be taken into consideration.

First Term

12

1. Civilization

1. Concept & scope of civilization
2. Geographic identity of Maharashtra
3. Nomenclature of Maharashtra
4. Origin of Marathi language

2. Maharashtra Culture

12

1. Concept & scope of civilization
2. Cultural identity of Maharashtra
3. Proto historic culture – Dayamabad, Nevase, Inamgaon
4. Megalithic culture

3. Political outline

12

1. Satvahan
2. Vakatak
3. Rashtrakut
4. Chhatrap
5. Shilahar
6. Yadav



4.	Social Life	12
	1. Caste System	
	2. Village Life	
	3. Position of Women	
	4. Fairs & Festivals	

Second Term

5.	Economic life	12
	1. Agriculture	
	2. Trade and commerce	
6.	Art and Architecture	12
	1. Sculpture, Painting, Folk Arts	
	2. Caves, Forts and temples	
7.	Bhakti Cult – Philosophy and teaching	12
	1. Nath	
	2. Mahanubhav	
	3. Varkari	
	4. Shakti	
8.	Literature – A brief survey	12
	1. Sanskrit, Spl. Ref. to Manassollas	
	2. Prakrit, Spl. Ref. to Gatha Saptshati	
	3. Apabramsha, Spl. Ref. to Jain Agam	
	4. Marathi, Spl. Ref. to Jyotish Ratnamala, Lila Charitra, Vivek Sindu	

Books for Study :

1. Gokhale B.G., Buddhism in Maharashtra, Popular Prakashan, Mumbai, 1976.
2. Mate M.S., Maratha Architecture, Mansanman Publication, Pune.

मराठी

१. जोगळेकर ग.ना. (संपा), गाथासप्तशती
२. साखरे विजया — वाकाटक कला



३. साखरे विजया — पुरातत्व विद्या.
४. कठारे अनिल व साखरे विजया — भारतीय कलेचा इतिहास.
५. कुलकर्णी गो.त्रं., मध्ययुगीन महाराष्ट्राचा इतिहास इ.स. १२९६—१६३६, महाराष्ट्र राज्य साहित्य संस्कृती मंडळ, मुंबई, २००१.
६. केतकर श्री.व्यं., प्राचीन महाराष्ट्र, वरदा प्रकाशन, पुणे, १९८९.
७. जाधव रा.ग. संपा., विचारशिल्प, कॉन्टिनेन्टल प्रकाशन, पुणे, १९९४.
८. जोशी महादेवशास्त्री, गाजती दैवते, ज्ञानराज प्रकाशन, पुणे १९५९.
९. जोशी वसंत (संपा), मराठी संस्कृती काही समस्या, व्हीनस प्रकाशन, पुणे १९८०.
१०. डिसकळकर द.बा., महाराष्ट्राचा प्राचीन इतिहास आणि संस्कृति, पुणे विद्यापीठ, पुणे, १९६७.
११. ढेरे रा.चिं., नाथ संप्रदायाचा इतिहास, पद्मगंधा प्रकाशन, पुणे, २००१.
१२. ढेरे रा.चिं., महाराष्ट्राचा देव्हारा, विश्वकर्मा प्रकाशन, पुणे १९७६.
१३. तुळपुळे शं.गो., प्राचीन मराठी कोरीव लेख, पुणे विद्यापीठ प्रकाशन, पुणे, १९६३.
१४. दांडेकर गो.नी., महाराष्ट्र दर्शन, मृण्मयी प्रकाशन, पुणे, २००१.
१५. पाठक अ.शं. संपा., इतिहास: प्राचीन काळ खंड १, दर्शनिका विभाग, मुंबई २००२.
१६. पाठक अ.शं. संपा., महाराष्ट्र: इतिहास प्राचीन काळ खंड १, भाग २ स्थापत्य व कला, दर्शनिका विभाग, मुंबई २००२.
१७. माटे म.श्री., प्राचीन भारतीय कला, कॉन्टिनेन्टल प्रकाशन, पुणे.
१८. सोवनी म.वि., महाराष्ट्राच्या कालमुद्रा, नितीन प्रकाशन, पुणे, १९८३.
१९. सहस्रबुध्दे पु.ग., महाराष्ट्र संस्कृती, कॉन्टिनेन्टल प्रकाशन, पुणे, १९७९.
२०. शेणोलीकर ह.श्री. व देशपांडे प्र.न. — महाराष्ट्र संस्कृती.
२१. पानसे मु.ग. — यादवकालीन महाराष्ट्र.
२२. ढवळीकर म.के. — महाराष्ट्राची कुळकथा
२३. सांकलिया (संपा) — महाराष्ट्राचे पुरातत्व



२४. देव शं.भा. — पुरातत्त्व विद्या
२५. ढवळीकर म.के. — महाराष्ट्राची पुरातत्त्व विद्या.
२६. अत्रे शुभांगणा — महाराष्ट्र संस्कृती.
२७. गोखले शोभना — पुराभिलेख विद्या.
-



PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar. Pune- 28.

University of Pune

BOARD OF STUDIES IN ECONOMICS

F.Y.B.A. Economics Revised Syllabus (From June - 2013)

G-1 Indian Economy – Problems and Prospects

OR

G-I Agricultural Economics

UNIVERSITY OF PUNE

BOARD OF STUDY IN ECONOMICS

F.Y.B.A. ECONOMICS REVISED SYLLABUS COMMITTEE.

Dr. Suhas Avhad

Chairman

Dr. N.R. Dangat

Coordinator

Dr. R.Y.Shide

BOS Member

Dr. S.K Pagar

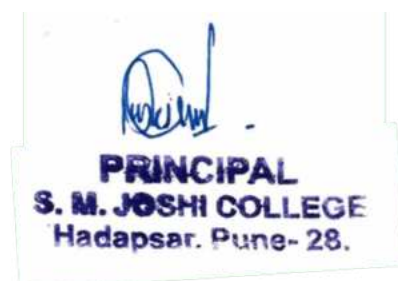
BOS Member

Dr. R.K Datir.

Subject Expert

Dr. R.G Rasal.

Subject Expert



University of Pune
F.Y.B.A. Economics Revised Syllabus.
G-1 Indian Economy – Problems and Prospects
(From June - 2013)
Section – I

1. Developing Economy. (12)

- 1.1 Developed and Developing Economy – Meaning & Concept.
- 1.2 Basic Characteristics of Indian Economy as a Developing Economy.
- 1.3 Comparison of Indian Economy with Developed Countries –
 - a) Population b) Per-capita Income c) Human Development Index.
 - d) Agriculture e) Industry f) Service Sector.
- 1.4 Major issues of Development in India

2. Population . (12)

- 2.1 Theory of Demographic Transition.
- 2.2 Size and Growth of Population.
- 2.3 Features of Indian population
 - 2.3.1 Sex Composition.
 - 2.3.2 Rural Urban Distribution.
 - 2.3.3 Age Composition.
 - 2.3.4 Density of Population.
 - 2.3.5 Occupational Distribution.
 - 2.3.6 Quality of Population.
- 2.4 Causes of growing Population.- High Birth rate and Decreasing Death rate.
- 2.5 Problems of Over Population
- 2.6 Measures for Population Control.
- 2.7 Population Policy 2005 onward

3. Poverty and Unemployment (12)

- 3.1 Meaning and Concept of Poverty.
- 3.2 Poverty line- Need of redefining.
- 3.3 Measurement of Poverty.
- 3.4 Causes of Poverty.



- 3.5 Measures of eradication of Poverty.
- 3.6 Unemployment – Nature & Types, Causes & Measures

4. Agriculture. (12)

- 4.1 Place of Agriculture in Indian economy.
- 4.2 Agricultural Productivity – Causes of Low Productivity & Measures.
- 4.3 Green Revolution- Achievements & Failures.
- 4.4 Sources of Agricultural Finance.
- 4.5 Agricultural Marketing – Defects & Measures.
- 4.6 Suicide of Farmer's - Causes and Measures to prevent Farmer's Suicide
- 4.7 Special Economic Zone- Concept, Features, Problems.

Section – II

5. Industry. (12)

- 5.1 Role of Industrialization.
- 5.2 Industrial Policy – 1991.
- 5.3 New Economic Reforms – Concept
 - i) Liberalization ii) Privatisation, iii) Globalization
- 5.4 Small and Large Scale Industry – Growth and Problems.
- 5.5 Growth of Knowledge Based Industry – IT, Software Consultancy.

6. Labour. (12)

- 6.1 Meaning and Classification of Labour.
- 6.2 Characteristics of Industrial Labour.
- 6.3 Industrial Dispute :- Causes, Measures for Settlement.
- 6.4 Social Security Measures in India.

7. Planning. (12)

- 7.1 Meaning, Concept, Need and Objectives.
- 7.2 Types of Planning – Merits and Demerits.
- 7.3 Objectives, Achievements, and Failures of 11th Five Year Plan.
- 7.4 Objectives, of 12th five year plan

8. Economy of Maharashtra. (12)

- 8.1 Salient Features of Economy of Maharashtra.
- 8.2 Co-operative Movement – Progress, Problems & Prospects



- 8.3 Role of Co-operative in Economic Development of Maharashtra.
- 8.4 Regional Imbalance Causes & Preventive Measures.
- 8.5. Water Management concept and utility

Basic Reading List

- Gaurav Datta Ashwani Mahajan (2012), Indian Economy. S. Chand & Company Ltd., New Delhi.
- Misra & Puri - (2011) Indian Economy, Himalaya Publication house, Mumbai.
- Gopal and Suman Banhri (2013) Indian Economy Performance and Policies. Pearson Publication Delhi.
- Prakesh B.A. (2011) The Indian Economy Since 1991 Economic Reforms and performance, Pearson Publication Delhi.
- **Reference Books**
- Tandon - Indian Economy.
- Dhar P.K., Indian Economy.
- Agrawal A.N., Problems of Development & Planning.
- Memoria C.B. Agricultural Problems of India, Kitab Mahal Publication. Kitab mahal, New Dehli.
- Dr. Datir R.K. And others Bharatiya Arthvyavastha- 5th Edition 2012, Nirali prakashan Pune.
- Jalan B., The Indian Economy Problem and prospectus, Viking, New Dehli
- Planning Commission (2007), Eleven Five Year Plan (2007-12).
- Govt. of India – Economic Survey.
- World Bank – World Development Report.
- Census of India (2001),
- C.S.O. National Account Statistics.



University of Pune
F.Y.B.A Economics- General Paper - I
G-I Agricultural Economics
(From June 2013)
Section – I

1) Introduction (10)

- 1.1 Agricultural Economics - Meaning, Nature, Scope and Importance
- 1.2 Role of Agriculture in Economic Development
- 1.3 Trends in Agricultural Growth since 1950-51

2) Development of Agriculture (14)

- 2.1 Agricultural Productivity – Meaning and concept
 - 2.1.1 Causes of Low Productivity and Measures.
 - 2.1.2 Regional Variations, Comparison with Developed Countries,
- 2.2 Green Revolution – Achievement and Failures. Need of second Green Revolution
- 2.3 Changes in Cropping Pattern
- 2.4 Organic Farming – Meaning & Scope

3. Recent Issues in Indian Agriculture (12)

- 3.1 Environmental Issues
- 3.2 Special Economic Zone (SEZ) - Impact on Agriculture.
- 3.3 Farmers Suicide – Causes & Preventive Measures.
- 3.4 Agriculture Price Policy.
- 3.5 Issues on Agriculture - Food Security.

4. Agricultural Marketing (12)

- 4.1 Problems and Remedies of Agricultural Marketing in India.
- 4.2 Co- operative Marketing – Merits and demerits.
- 4.3 Market Model Act 2007.
- 4.4 Agricultural Export and Import –policies since 2009
- 4.5 Foreign direct investment in Agriculture

Section – II

5. Agricultural Labour (12)

- 5.1 Agricultural Labour - Meaning and concept.
- 5.2 Features of Agricultural Labour.
- 5.3 Type of Agricultural Labour
- 5.4 Minimum Wages Act.
- 5.5 National Rural Employment Guaranty Scheme.- Nature & Evaluation

6) Agricultural Finance (12)

- 6.1 Importance of Agricultural Finance
- 6.2 Sources of Agricultural Finance
- 6.3 Problems of Agricultural Finance
- 6.4 Role of NABARD in Agricultural Finance
- 6.5 Role of Micro Finance



7) Irrigations and Agricultural Inputs (12)

- 7.2 Importance of Irrigations in Agriculture
- 7.2 Type of Irrigation – Traditional Advanced
- 7.3 . Type of New Irrigation System -Benefits of New of Irrigation
- 7.4 Role of Farmer in Water Management
- 7.5 Drought –Reason and Remedies

8) WTO and Indian Agriculture (12)

- 8.1 WTO – Objectives and Functions.
- 8.2 WTO- Agreement on Agricultural, Patent Policy
- 8.3 WTO-Impact on Indian Agriculture

Basic Reading List

- Dalt.R.& K.P.M.Sundharm (2011), Indian Economy , S.Chand & Co.Ltd New Delhi
- Misra S.K. & V.K.Puri (2011), Indian Economy Himalaya Publication house Mumbai
- Sadhu A.N. and J.Sing, Agricultural Problems in India, Himalaya Publishing House Mumbai
- Sundarm I.S. Rural Development Himalaya Publishing House Mumbai

Additional Reading List

- Gopal and Suman Banhri (2013) Indian Economy Performance and Policies. Pearson Publication Delhi.
- Dr. Datir R.K. And others Bharatiya Arthvyavastha- 5th Edition 2012, Nirali prakashan Pune.
- GoMamoria C-D : Agricultural Problem of India Kitab Mahal 2005
- Government of India ,Economic Survey New Delhi
- RBI,Hand Book of statistics of India.



University of Pune

**F. Y. B. A. Political Science
G-1 General Paper**

**INDIAN GOVERNMENT AND POLITICS
OR
MODERN INDIAN POLITICAL
THOUGHT**

(80. 20 pattern to be Implemented from 2013-2014)



University of Pune
F. Y. B. A. Political Science
G-1 General Paper

INDIAN GOVERNMENT AND POLITICS

(80. 20 pattern to be implemented from 2013-2014)

COURSE RATIONALE

This paper focuses in detail on the political processes and the actual functioning of the political system. It simultaneously studies in detail the political structure both Constitutional and Administrative. It emphasizes on local influences that derive from social stratification of castes and jatis, from language, religion, ethic and economic determinants and critically assesses its impact on the political processes. The major contradictions of the Indian Political Process are to be critically analyzed along with an assessment of its relative success and failure in a comparative perspective with other developing countries and in particular those belonging to the South Asian region.

Term I

Period

Topic 1: Background and the Salient Features of Indian Constitution

- a) Formation of Constituent Assembly
 - b) Philosophy of the Preamble for Indian Constitution
 - c) Major Features: Parliamentary Democracy, Federalism, Independent Judiciary –Social Justice and Social Transformation
- 12

Topic 2: Fundamental Rights, Duties and the Directive Principles of State Policy

- a) Nature of Fundamental Rights –Major Fundamental Rights-Right to Equality, Right to Liberty, Right to Freedom of Religion, Cultural and Educational Rights
 - b) Importance of Fundamental Duties
 - c) Nature and Significance of Directive Principles of State Policy
- 12



Topic 3: Federalism

- a) Salient Features of Indian Federalism
- b) Centre –State Relations 12
- c) Issues of Conflict-Water Issue, Border Issue and Sharing of Resources

Topic 4: Structure of Union Government -Legislature-Executive –Judiciary

- a) Union Legislature - Structure-Powers and Role
- b) Union Executive-President, Prime Minister and his Cabinet- 12
Role and Functions
- c) Judiciary- Nature of Judiciary, Supreme Court-Powers and Functions

Term II

Topic 5: Structure of State Government -Legislature-Executive –Judiciary

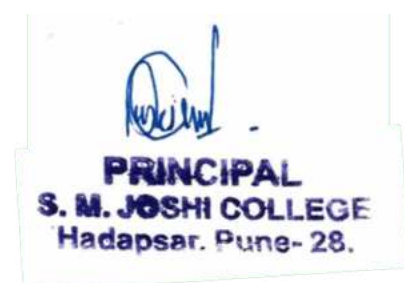
- a) State Legislature - Structure-Powers and Role 12
- b) State Executive-Governor , Chief Minister and his Cabinet-
Role and Functions
- c) Judiciary- Nature of Judiciary, High Court-Powers and Functions

Topic 6: Party System and Elections

- a) Nature and Changing Pattern of Party System
- b) Elections- Election Commission :-Major Features of Electoral System and
Patterns Of Voting Behavior 12
- c) Rise and Role of Regional Parties

Topic 7: Role of Caste and Religion in Indian Politics

- a) Caste and Politics of Identity
- b) Rise of OBCs 12
- c) Religion and Politics of Communalism



Topic 8: Issues of Regionalism and Development

- a) Causes and Patterns of Regionalism
 - b) Issues of Development-Uneven Development-Leading to Regional Imbalance-Poverty Eradication, Health and Education
- 12

Readings:

Chavan Shankar, Bhartiya Shashan ani Rajkaran, Pratima Prakashan, Pune

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Lodhi Kaniz Fatema Niyaz Ahmed and Prof. Salma A.S. : Government and Politics of India, Prashant Publication, Jalgaon.

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Jha Rajesh, Fundamentals of Indian Political System. Dorling Kindersley (India) Pvt Ltd, Pearson Education Society Delhi 2012

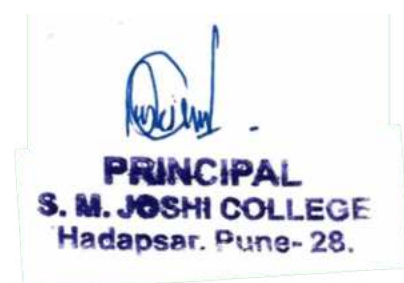
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F.R. Frankel, India's Political Economy 1947-1977: the Gradual Revolution, Oxford, Oxford University Press, 1978

A. Kohli, Democracy and Discontent: India's Growing Crisis of Governability, Cambridge, Cambridge University Press, 1991.

A.G. Noorain (ed.), Constitutional Questions in India: The President, Parliament and the States, Delhi, Oxford University Press, 2000.



T.V. Sathyamurthy, Social Change and Political Discourse in India: Structures of Power, Movements of Resistance, Vol.4., Oxford University Press, 1996.

Rajendra Vora and Suhas Pulshikar, Indian Democracy: Meaning and Practice, Sage Publication-New Delhi, 2004.

Rajendra Vora and Suhas Pulshikar, Bhartiya Lokshahi: Arth and Vavyhar, Diamond Publication 2010.

Singh Mahendra Prasad and Raj Subhendu Ranjan, The Indian Political System (ed) Dorling Kindersley (India) Pvt Ltd, Pearson Education Society Delhi 2012.

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जाधव तुकाराम आणि महेश शिरपुरकर 'भारतीय राज्यघटना व घटनात्मक प्रक्रिया', द युनिक अकॅडमी, प्रथम आवृत्ती जाने. २०११

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वाईकर अनंत— 'भारतीय शासन आणि राजकारण' निराली प्रकाशन, पुणे

बाचल वि. मा., स. मा. गोळवलकर—भारतीय गणराज्य (शासन आणि राजकारण), सुविचार प्रकाशन मंडळ, पुणे—४११०३०

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Hoveyda Abbas, Ranjay Kumar, Mohammed Aftab

Alam- Indian Government and Politics, Person, Delhi.

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खांदवे एकनाथ — महाराष्ट्राचे शासन व राजकारण, आरती प्रकाशन, कर्जत



University of Pune
F. Y. B. A. Political Science
G-1 General Paper

FYBA Optional Paper

MODERN INDIAN POLITICAL THOUGHT

COURSE RATIONALE

This is an introductory paper to the concepts, ideas and theories that developed in India. It highlights the main sources of the political traditions in ancient India and its development in modern times. It focuses on key thinkers from ancient to modern times to understand their seminal contribution to the evolution of Political theorizing in India. It critically assesses their contribution and explains thinkers to political theorizing and the relative autonomy of Indian political thought. It also situates Indian political thought vis-à-vis other traditions.

<u>Term I</u>	Period
Topic 1: Jyotiba Phule (1827-1890)	
a) Radical liberalism	
b) Critique of Brahmanism and money lenders	12
c) Views on emancipation of Shudra-Atishudra and Women	
d) Doctrine of Sarvajnik Satyadharma	
Topic 2: M.G.Ranade (1842-1901)	
a) Liberalism	
b) Understanding of British Rule in India	12
c) Views on State and Economy	
d) Views on Social Reforms	



Topic 3: B.G.Tilak (1856-1920)

- a) Tilak's theory of Nationalism
- b) Views on 'Swarajya' 12
- c) Critique of Social Reformism
- d) Doctrine of 'Loksangraha'

Topic 4: M.K.Gandhi (1869-1948)

- a) Theory of Satyagraha-meaning of Non Violence-Ends and Means
Debate,Forms of Satyagraha
- b) Critique of Western Civilization 12
- c) Views on Sarvodya
- d) Views on Communal Harmony

Term II

Topic 5: B.R. Ambedkar (1891-1956)

- a) Critique of Caste System and Ways to Annihilate the Caste System
- b) Theory of Social Democracy 12
- c) Views on State Socialism
- d) Doctrine of Dhamma

Topic 6: M.N.Roy (1887-1954)

- a) Understanding of Marxism
- b) Understanding and Critique of Indian National Movement 12
- c) Radical Humanism

Topic 7: V.D.Savarkar (1883-1966)

- a) Theory of Hindutva
- b) Understanding and Critique of British Rule in India 12
- c) Views on Eradication of Caste Discrimination
- d) Savarkar's views on Religion and Science



Topic 8: Abul Kalam Azad (1888-1958)

- a) Theory of Nationalism
- b) Interpretation of Islam
- c) Views on Communal Harmony
- d) Pan -Islamism

12

Readings:

Thomas Pantham and Kennein L.Deutsch, Political Thought in Modern India ,New Delhi,Sage Publication

____Modern Indian Political Thought,Delhi,Alied 1984.

K.S.Padhy Indian Political Thought, Eastern Publication –PHI Learning Private Limited New Delhi.2011.

V.P.Verma Modern Indian Political Thought, Lakshmi Narain Agarwal Educational Publishers Agra-3.1996.

M.P.Singh and Himanshu Roy Indian Political Thought Themes and Thinkers(edt), Dorling Kindersley (India) Pvt Ltd,Pearson Education Society Delhi 2011

R.K.Misra An Introduction to Political Thought (edt) , Dorling Kindersley (India) Pvt Ltd,Pearson Education Society Delhi 2012.

Bhole B.L- Adhunik Bhartiya Rajakiya Vicharvant, Pimpalapure Prakashan Nagapur.

पाटील वा. भा. 'आधुनिक राजकीय विचारवंत', प्रशांत पब्लिकेशन, जळगांव

कुलकर्णी व्ही. जी., कांत सोमवंशी—'भारतीय विचारवंत', कैलास पब्लिकेशन, औरंगाबाद.

भोळे भा. ल. 'भारतीय राजकीय विचारवंत' तिरुपती प्रकाशन, नारळीबाग, औरंगाबाद.

शिंदे ज. रा., परळीकर रेखा, 'भारतीय राजकीय विचारवंत', तिरुपती प्रकाशन, नारळीबाग, औरंगाबाद

महात्मा फुले समग्र वाडःमय, महाराष्ट्र शासन प्रकाशन



Revised Syllabi for Three - Year Integrated B.Com. Degree course (From June 2013)

1) INTRODUCTION

The revised syllabi for B.Com Degree Course will be introduced in the following order.

i)	First Year B.Com.	2013-2014
ii)	Second Year B.Com.	2014-2015
iii)	Third Year B.Com.	2015-2016

The B.Com. Degree Course (Revised Structure) will consist of three Years. The first year annual examination will be held at the end of the first year. The Second Year annual examination will be held at the end of the second year. The Third annual examination shall be held at the end of the third year.

2) ELIGIBILITY

1. No Candidates shall be admitted to enter the First Year of the B.Com. Degree Course (Revised Structure) unless he/she has passed the Higher Secondary School Certificate Examination of the Maharashtra State Board of Higher Secondary Education Board or equivalent or University with English as a passing subject.
2. No candidate shall be admitted to the annual examination of the First year B.Com. (Revised Structure) unless he/ she has satisfactorily kept two terms for the course at the college at the college affiliated to this University.
3. No candidate shall be admitted to the annual examination of the Second Year unless he/she has kept two terms satisfactorily for the course at the college affiliated to this University.
4. No candidate shall be admitted to the Third year of the B.Com. Degree Course (Revised Structure) unless he/she has passed in all the papers at the First Year B.Com. Examination and has passed in all the papers at the first Year B.Com. Examination and has satisfactorily kept terms for the second year and also two terms for the third year of B.Com. satisfactorily in a college affiliated to this University.

3) A.T.K.T. Rules :

As far as A.T.K.T. is concerned, a student who fails in two theories and one practical head of passing at F.Y.B.Com may be admitted to S.Y.B.Com. likewise a student who fails in the two theory and one practical head of passing at S.Y.B.Com may be admitted to T.Y.B.Com. But a student passing S.Y.B.Com but fails in any subject at F.Y.B.Com cannot be admitted to T.Y.B.Com.

4) (A) Revised Structure of B.Com. Course.

F.Y.B.Com. w.e.f. 2013-14	
Sr. No.	Compulsory / Main Subjects
101	Compulsory English
102	Financial Accounting
103	Business Economics (Micro)
104 (A)	Business Mathematics and Statistics
	or
104 (B)	Computer Concepts and Applications
105	Optional Group (Any one of the following) a) Organizational Skill Development. b) Banking & Finance c) Commercial Geography d) Defense Organization and Management in India e) Co-Operation. f) Managerial Economics
106	Optional Group (Any one of the following) a) Essentials of E-Commerce b) Insurance & Transport c) Marketing & Salesmanship d) Consumer Protection & Business Ethics. e) Business Environment & Entrepreneurship f) Foundation Course in Commerce
107	(Any one of the language from the following groups) Modern Indian Languages (M.I.L.) -: Compulsory English / Marathi / Hindi / Gujarathi / Sindhi / Urdu / Persian. Modern European Languages (M.E.L.) -: French / German. Ancient Indian Languages (A.I.L.) -: Sanskrit. Arabic.

S.Y.B.Com. w.e.f. 2014-15	
Sr. No.	Compulsory / Main Subjects
201	Business Communication.
202	Corporate Accounting.
203	Business Economics (Macro)
204	Business Management
205	Elements of Company Law
206	Special Subject – Paper I (Any one of the following) a) Business Administration b) Banking & Finance. c) Business Laws & Practices.

	d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.

T.Y. B.Com. w.e.f. 2015-16	
Sr. No.	Compulsory / Main Subjects
301	Business Regulatory Framework (Mercantile Law)
302	Advanced Accounting.
303 (A)	Indian & Global Economic Development Or
303 (B)	International Economics
304	Auditing & Taxation
305	Special Subject – Paper II (Same special subject offered at S.Y. B.Com.) a) Business Administration b) Banking & Finance. c) Business Laws & Practices. d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.
306	Special Subject – Paper III (Same special subject offered at S.Y. B.Com.) a) Business Administration b) Banking & Finance. c) Business Laws & Practices. d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.

B) Subjects Carrying Practical's

There will be practical examination for the F.Y.B.Com. for the subject Financial Accounting. There will be practical and practical examinations for the special subjects at S.Y.B.Com. and T.Y.B.Com. levels. There will be Practical for the S.Y.B.Com level Compulsory subject Business Communication & for T.Y.B.Com Auditing & Taxation.

(C) A Student must offer the same Special Subject at T.Y.B.Com. which he has offered at S.Y.B.Com.

(D) In an exceptional cases, a student may change the subject chosen by him at second year during the first term of the third year provided he keeps the additional terms of the new subject at S.Y.B.Com.

4. EXTERNAL CANDIDATES

- 1) The student who has registered his name as the external student will appear at the annual examination.
- 2) The result of external student will be declared on the basis of Annual Examination of 80 marks for practical subjects by converting the same out of 100.
- 3) No foreign student shall be allowed to register as an External Student.

5. MEDIUM OF INSTRUCTION.

Medium of instruction for B.Com. degree course shall be either Marathi or English except languages.

The Medium of instructions for Business Communication (S.Y.B.Com) shall be English only.

6. WORKLOAD

The present norms of workload of lectures, tutorials and practicals per subject in respect of B.Com. Course shall continue.

7. UNIVERSITY TERMS

The dates for the commencement and conclusion of the first and the second terms shall be as determined by the University Authorities. The terms can be kept only by duly admitted students. The present relevant ordinances pertaining to grant of terms will be applicable.

8. VERIFICATION AND REVALUATION

The candidate may apply for verification and revaluation or result through Principal of the College which will be done by the University as per ordinance framed in that behalf.

9. EQUIVALENCE AND TRANSITORY PROVISION

The University will conduct examination of old course for next three academic years from the date of implementation of new course.

The candidate of old course will be given three chances to clear the old course and thereafter he will have to appear for the subjects under per the equivalence given to old course.

10. RESTRUCTURING OF COURSES

This new revised structure shall be made applicable to the colleges implementing 'Restructured Programme' at the undergraduate level from June, 2004. The existing pattern of 'C', 'D', and 'E' Components shall be continued.

The Colleges under the Restructured Programme which has revised their structure in the light of the "2008 Pattern" shall be introduced with effect from academic year 2010-11.

11. SETTING OF QUESTION PAPERS

1. A candidate shall have the option of answering the question in any of the subjects either in Marathi or English except in languages.
2. The question papers shall be framed so as to ensure that no part of the syllabus is left out of study by a student.
3. The question paper shall be balanced in respect of various topics outlined in the syllabus.
4. The question papers shall have combination of long and short answer type question. As far as possible short answer type questions should not exceed 15 to 20 percent.
5. There shall be no overall option in the question paper, instead, there shall be internal options (such as either/ or and three short answers out of five etc.).
6. In case of question paper under the Special Subject (Paper No. III) one question carrying 10 marks will be set on current knowledge in relating subject in the academic year.

F.Y. B.Com.
Compulsory Paper
Subject Name -: Financial Accounting.
Course Code -: 102

Objectives -:

1. To impart the knowledge of various accounting concepts
2. To instill the knowledge about accounting procedures, methods and techniques.
3. To acquaint them with practical approach to accounts writing by using software package.

Term I

Unit No.	Topic	No. of Lectures
1.	Piecemeal Distribution of Cash Meaning and Introduction, Surplus Capital Method and Maximum Loss Method	12
2.	Amalgamation of Partnership Firms:- Meaning and Introduction, Objectives, Methods of accounting	12
3.	Conversion of a partnership firm into a limited company Meaning and introduction, objectives, effects, methods of calculation of purchase consideration (Net Asset and Net Payment method), accounting procedure in the books of the firm and balance sheet of new company	12
4.	Computerized Accounting Environment Meaning and Introduction, application of accounting software package, Voucher entry through software package.	12
Total		48

Term II

Unit No.	Topic	No. of Lectures
5.	Introduction and Relevance of Accounting Standards Overview of Accounting Standards in India-Concept, Need, Scope and Importance. Study of AS- 1, AS- 2, AS- 4 and AS- 9	10
6.	Royalty Accounts [excluding sub-lease]: Royalty, Minimum Rent, Short Workings, Recoupment of Short Working, Lapse of Short Working. Journal Entries and Ledger Accounts in the Books of Landlord and Lessee.	12
7.	Hire Purchase and Installment System:[Excluding H. P. Trading] Basic Concepts and Distinction, Calculation of Interest and Cash Price, Journal Entries And Ledger Accounts in The Books of Purchaser and Seller.	16
8.	Departmental Accounts Meaning and Introduction, Methods and Techniques, Allocation of expenses, Inter Departmental Transfers, Provision for unrealized profits	10
Total		48

Notes:-

University of Pune, F.Y. B.Com.


PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar. Pune- 28.

1. Question Paper for Term and Annual Examination should consist of :
 Theory Questions: -30%
 Problems:- 70%
2. There will be minimum two practicals.
3. Accounting practical be conducted in Computer or Commerce Laboratory only.
4. Students are expected to study and practice the application of accounting software packages.
5. Colleges are expected to use only licensed copy of software.
6. Practical examination need to be conducted in the computer laboratory.
7. Each student should be given separate set of transactions for practical examination.
8. For practical examination, internal and external examiner shall be appointed by the college.

Recommended Books	
1. Financial Accounting: By P. C. Tulsian (Tata McGraw-Hill Publishing Co. Ltd. New Delhi)	
2. Financial Accounting: By A. Mukharji & M. Hanif (Tata McGraw-Hill Publishing Co. Ltd. New Delhi)	
3. Financial Accounting: By S.N. Maheshwari & S.K. Maheshwari (Vikas Publishing House Pvt. Ltd)	
4. Financial Accounting: By Dr. K.N. Jagtap, Dr. S. Zagade & Dr. A.H. Gaikwad (Success Publications, Pune)	
5. Advanced Accounts: By M.C. Shukla & S.P. Grewal (S.Chand & Co. Ltd. New Delhi)	
6. Advanced Accountancy: By S.P. Jain & K.N. Narang (Kalyani Publishers, New Delhi)	
7. Advanced Accountancy: By R.L.Gupta & M. Radhaswamy (Sultan Chand & Sons, New Delhi)	

Journals:-

1. The Chartered Accountant: Journal of the Institute of Chartered Accountants of India.
2. The Accounting World : ICFAI Hyderabad

F.Y. B.Com.
Compulsory Paper
Subject Name -: Business Economics (Micro)
Course Code -: 103

Objectives -:

1. To expose Students of Commerce to basic micro economic concepts and inculcate an analytical approach to the subject matter.
2. To stimulate the student interest by showing the relevance and use of various economic theories.
3. To apply economic reasoning to problems of business.

Term I

Unit No.	Topic	No. of Lectures
1.	INTRODUCTION. 1.1 Meaning, Nature and Scope of Business Economics- (Micro) 1.2 Difference between Micro and Macro Economics. 1.3 Tools for Analysis a. Functional Relationships b. Schedules c. Graphs d. Equations 1.4 Goals of firms a) Economic Goals of Firms 1. Profit Maximization 2. Shareholders Wealth Maximization 3. Management Reward Maximization 4. Growth of the firm 5. Sales maximization 6. Long run survival b) Non-Economic goals 1. Political power, Prestige 2. Social responsibility and welfare 3. Goodwill of employees	12
2.	DEMAND ANALYSIS 2.1 Elasticity of Demand, Types of Elasticity, Price Elasticity, Income Elasticity and Cross Elasticity. 2.2 Consumer Behaviour a) Marginal Utility Approach - Limitations b) Indifference Curve Analysis - Concept - Characteristics - Consumer Equilibrium 2.3 Demand Forecasting and Estimation a) Meaning and objectives of Demand Forecasting b) Methods of Demand Forecasting c) Descriptive Analysis of	20

	i) Direct Methods 1) Consumer Survey 2) Expert opinion 3) Simulating market situation 4) Controlled Market Experiments ii) Indirect Methods 1) Simple correlation 2) Trend Projections	
3.	PRODUCTION AND COST ANALYSIS 3.1 Production Function – Meaning 3.2 Law of Variable Proportions - The Three Stages 3.3 Law of Returns to Scale - The Three Stages 3.4 Economies and Diseconomies of Scale – Internal and External 3.5 Cost Analysis – Types of Costs a) Types of Costs 1) Total cost 2) Average Cost 3) Marginal Cost 4) Opportunity cost b) Behaviour of Cost Curves 1) In the Short Run 2) In the Long Run	16
Total		48

Term II

Unit No.	Topic	No. of Lectures
4.	REVENUE BEHAVIOUR 4.1 Meaning and Importance of Revenue Concepts 4.2 Total Revenue (TR), Average Revenue (AR) Marginal Revenue (MR). 4.3 Relationship between Total Revenue, Average Revenue and Marginal Revenue	8
5.	PRICING UNDER VARIOUS MARKET CONDITIONS 5.1 Perfect Competition – Features and equilibrium 5.2 Monopoly – Features and equilibrium, Price Discrimination 5.3 Monopolistic competition - Features and equilibrium 5.4 Oligopoly – Features	20
6.	FACTOR PRICING 6.1 Marginal Productivity theory of Distribution. 6.2 Rent a) Theories of Rent i) Ricardian Theory of Rent ii) Modern Theory of Rent	20

	6.3 WAGES - i) Backward sloping Supply curve of Labour. ii) Collective Bargaining & Trade Unions 6.4 INTEREST - a) Theories of Interest – i) Loanable Fund Theory of Interest ii) Keynes Liquidity Preference Theory of Interest 6.5 PROFIT - a) Theories of Profit – i) Dynamic Theory of Profits ii) Innovation Theory of Profit iii) Risk and Uncertainty Theory of Profit	
Total		48

Recommended Books	
1. Economics – Samuelson P. A. and Nordhaus W. D. TataMcGraw Hill Publishing Co. Ltd. N.Delhi. 2. A text Book of Economic Theory – Stonier A. W. and Hague D. C. Longman Green and Co. London 3. Business Economics – V. G. Mankar, Macmillan India Ltd. N. Delhi. 4. Vyavasaik Arth Shastra (Sukshm) Dr. T. G. Gite, Atharv Publication. Pune 5. Modern Micro Economics – Theory and Applications H.L. Ahujna S. Chand and Co Ltd. N Delhi. 6. Business Economics – Dr. Girija Shankar – Atharv Publication, Pune. 7. Principals of Economics – N.Gregory Mankiw 6th edition 2012 Cengage learning india pvt ltd Delhi 8. Understanding Microeconomics- Robert L. Helibroner and Lester C. Thurow. Prentice Hall International Inc. London. 9. Micro Economic Theory An Analytical Approach – J M Joshi and R. Joshi Wishwa Prakashan (Division of Wiley Eastern Limited) N. Delhi. 10. Business & Managerial Economics (in the global Context) Sampat Mukherjee. New Central Book Agency, Calcutta. 11. Micro Economics Theory and Application D.N.Dwivedi Second Edition PEARSON.	

F.Y. B.Com.
Optional Paper
Subject Name :- Business Mathematics and Statistics
Course Code :- 104 (A)

Objectives :-

1. To prepare for competitive examinations
2. To understand the concept of Simple interest, compound interest and the concept of EMI.
3. To understand the concept of shares and to calculate Dividend
4. To understand the concept of population and sample.
5. To use frequency distribution to make decision.
6. To understand and to calculate various types of averages and variations.
7. To understand the concept and application of profit and loss in business.
8. To solve LPP to maximize the profit and to minimize the cost.
9. To use correlation and regression analysis to estimate the relationship between two variables.
10. To understand the concept and techniques of different types of index numbers.

FIRST TRM

Medium for this subject shall be ENGLISH only

Unit 1.	Pre-requisites (For objective type questions only)	(10)
	1. Natural Numbers and Integers 2. H.C.F and L.C.M. 3. Fractions- addition, subtraction multiplication and division of two or more fractions 4. Laws of Indices 5. Ratio and Percentage 6. Proportion and partnership	
Unit 2.	Interest	(08)
	1. Simple Interest 2. Compound interest (nominal and effective rate of interest) 3. Equated Monthly Installments (EMI) (Reducing and flat rate of interest) 4. Examples	
Unit 3.	Shares and dividends	(06)
	1. Concept of Shares, face value, market value, Net Asset Value 2. Equity Shares and Preference shares 3. Dividend 4. Bonus Shares 5. Examples	
-----		Total [24]

Unit 4.	Population and Sample	(08)
	1. Definition and concept of Statistics 2. Scope of Statistics in Economics, Management Science and Industry 3. Concept of Population and Sample 4. Methods of Sampling: Simple Random Sampling and Stratified Random Sampling (Description of procedures only)	
Unit 5.	Measures of central tendency	(16)
	1. Variables Qualitative and Quantitative, Raw data, Classification of data, 2. Frequency distribution, cumulative frequency distribution, 3. Histogram (finding mode graphically) Ogive curves and its uses. 4. Measures of central tendency: Mean, Median for ungrouped and Grouped data. 5. Examples	
-----		Total [48]

SECOND TERM

Unit 6.	Profit and Loss	(12)
	1. Concept of Cost Price, Marked Price and Selling Price 2. Trade Discount and Cash Discount 3. Commission and Brokerage 4. Examples	
Unit 7.	Linear Programming Problems (For two Variables only)	(12)
	1. Definition and terms in a L.L.P. 2. Formulation of L.L.P. 3. Solution by Graphical Method 4. Examples	
-----		Total [24]
Unit 8.	Measures of dispersion	(08)
	1. Concept of Dispersion 2. Measures of Dispersion – Range, Variance and Standard Deviation (S.D.) for Grouped and ungrouped data 3. Measures of relative dispersion- Coefficient of range and coefficient of Variation 4. Examples	
Unit 9.	Correlation and Regression	(08)
	1. Concept of Bivariate data, correlation using scatter diagram 2. Karl Pearson's Coefficient correlation for ungrouped data 3. Spearman's Rank correlation coefficient 4. Concept of regression, lines of regression 5. Regression as prediction Model 6. Examples	

Unit 10.	Index number	
	1. Concept of Index Number	

University of Pune, F.Y. B.Com.



2. Construction of Price Index Number
3. Laspeyre's, Paasche's and Fisher's Method
4. Family Budget and Aggregate Expenditure Method
5. Concept of – Cost of Living /Consumer Price Index Number, SENSEX and NIFTY
6. Examples

----- **Total [24]**

Grand Total [48]

Recommended Books:

1. Practical Business Mathematics by S.A.Bari (New Literature Publishing Company)
2. Business Mathematics by V.K.Kapoor (Sultan Chand And Sons)
3. Fundamentals of Statistics by S.C.Gupta (Himalaya Publishing House)
4. Basic Statistics by B.L.Agrawal (New Age International Publishers)
5. Statistical Methods by S.P.Gupta (Sultan Chand And Sons)

F.Y. B.Com.
Optional Paper
Subject Name -: Computer Fundamentals
Course Code -: 104 (B)

Objective:

1. To make the students familiar with Computer environment.
2. To make the students familiar with the basics of Operating System and business communication tools.
3. To make the students familiar with basics of Network, Internet and related concepts.
4. To make awareness among students about applications of Internet in Commerce.
5. To enable students to develop their own web site.

Term - I

Unit No.	Topic	Lectures
1.	Introduction to Computer Fundamentals	[10]
	Introduction to Computer Computer System Hardware Computer Memory Input and Output Devices Interaction between User and Computer Introduction to Free and Open Source Software Definition of Computer Virus, Types of Viruses, Use of Antivirus software	
2.	Basics of Operating System	[12]
	Definition of Operating System Objectives, types, and functions of Operating Systems Working with Windows Operating System: Introduction, The Desktop, Structure of Windows, Windows Explorer, File and Folder Operations, The Search, The Recycle Bin, Configuring the Screen, Adding or Removing New Programs using Control Panel, Applications in windows (Paint, Notepad, WordPad, Calculator)	
3.	Introduction to Business Communication Tools	[12]
	MS-Word: Introduction, Starting MS-Word, MS-Word Screen and its Components, Elementary Working with MS-Word MS-Excel: Introduction, Starting MS-Excel, Basics of Spreadsheet, MS-Excel Screen and Its Components, Elementary Working with MS-Excel MS-Powerpoint: Introduction, Starting MS-PowerPoint, Basics of PowerPoint, MS-PowerPoint Screen and Its Components, Elementary Working with MS-PowerPoint	
4.	Introduction to Computer Network	[06]
	Introduction Importance of Networking Computer Network (LAN, WAN, MAN) Network Components (Hub, Switch, Bridge, Gateway, Router, Modem) Network Topology, Wireless Networks	
5.	Use of Computer in Commerce	

	Data Processing, Files and Records, File Organization (Sequential, Direct/Random, Index) Computer Applications in Business – Need and Scope Computer Applications in various fields of Commerce: Personnel Administration, Accounting, Cost and Budgetary Management, Purchasing, Banking, Insurance and Stock-broking, e-governance Introduction to E-Commerce, Evolution of E-Commerce, Role of E-Commerce, E-Commerce Framework, E-Commerce Categories	

Term - II

Unit No.	Topic	Lectures
1.	Internet and Internet application Introduction, Internet evolution Working of Internet, Use of Internet Overview of World Wide Web (Web Server and Client) Introduction to Search engine and Searching the Web Downloading files Introduction to Web Browsers Working with E-mail (creation and use of the same)	[08]
2.	Electronic Data Interchange Introduction to EDI EDI Architecture Financial EDI Overview of the technology involved in EDI	[04]
3.	Electronic Payment System Introduction to EPS Introduction to EFT (Electronic Fund Transfer) Introduction to SET (Secure Electronic Transaction) Business requirement addressed by SET Introduction to Digital Signature and Digital Certificates , Stages of SET Types of Payment System: Digital Cash, Electronic Cheque, Smart Card, Credit/Debit Card	[08]
4	Introduction to HTML. Introduction to HTML. Working of HTML Creating and loading HTML page, tags Structure of on HTML, Document, Stand Alone Tags Formatting text, Adding Images Creating hyper Links, Tables Sending E-mails through Web Page Sample web pages	[10]
5.	Introduction To Web page Design Introduction to Web design, Types of Web Pages Web design Pyramid Building web sites	[07]

	Web development process model	
6.	Designing The web pages Page size, Page type, Page margin, Entrance page Exit page, Graphics in Webpage design Animation Effect, Sound Effect Color Effect Uploading the web site (Web space, Domain Name, Hosting the web site)	[08]
7.	Internet Security Security, Privacy Ethical Issues & Cyber Law	[03]

Reference Books

1. Computer Fundamentals by: Anita Goel, Pearson Education India ISBN: 9788131742136
2. Connecting with Computer Science, by Greg Anderson, David Ferro, Robert Hilton, Course Technology, Cengage Learning, ISBN: 9781439080351
3. Fundamentals of Computer : For undergraduate courses in commerce and management, ITL Education Solutions Limited, Pearson Education, ISBN: 9788131733349
4. Introduction to Computer Science, 2/e, ITL Education Solutions Limited, Pearson Education, ISBN: 9788131760307
5. Frontiers of Electronic Commerce, Ravi Kalakota, Andrew B. Whinston, Pearson Education, ISBN: 9788177583922
6. Internet: The Complete Reference, Margaret Levine Young, Tata McGraw Hill Education Private Limited, ISBN: 9780070486997
7. Murach's HTML, XHTML and CSS: Training & Reference, Anne Boehm, Shroff/Murachs Publication, ISBN-9789350230954
8. On the Way to the Web: The Secret History of the Internet and Its Founders, A. Banks, Apress Publication, ISBN: 9781430208693
9. Computers and Commerce: A Study of Technology and Management at Eckert-Mauchly Computer Company, Engineering Research Associates, and Remington, Arthur L. Norberg, MIT Press (MA), ISBN: 9780262140904

Guidelines for Examination:

1. Term End Exam (20 Marks):
To be conducted by college as per rules provided by University of Pune.
2. Annual Exam (80 Marks):
To be conducted by University of Pune at the end of the academic year.
Passing marks for the course are 40 (Out of which **minimum 32** marks are compulsory in Annual Examination).

F.Y. B.Com.
Optional Paper
Subject Name :- Organizational Skill Development.
Course Code :- 105 – a.

Objective:

1. To orient the students towards the concept of Organization and Modern Office.
2. To acquaint the students with the role of and Functions of Office Manager.
3. To develop the insights regarding Organizational Skills for Office Managers.
4. To know the functioning of Modern office appliances equipments and e- format records

Term I

Unit No.	Topic	No. of Lectures
1.	Modern Office 1.1 Introduction, Definition, Characteristics, Importance and Functions 1.2 Traditional and Modern Concepts of Office 1.3 Office Location Meaning, Objectives , Principles of Office Location Office Layout – Meaning , Objectives , Principles and Layout ,Modular and Structured Furniture 1.4 Factors of Good Ambience Office Lighting, ventilation. Temperature, Sanitation, Interior Decoration, Noise and Cleanliness.	12
2.	Office Organization 1.1 Definition, Importance of office organization, 1.2 Principles, Steps. 1.3 Types of Organization 1.4 Concept and Functions of Office Administrator.	12
3.	Office Manager and Organizational Skills 3.1 Office Manager – Role, duties and responsibilities 3.2 Qualification, Qualities and skills of an office manager 3.3 Time Management –Definition, Need, Principles, advantages and Disadvantages, Time Management techniques. 3.4 Goal Setting-Concept of goal-setting - Importance of goals, SMART(Specific, Measurable, Achievable, Realistic, Time-bound) goals , Do's and Don'ts about goals.	12
4.	Office services 4.1 Mail Routine , Courier Services its need and Importance 4.2 Office Forms - objectives, advantages and types of office forms E-forms – advantages. 4.3 Organizational Web Page – Contents, advantages, Internet based applications of office activities. 4.4 Office Stationary and Supplies - Importance of stationary, E	12

	a good system of regulating stationary, purchases, storage, Record of stationary,	
Total		48

Term II

Unit No.	Topic	No. of Lectures
5.	Office Records Management 5.1 Introduction - Need - Objectives - Kinds of Records. 5.2 Organization of records department. 5.3 Classifying and Indexing of Records and Files. Principles - Retention and disposition of records. 5.4 Digitalization of Records: Meaning, advantages, process, utility and feasibility.	12
6.	Office Communications 6.1 Meaning and Elements of Office Communications, 6.2 Channels of Communication – Internal and External 6.3 Significance and barriers to effective communications 6.4 Recent trends in modern communications such as Fax - E-Mail, Internet, Intranet, www(World Wide Web), Tele conferencing, Video Conferencing as means of Communication	12
7.	Public Relations : 7.1 Definition, nature, Scope of PR with customers, investors , employees, government offices and others 7.2 Objectives, importance and functions 7.3 Role of Public Relation Officer in Modern Office 7.4 – Modern methods of Public Relations	12
8	Office Automation 8.1 Office Automation – meaning, scope, feasibility, and advantages 8.2 Different types of modern appliances and machines used in Offices. 8.3 Computerization of office activities - LAN – WAN 8.4 Accounting Packages, Payroll Accounting, Inventory statements, - Vouchers –Invoices - Salary - Maintenance of records and Accounting Books and preparation of financial Report, Leave accounting, Attendance.	12
Total		48

Recommended Books
1. Office Organization and Management – By S. P. Arora 2. Office Methods - By M. L. Basu 3. Office Automation – By G. R. Terry 4. Office Management & Control – By G. R. Terry 5. Office Management – By P. K. Ghosh 6. Files and Record Management By Pophan 7. A text book of Office Management By William II &Leffingwell& Robinson 8. Office Administration and Management – by Dr. KhorshedMadon. and Dr.Homai M. Dowell, Vikas Publishing House , Delhi

F.Y. B.Com.
Optional Paper
Subject Name -: Banking and Finance
[Fundamentals of Banking]
Course Code -: 105 – b.

Objective:

1. To acquaint the students with the fundamentals of banking.
2. To develop the capability of students for knowing banking concepts and operations.
3. To make the students aware of banking business and practices.
4. To give thorough knowledge of banking operations.
5. To enlighten the students regarding the new concepts introduced in the banking system.

Term I

Unit No.	Topic	No. of Lectures
1.	Evolution of banking 1.1 Origin, Meaning and Definition of 'Bank' 1.2 Evolution of banking- Europe, USA & Asia 1.3 Evolution of banking in India. 1.4 Structure of Indian Banking System	06
2.	Functions of Bank 2.1 Primary functions: A) Accepting deposits: Demand deposits: Current and Savings; No Frills Account, Time deposits-Recurring and Fixed deposits, Flexi Deposits (Auto Sweep) B) Granting Loans and Advances- Term Loan, Short term credit, Overdraft, Cash Credit, Purchasing, Discounting of bills, 2.2 Secondary functions: A) Agency Functions- Payment and Collection of Cheques, Bills and Promissory notes, Execution of standing instructions, Acting as a Trustee, Executor. B) General Utility Functions: Safe Custody, Safe deposit vaults, Remittances of funds, Pension Payments, Acting as a dealer in foreign exchange.	14
3.	Procedure for opening and operating of deposit account 3.1 Procedure for Opening of Deposit Account: Know Your Customer- Needs and Norms (KYC Norms), Application form, Introduction, Proof of residence, Specimen signature and Nomination: Their Importance 3.2 Procedure for Operating Deposit Account: Pay-in-slips, Withdrawal slips, Issue of pass book, (Current Savings or Recurring deposits), Issue of Cheque book, Issue of fixed deposit receipt, Premature encashment of fixed deposits and loan against fixed deposit. Recurring deposits: Premature encashment and loan against recurring deposit. 3.3 a) Closure of accounts b) Transfer of accounts to other branches/Banks 3.4 Types of account holders a) Individual account holders- Single or joint, Illiterate, Minor,	14

	woman, Pardahnashin woman, Non resident accounts b) Institutional account holders- Sole proprietorship, Partnership firm, Joint stock company, Hindu undivided family, Clubs, Associations and Societies and Trusts.	
4.	Methods of Remittances 4.1 Demand drafts, bankers' Cheques and Truncated Cheques 4.2 Mail transfer, Telegraphic transfer, 4.3 Electronic Funds Transfer- RTGS, NEFT and SWIFT	14
Total		48

Term II

Unit No.	Topic	No. of Lectures
5.	Lending principles, Credit Creation and Balance Sheet of a bank 5.1 Safety, Liquidity, Profitability, Diversification of risks Conflict between liquidity and profitability 5.2 Multiple Credit Creation: Process and Limitations 5.3 Balance sheet of a commercial bank.	16
6.	Negotiable Instruments 6.1 Definition, meaning and characteristics of Promissory note, Bill of Exchange and Cheque 6.2 Types of Cheques- Bearer, Order and Crossed 6.3 Types of Crossing- General and Special.	16
7.	Endorsement 7.1 Definition and meaning of endorsement 7.2 Types of endorsement- Blank, Full or Special, Restrictive, Partial, Conditional, Sans Recourse, Facultative.	08
8	Technology in Banking 8.1 Need and importance of technology in banking 8.2 E-Banking: ATM, Credit card, Debit card, Tele Banking, Mobile Banking, Net Banking, SWIFT (Society for Worldwide Inter-bank Financial Telecommunication) 8.3 Concept and benefits of Core Banking Solution.	08
Total		48

Recommended Books

1. Practice and Law of Banking- G.S.Gill
2. Banking: Law and Practice- P.N. Varshney
3. Banking: Theory and practice- E.Gordon, K. Talraj
4. Banking: Law and practice in India- Tannan
5. Banking: Law and practice in India- Maheshwari
6. Fundamentals of Banking- Dr. G.V.Kayandepatil, Prof. B.R.Sangle, Dr. G.T.Sangle, Prof. N.C.Pawar
8. Banking: Law and Practice- Prof. Mugle
9. Banking and financial system - Vasant Desai
10. Banking theory and practice- K.C.Shekhar
11. Fundamentals of banking'- Dr. R.S.S.Swami
12. Annual Report on trends and progress of banking in India- R.B.I.
13. Toor N. S., Handbook of Banking Information

F.Y. B.Com.
Optional Paper
Subject Name -: Defense Organization and Management in India
Course Code -: 105 – d.

Objective:

1. To understand the role of Armed Forces for maintaining national security of the country.
2. To understand Higher Defense Mechanism, Role of Intelligence and Management Technique in Decision making at Strategic & Tactical Level

Term I

Unit No.	Topic	No. of Lectures
1.	Principles of Defense Organization 1.1 Reconstruction of Indian Armed Forces since 1947 1.1.1 Development of the Army after Independence 1.1.2 Development of the Navy after Independence 1.1.3 Development of the Air Force after Independence	12
2.	Higher Defense Organization in India 2.1. Powers of the President in relation to the Armed Forces 2.2. Defense Committee of the Cabinet. 2.3. Ministry of Defense – its organization & function 2.4. National Security Council	12
3.	Defense Mechanism of the Indian Armed Forces 3.1 Chief of Staff Committee 3.2 Organization of Army, Naval & Air Headquarters. 3.3 Organization of Army, Naval & Air Commands.	12
4.	Second Line of Defense 4.1. Border Security Force 4.2. Coast Guard 4.3. Territorial Army 4.4. Home Guard 4.5. Civil Defense 4.6. National Cadet Corps (N.C.C) 4.7. Central Reserve Police Force 4.8. State Reserve Police Force	12
Total		48

Term II

Unit No.	Topic	No. of Lectures
5.	Intelligence 5.1. History & Types of Intelligence 5.2. Process & Principles of Intelligence 5.3. Devices for Collecting Intelligence 5.4. Role of Intelligence 5.5. Counter Intelligence 5.6. Indian Intelligence Organization	12

6.	The Combat Branches 6.1. Infantry 6.1.1. Characteristic, Role & Limitations. 6.1.2. Division & Battalion Organization. 6.2. Armoured Crops 6.2.1. Characteristics, Role & Limitations 6.3. Supporting Arms 6.3.1. Artillery – Characteristics, Role & Limitations 6.3.2. Engineers - Characteristics, Role & Limitations 6.3.3. Signal Corps - Characteristics, Role & Limitations means of signals	12
7.	The Administrative Services 7.1 Army Service Crops 7.2 Army Ordnance Crops 7.3 Electrical & Medical Engineers. 7.4 Army Medical Crops – its role in Peace & War time	12
8	Indian Navy & Indian Air Force 8.1. Characteristic, Role & Limitations Navy & Air Force 8.2. Various Types of Battle Ships in Indian Navy 8.3. Various Types of Aircrafts in Indian Air Force	12
Total		48

Recommended Books	
1. Ron Mathews – “Defence Production in India” ABC – New Delhi 2. Raju G. C. Thomas – “The Defence of India – A Budgetary perspective of strategy & politics”, Mac Millan Publication, New Delhi – 1978 3. Sam-C-Sarkesian – “The Military Industrial Complex – A Reassessment”, Sage Publication, 1972 4. Maj. Gen. Pratap Narain (Retd.) “India’s Arms Bazaar” Shilpa Publication, New Delhi – 1998 5. Y. Lakshmi, “Trends in India’s Defence Expenditure” ABC, New Delhi 1998. 6. Lt. Gen. R.K. Jasbir Singh, “India’s Defence Year Books”, Natraj Publication, Dehradun 1999 7. Annual Report, Ministry of Defence, Government of India 8. Venkateshwaram A.L. – “Defence organisation in India” 9. Nagendra Singh – “Defence Mechanism of Modern State”. 10. Lt. Col. Abhyankar M. G. – “Defence Principle & Organisation”. 11. U. C. Jain, Jeevan Nair – “Indian Defence & Security”, Pointer Publishers, Jaipur, 2000 12. D.C.Pathak, “Intelligence: A Security Weapon”, Manas Publication, New Delhi, 2003 13. Stephen Peter Rosen, “Societies & Military Power – India & its Armies”, Oxford University Press, New Delhi, 1996 14. Maj. K.C. Praval, “Indian Army after Independence”, Lancer International, New Delhi, 1990 15. H. B. Mishra, “Defence Programmes of India” – Author Press – New Delhi – 2000 16. Maj. Udaya Chandar, “The Art of Military Leadership”, Jaico Publishing House, Mumbai - 1979	

F.Y. B.Com.
Optional Paper

Subject Name -: Co-operation

Course Code -: 105 – e.

Objectives:

1. To acquaint the students with the concept of co-operation and its movement.
2. To introduce the scope of Co-operation.
3. To make students build their career in the field of Co-operation and Rural Development.

Term I

Unit No.	Topic	No. of Lectures
1	Concept of Co-operation- ➤ Meaning & Definitions ➤ Objectives ➤ Nature and Scope of Co-operation.	12
2	Principles of Co-operation- Evaluation of Co-operative principles and modifications there in from time to time. ➤ International Co-operative Alliance (I.C.A) Committee-1937 ➤ International Co-operative Alliance (I.C.A.) Commission-1966 ➤ International Co-operative Alliance (I.C.A.) Commission-1995	12
3	History of Indian Co-operative Movement – Origin of Co-operative movement in India. ➤ Sir Fedrick Nicholson Report 1904 ➤ Maclagen Committee Report 1912 ➤ Gorewala Committee Report 1954 ➤ Vaidyanathan Committee Report 2005	12
4	Contribution to the development of Co-operative Movement in India of: ➤ Dr. Dhananjay Gadgil ➤ Padmashri. Vaikuntbhai Mehta ➤ Padmashri. Vitthalrao Vikhe Patil ➤ Dr. Verghese Kurien ➤ Karmaveer Bhausaheb Hiray	12
Total		48

Term II

Unit No.	Topic	No. of Lectures
5	Different Types of Co-operative: ➤ Rural Co-operative and Urban Co-operative ➤ Agriculture Co-operative and Non Agriculture Co-operative. ➤ Credit Co-operative and Non Credit Co-operative.	12

University of Pune, F.Y. B.Com.


PRINCIPAL
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Hadapsar. Pune- 28.

	➤ Weaker Sections Co-operatives. ➤ Federation of Co-operatives.	
6	Government and Co-operative movement: ➤ Role of Central Government ➤ Role of State Government	12
7	Achievement of Co-operative movement: ➤ Strength and Weakness ➤ Future Trends of Co-operative Movement in India.	12
8	Co-operative Education and Training: ➤ Objectives of Co-operative Education and Training. ➤ Training arrangement in India. ➤ Evaluation of education and training programmes. ➤ Problems and suggestions.	12
Total		48

Recommended Books	
1. Co-operation- Principles and Practice- Dr. D.G. Karve 2. Co-operation in India- Dr. B.S. Mathur 3. Theory, History and Practice of Co-operation- Dr. R.D. Beddy 4. Co-operation in India- Dr. C. B. Memoriya and R.D. Saxena 5. Theory and Practice of Co-operation in India and Abroad- Prof. R.K. Kulkarni 6. Bhartiya Sahkari Chadvad- Tatve va Vyavhar (Marathi)- Prof. Jagdish Killol; Prof. Arvind Bondre; Prof. A. C. Bhavsar 7. Sahkari Chalval 1904-2004 (Marathi) – Prof. K. L. Fale	

F.Y. B.Com.
Optional Paper
Subject Name -: Managerial Economics
Course Code -: 105 – f.

Objectives:

1. To enable students of Commerce to apply economic theory and analysis, practices of business firms.
2. To use tools and techniques of economic analysis to develop managerial decision making
3. To apply economic analysis in the formulation of business policies.

Term I

Unit No.	Topic	No. of Lectures
1	INTRODUCTION 1.1 Definition, Nature & Scope and Characteristics of Managerial Economics. 1.2 Theories of the Firm 1.3 Objectives of the Firm – a. Profit Maximization b. Security Objective c. Profit Satisfying Objective d. Sales maximization e. Utility Maximization f. Growth Maximization	13
2	DEMAND ANALYSIS 2.1 Law of Demand 2.2 Determinants of Demand 2.3 Elasticity of Demand – Concept and Measurement of – 2.3.1 Price Elasticity of Demand 2.3.2 Income Elasticity of Demand 2.3.3 Cross Elasticity of Demand 2.4 Importance of Elasticity of Demand in business decision making. 2.5 Business or Economic Forecasting - 2.5.1 Objectives 2.5.2 Methods of Business Forecasting 2.6 Theory of Supply	20
3	PRODUCTION AND COST ANALYSIS 3.1 Production Function –Meaning & Nature 3.2 Law of Variable-the three stages. 3.3 Law of Returns to scale - the three stages. 3.4 Cost Analysis – 3.4.1 In the short run 3.4.3 In the long run	15
Total		48

Term II

Unit No.	Topic	No. of Lectures
4	PRICING AND INVESTMENT DECISIONS 4.1 Pricing Practices -Objectives 4.2 Investment Decisions – 4.2.1 Concept and Types – a. For Expansion b. For Replacement c. For Modernization d. For Diversification e. For Research and Development. 4.2.2 Aids to Investment Decisions – a. Capital Budgeting – Meaning and Usefulness. 4.2.3 Methods of Investment Decision – Concept and Descriptive analysis of – a. Payback period. b. Average Rate of Return	20
5	COST – BENEFIT ANALYSIS 5.1 Meaning 5.2 Use 5.3 Limitations	13
6	MACRO ECONOMIC ENVIRONMENT 6.1 Business Trends in India – 6.2 Overview of Economic Reforms and Business. 6.3 Role of Multinational Corporations (MNCs) 6.4 Acquisitions and Mergers	15
Total		48

Recommended Books
1. Dean Joel – managerial Economics. Prentice Hill India Pvt. Ltd. New Delhi. 2. Gupta G.S. –Managerial Economics. Tata Mcgrew Hill, New Delhi. 3. Mithani D.M. – Managerial Economics Theory and Applications. Himalaya Publishing House, N. Delhi. 4. Mmankar V.G. –Business Economics, Macmillan India Ltd. N. Delhi. 5. Varshney and Maheshwari – Managerial Economics.Sultan Chand and sons, N. Delhi. 6. Dr. T. G. Gite - Vyavasaik Arthshstra (Sukshma) Atharve Publication, Pune. 7. Salvatore Dominick – Managerial Economics in a Global Economy. Mcgraw Hill N. York. 8. Dr.Girija Shankar: Micro Economics – Atharva Publication. 9. H. Craig Peterson, W. Cris Lewis – Managerial Economics. Prentice Hill of India Ltd. New Delhi. 10. Dwivedi D. N. Managerial Economics; Tata Mcgrew Hill, New Delhi

F.Y. B.Com.
Optional Paper
Subject Name -: Essentials of E-Commerce
Course Code -: 106 – a.

Objective:

To make a student familiar with the mechanism of conducting business transactions through electronic media. Learning Outcomes: After completing this course, a student is expected to be able to

- explain various components of e-commerce,
- understand the dynamics of e-commerce,
- appreciate the Internet technology and its utility in commercial activities,
- understand the methodology of online business dealings using e-commerce infrastructure.

Term I

Unit No.	Topic	No. of Lectures
1.	Overview of Electronic Commerce (EC): Concept, features, and functions of e-commerce, e-commerce practices v/s traditional practices, scope and limitations of e-commerce.	10
2.	Fundamental of e-commerce: Definition and types of e-commerce: B2B, B2C, C2C, and P2P, B2B service provider, e-distributor, procurement and just-in-time delivery.	12
3.	Infrastructure: Internet and its role in e-commerce, procedure of registering Internet domain, establishing connectivity to Internet, tools and services of Internet.	10
4.	E-Payment: Transactions through Internet, requirements of e-payment systems, functioning of debit and credit cards, pre and post payment services.	06
5.	Electronic Data Interchange: Evolution, uses, Benefits, Working of EDI, EDI Standards (includes variable length EDI standards), Cost Benefit Analysis of EDI, Electronic Trading Networks, EDI Components, File Types, EDI Services, EDI Software	10
Total		48

Term II

Unit No.	Topic	No. of Lectures
6.	Digital economy: Major characteristics, economic rules, impact on trading and intermediaries, impact on business processes and functional areas in banking, financial insurance organizations.	08

7.	E-Marketing: Market place v/s Market space, impact of e-commerce on market, marketing issues in e-marketing, direct marketing, one-to-one marketing.	08
8.	E-Finance: Areas of e-finance, e-banking, traditional v/s e-banking, trading v/s e-trading, importance and advantages of e-trading, operational aspects of e-trading.	08
9.	E-Ticketing: Online booking systems, online booking procedure of railways, airlines, tourist and religious places, hotels and entertainment industry.	08
10	E-Commerce in India: State of e-commerce in India, problems and opportunities in e-commerce in India, legal issues, Social and Ethical Issues, future of e-commerce, Mobile Commerce.	08
11	Security in e-commerce: Setting up Internet security, maintaining secure in Formation, encryption, digital signature and other security measures.	08
Total		48

Recommended Books
Reference Books: 1. Daniel Amor, E Business R(Evolution), Pearson Edude. 2. Krishnamurthy, E-Commerce Management, Vikas Publishing House. 3. David Whiteley, E-Commerce: Strategy, Technologies and Applications, Tata McGraw Hill. 4. P. T. Joseph, E-Commerce: A managerial Perspectives, Tata McGraw Hill. 5. Doing Business on the Internet E-COMMERCE (Electronic Commerce for Business): S. Jaiswal, Galgotia Publications. 6. C.S.V.Murthy: E-Commerce-Concepts, Models & Strategies, Himalaya Publishing. 7. Kamallesh K Bajaj & Debjani Nag: E-Commerce, the Cutting Edge of Business- Tata McGraw-Hill, New Delhi.

F.Y. B.Com.
Optional Paper
Subject Name :- Insurance and Transport
Course Code :- 106 – b.

Objectives :-

1. To acquaint students with the concept of Insurance and Transport.
2. To introduce the scope of Insurance including Life & General Insurance and Transport including Travel & Tourism.
3. To make the students aware of carrier opportunities in the field of Insurance & Transport and impart appropriate skills.

Marks : 100

No. of Lectures 48

Term I - INSURANCE

Unit No.	Topic	Lectures
1.	Concept of Insurance Risk : Meaning, Definition & Scope ---Types: Human & Business ---Types of Business Risk. Insurance : Meaning, Definition, Need & Scope -Insurance Contract: Meaning, Components.	12
2.	Life Insurance Meaning, Definition, Need, Scope & Principles of Life Insurance. Types of Life Insurance Policies---Carrier Options in Life insurance Business.	12
3.	General Insurance Meaning, Definition, Need, Scope & Principles of General Insurance. Types of General Insurance --- Carrier Options in General Insurance Business.	12
4.	Role of Insurance in Logistics Meaning and significance of logistics – Need for social security – Procedure for claim settlement – Role of Insurance in Logistics in the Global age and challenges.	12
Total		48

Term II - TRANSPORT

Unit No.	Topic	Lectures
5.	Concept & Role of Transport Meaning, Need & Scope of Transport. ---- Transport being a primary mode of Service Trade--Role of Transport in Indian economy --- Existing problems & suggestions.	12
6.	Modes of Transport Types of Transportations in India --- Meaning, Need, Scope & Advantages. Road Transport & Rail Transport in India – Their Suitability and Limitations.	12
7.	Other means of Transports Water Transport : Meaning, Scope, Advantages & Limitations. Air Transport : Meaning, Scope, Advantages and Limitations -- Choice of Transport Mode : Cost, Speed & Flexibility.	12
8.	Travel & Tourism Meaning & Scope - Role and contribution to Economic Development -- Means of Travel & Tourism in India. – Career Options in Travel, Tourism and Hospitality Management.	12

Recommended List of Reference Books

Insurance

1. Insurance -- Principles & Practices of Insurance – By : G.S. Pande
2. Theory & Practice of Life Insurance – By : Mitra
3. Insurance Principles & Practice
– By : M.N.Mishra & S.B. Mishra (S. Chand Publication)
4. Insurance & Risk Management – By : P.K.Gupta (Himalaya Publication)

Transport

1. Economics of Transport – By : S.K. Shrivastava
2. Transport in Modern India – By : P.P. Bhatnagar
3. Rail & Road Transport in India – By : M.D. Mathur
4. Transportation System & Policy Analysis
– By : S. Sriraman (Himalaya Publication)
5. Challenges To Transportation – By : Rupenthal Karl M. (ASRC Hyderabad)

Tourism

1. Introduction to Tourism – By : M.A. Khan
2. Tourism Management – By Seth P.N. (Sterling Publishers, Delhi)
3. Tourism & Travel : Concepts & Principles
– By : Negi Jagmohan (Gitanjalee Publishers, Delhi)
4. Tourism in India : Trends & Issues – By : Dharmarajan S & Seth Rabindra (Har-Anand Publishers, Delhi)

F.Y. B.Com.
Optional Paper
Subject Name :- Marketing and Salesmanship
[Fundamentals of Marketing]
Course Code :- 106 – c.

Objectives :-

1) General Objective of the Paper.

- a) To create awareness about market and marketing.
- b) To establish link between commerce/Business and marketing.

2) Core Objectives of the paper.

- a) To understand the basic concept of marketing.
- b) To understand marketing philosophy and generating ideas for marketing research.
- c) To know the relevance of marketing in modern competitive world.
- d) To develop an analytical ability to plan for various marketing strategy.

Term I

Unit No.	Topic	No. of Lectures
1	<u>Basics of marketing</u> 1.1) Market – Marketing – Introduction, Meaning, Definition, Scope, Types and Significance. 1.2) Marketing Management – Introduction, Meaning, Definition, Scope, and Significance. 1.3) Functions of Marketing – Basic Functions, Functions of Exchanges, and Subsidiary Functions. 1.4) Marketing Mix - Introduction, Meaning, Definition, Scope, and Significance.	
2	<u>Marketing Environment</u> 2.1) Introduction – Definition and Nature. 2.2) Factors Constituting Marketing Environment. 2.3) Micro and Macro Environment. 2.4) Impact of Marketing Environment on Marketing Decisions.	
3	<u>Buyer Behaviour and Market Segmentation</u> 3.1) Introduction – Meaning, Definition, Scope and Significance of Buyer Behavior. 3.2) Determinants of Buyer Behaviour, Stages of Buyer Behaviour – Buying Process.. 3.3) Introduction, Meaning, Importance of Market Segmentation. 3.4) Bases for Segmentation – Qualities of Good Segmentation.	
4	<u>Product and Pricing Decision</u> 4.1) Concept of Product – Product Classification. 4.2) Factors Considered For Product Management – Role of Product Manager. 4.3) Factors Affecting Pricing Decisions – Pricing Objectives. 4.4) Pricing and Product Life Cycle – Pricing Methods.	

Term II

Unit No.	Topic	No. of Lectures
5	<u>Logistics and Supply Chain Management</u> – 5.1) Introduction – Definition – Objectives – Scope and Significance 5.2) Market Logistics Decisions – Channel Structure. 5.3) Designing Distribution Channels. 5.4) Types of Marketing Channels.	
6	<u>Market Promotion Mix</u> – 6.1) Promotion Mix – Meaning, Scope and Significance. 6.2) Factors Affecting Market Promotion Mix 6.3) Advertisement and sales Promotion – Meaning and Definition. Means and Methods of Sales Promotion. 6.4) Advertising Meaning and Goals – Advertising Media– Meaning, Types, Advantages and Limitations.	
7	<u>Rural Marketing</u> – 7.1) Introduction – Meaning – Definition – Features – Importance – 7.2) Rural Marketing Mix – Importance, Elements, Scope 7.3) Present Scenario of Rural Market – 7.4) Problems And Challenges of Rural Market –	
8	<u>Services Marketing</u> – 8.1) Introduction – Meaning – Definition – Features – Importance of Services – Significance of Services in Marketing. 8.2) Classification of Services – Marketing of Industrial Goods Services, Marketing of Consumer Goods Services. 8.3) Marketing Mix for Services 8.4) Services Marketing And Economy – Scope of Services Marketing in Generation of Job Opportunity, Role of Services in Economy, Services Quality	
Total		48

Recommended Books

Sr. No.	Name of the Book	Publisher	Author
1	Marketing Management	Macmillan Publication	V.S.Ramaswamy S. Namakumari
2	Principals of Marketing	Prentice- Hall of India Pvt. Ltd.	Philip Kotler Gary Aramstrong
3	Rural Marketing	Dorling Kindersley (India) Pvt.Ltd.Pearson	Pradeep Kashyap
4	Marketing Management	Himalaya Publishing House	Dr.K.Karuna Karan
5	Marketing in India	Vikas Publishing House	S. Neelamegham
6	Basics of Marketing Management	S. Chand	Dr.R.B.Rudani
7	Services Marketing	Himalaya Publishing House	V. Venugopal Raj

F.Y. B.Com.
Optional Paper

Subject Name -: Consumer Protection and Business Ethics

Course Code -: 106 – d.

Objectives:

- 1) To acquaint the students with consumer and consumer movement.
- 2) To make the students aware about consumer rights, duties and mechanism for resolving their disputes.
- 3) To make students aware about role of united nations and consumers' associations in protection of consumers.
- 4) To make the students aware about laws relating to consumers.
- 5) To acquaint the students with role of Business Ethics in various functional areas.

First Term		Periods
Unit – I	Consumer and Consumerism:	[18]
	1. 1. Consumer: Concept, Meaning, Definition and Features 1. 2. Problems of consumers: Rural and urban, Its Nature and Types 1. 3. Consumerism – Meaning, objectives, Benefits-Consumerism in India 1. 4. Rights, Duties and Responsibilities of Consumers. 1. 5. Consumer Movement-Meaning-Definition-Importance, Scope and Features 1. 6. Development of Consumer Movement in India- Problems and Prospects.	
Unit – II	Voluntary Consumer Organizations (VCO) and Consumer Protection:	[06]
	2. 1. VCO: Origin, Importance, Functions and Limitations 2. 2. Challenges before VCOs 2. 3. Role of Voluntary Consumer Organization in Consumer Protection in the area of marketing & Advertisements. 2. 4. Consumer Education-Meaning-Definition-Objectives	
Unit - III	United Nations Guidelines for Consumer Protection:	[06]
	3. 1. United Nations and Consumer Protection 3. 2. United Nations Guidelines for Consumer protection, 1985. 3.2.1. Objectives. 3.2.2. General principles. 3.2.3. Guidelines a) Physical Safety b) Promotion and protection of consumers' eco interests c) Standards for the safety and quality of con	

	goods and services d) Education and Information Programme e) Promotion of Sustainable Consumption	
Unit - IV	Consumer Protection Act, 1986:	[18]
	4. 1. Background – Need-Scope and Features 4. 2. Definitions- Consumer-Goods-Services- Complaints, Complainant- Defect in Goods- Deficiency in Services, Unfair Trade Practices, Restricted Trade Practices. 4. 3. Consumer Protection Councils-Composition-Working-and Objectives of: a) District Consumer Protection Council b) State Consumer Protection Council c) National Consumer Protection Council 4. 4. Mechanism for Redressal-Composition and working of- Consumer Disputes Redressal Agencies: a) District Consumer Disputes Redressal Forum b) State Consumer Disputes Redressal Commission c) National Consumer Disputes Redressal Commission 4. 5. Procedure of filing complaints	
Second Term		
Unit - V	An overview of various Laws for the Protection of Consumers:	[18]
	5. 1. The Bureau of Indian Standards Act, 1986 (Sections - 1,10,11,14,33) 5. 2. The Competition Act, 2002 (Sections – 1, 3 to 6) 5. 3. Right to Information Act, 2005 (Sections – 1 to 11, 18, 19 and 20) 5. 4. Food Safety and Standards Act, 2006 (Sections– 1to 3, 18 to 28)	
Unit - VI	Protection of Consumer against Standard Form of Contract:	[04]
	6. 1. Nature and Relevance of Standard Form of Contract 6. 2. Judicial Response to Standard Form of Contract in India and abroad 6. 3. Legislative Reforms	
Unit - VII	Conceptual Framework of Business Ethics:	[08]
	7. 1. Concept of Ethics: Its Meaning and Nature 7. 2. Definition importance and Scope of Business Ethics 7. 3. Types of Business Ethics; viz:- i. Professional business ethics	

	ii. Ethics of accounting information iii. Ethics of Production iv. Ethics of intellectual property skill, knowledge etc.	
Unit - VIII	Business Ethics in Modern Times:	[10]
	8. 1. Social Responsibilities of Business 8. 2. Business Ethics and Environmental Issues: Indian and International level - Green initiatives 8. 3. Management and Ethics i. Ethical Issues in Marketing ii. Ethical Issues in Human Resource Management	

Recommended Books:

1. Law of Consumer Protection in India- P.K. Majumdar (2011), Orient Publishing Co. New Delhi.
2. Practical Guide to Consumer Protection Law, Anup K. Kaushal (2006), Universal Law Publishing Co, New Delhi.
3. Consumer Protection Laws, Prof. RakeshKhanna, (2005) Central Law Agency, Alahabad.
4. Business Ethics and Corporate Governance, S.K. Bhatia 92005),
5. Consumer Protection Law, Dr. S. R. Myneni,(2010), Asia Law House, Hyderabad.
6. Law of Consumer Protection, Dr. Gurbax Singh, Bharat Law Publication, Jaipur.

F.Y. B.Com.
Optional Paper
Subject Name -: Business Environment & Entrepreneurship
Course Code -: 106 – e.

Objectives :

1. To make the students aware about the Business Environment.
2. To create entrepreneurial awareness among students,
3. To motivate students to make their mind set for taking up entrepreneurship as career.

FIRST TERM

Unit No.	Name of the Topic	Periods
1	Business Environment - Concept- Importance - Inter relationship between environment and entrepreneur, Types of Environment- Natural, Economic - Political - Social - Technical - Cultural - Educational - Legal - Cross-cultural – Geographical etc.	12
2	Environment Issues Protecting the Natural Environment – prevention of pollution and depletion of natural resources; conservation of natural resources, Opportunities in Environment.	12
3	Problems of growth Relevance to entrepreneurship -Unemployment- Poverty-Regional imbalance- Social injustice-Inflation - Parallel Economy- Lack of Technical knowledge and information.	12
4	The Entrepreneur- Evolution of the term entrepreneur-" Competencies of an entrepreneur - Distinction between entrepreneur and manager- Entrepreneur and enterprise -Entrepreneur and Intrapreneur. Entrepreneur and Entrepreneurship.	12

SECOND TERM

Unit No.	Name of the Topic	Periods
1	Entrepreneurial Behaviour - Comparison between entrepreneurial and non-entrepreneurial Personality-Habits of Entrepreneurs - Dynamics of Motivation	12
2	Entrepreneurship Importance of Entrepreneurship - Economic Development and Industrialization, Entrepreneurship in Economic Theory- Role of Entrepreneurship ~ Entrepreneur as a catalyst.	12
3	<u>National Level</u> Training Organizations in promoting entrepreneurship (1) Entrepreneurship Development Institute of India (EDII) <u>State Level</u> Training Organizations in promoting entrepreneurship (1) MCED (2) DIC (3) Maratha Chamber of Commerce and their role. (4) Local NGO's and their roles.	12
4	Biographical study of entrepreneurs i) Narayan R. Murthy ii) Cyrus Poonawala iii) Any successful Entrepreneur from your area (Milind Kamble)	12

Recommended Books & Journals

Recommended Books

1. Dynamics of Entrepreneurship Development and Management - Desai Vasant – Himalaya Publishing House
2. Crusade - Shirke B.G. - Ameya Prakashan
3. Entrepreneurship - Robert D. Histrith - Tata McGraw Hill Publishing Co.
4. Entrepreneurial Development – Khanka - S. Chand.
5. Entrepreneurial Development – Gupta, Shrinivasan - S. Chand.
6. Essentials of Business Environment - K. Aswathappa - Himalaya Publishing House
7. Indian Economy - Dutta Sundaram –
8. A complete guide to successful Entrepreneurship – Pandya G. N. – Vikas Publishing House
9. Trainers Manuals - NIESBUD, New Delhi.
10. Trainers Manuals - NIMID, Mumbai,
11. Business Environment - Francis Cherunilam – Himalaya Publishing House.
12. Business Environment - Tandon B C.
13. Udyog - Udyog Sanchalaya, Mumbai.
14. Environmental Studies basic concepts – U. K. Ahluwalia
15. Environmental Pollution & Health – U. K. Ahluwalia

Recommended Journal

1. The Journal of Entrepreneurship EDI Ahmedabad.
2. Udyojak – M.C.E.D.
3. Government of Maharashtra Website
4. Government of India Website

F.Y. B.Com.
Optional Paper
Subject Name :- Foundation Course in Commerce.
Course Code :- 106 – f.

Objective :

1. To Study the forms of Business Organization.
2. To understand the basic concepts and recent trends in Commerce & Business Practices.
3. To Understand the functioning of Stock Exchange, Commodity exchange, Trade. Associations and Chamber of Commerce.

FIRST TERM

Unit No.	Name of the Topic	Periods
1	Organization - Meaning, Importance Forms of business organizations; Proprietary - Partnership firms- Limited Liability Partnership (LLP) -Joint Ventures and Business Alliances, Organizational structures, Functional areas of business and their operations, Formal & informal organizations: principles of organizations, Criteria for grouping	12
2	Economic Sector - Role and challenges of Public sector, Co operative Sector, Joint Sector (Public and Private). Corporate Sector and Non Government organizations. Industrial Policy, Foreign Investment Policy, Current Foreign Policy, Joint ventures, drafting of agreement	12
3	Business Practices and Government Policies - Importance - Role of Trade. Commerce & Industry, Outsourcing - franchising -Turn key Management - Important Features of current labour policy. Indian joint ventures abroad & Indian experiences.	12
4	Recent Trends in Service Sector, Banking Sector - ATM Debit & Credit Cards Internet Banking etc. Insurance Sector - Malhotra Committee Report - Opening of insurance sector for private players. Logistics - Net working – Importance - Challenges.	12

SECOND TERM

Unit No.	Name of the Topic	Periods
1	Security Market Stock Exchange –Introduction of stock exchanges in India, Online Trading, Working of Stock Exchange, Trading through NSDL, Role of SEBI, Protection & Education of Investors. SEBI & Its Guidelines.	12
2	Commodity Exchange & its working - History & overview, terms used of Commodity Market - working & procedure followed in commodity exchanges, future of commodity exchanges. Study of regional / local commodity market.	12
3	Business Ethics	

University of Pune, F.Y. B.Com.


PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar. Pune- 28.

	Nature, purpose of ethics and morals for organizational interests; ethics and conflicts of interests; ethical and social implications of business policies and decisions; Corporate Social Responsibility; ethical issues in Corporate Governance. Ethics in Accounting and Finance	
4	Basic Concepts in Commerce Study of following terms & concepts used in recent field of commerce	12

Sr. No.	Terms / Concepts	Meaning
1	Affidavit	A declaration in writing made on oath.
2	Automation	Use of automatic machinery in industries / organizations.
3	Assimilation	Joining the culture of two or more activities / organizations.
4	Agmark	A mark showing standard / quality of agriculture produce.
5	B P O	Business Process Outsourcing
6	Benchmarking	A level or standard in a scale against which performance can be evaluated. It is a method of job evaluation
7	Body Shopping	A consultancy supplying people at work contract basis.
8	Brand Equity	Goodwill attached to name
9	Bank rate	It is the rate at which the central bank of a country grants credit to the other banks.
10	Capital Intensive	Those industrial activities where the preparation of fixed capital is more than the other factors of production like land, labour, etc.
11	Consortium	A combination of large number of bidder to fulfill the contract deal.
12	Consumer Delight	Consumer's complete satisfaction.
13	Credit rating	Assessment of credit worthiness of an organization by external agency.
14	Credit squeeze	It is state's interference to regulate the level of economic activity by reducing the money supply. In other words, it is an effort of making credit more expensive through controls on bank.
15	Corporate Governance	Accountability of the managers / directors of a company. The recent provision about the listed companies required them to comply with the through annual accounts & reports.
16	Consumerism	A materialistic attitude of consumers of consuming maximum without any consideration of future.
17	Dis-Investment	A policy of the government of gradually withdrawing the investments of public funds from a public sector unit.
18	Distributive negotiation	A term used in personal management of a trade unions approach for solving disputes.
19	Dumping & antidumping	A policy of capturing slice of market by pouring a huge stock a policy of the government of prohibiting the capturing of market by way of dumping.
20	Depository	A system whereby the shares can be lodged physically & need not be handled in the course of each transaction.
21	EXIM	Policy regarding import & exports.
22	E-Commerce	Commercial activities with help of electronic device
23	Factoring	Taking responsibility of collecting accounts receivable

24	Franchise	An agency given for distribution of manufactured products.
25	Fringe benefit	A reward beyond the basic pay for the job.
26	Globalization	A process of world market open to local markets.
27	Grapevine	The informal communication of an organization many times more effective than the formal one.
28	Hacking	The unauthorized breaking into data base of a computer.
29	Hedging	Protecting oneself against the financial loss.
30	Internal customer	One department within an organization becoming customer of another.
31	Entrepreneurship	Entrepreneurship is developed from a particular organization.
32	ISO	International Organization of Standard's.
33	ISI	Indian Standard Institute.
34	Internet Banking	Banking activities with the help of internet service.
35	Just in Time	A system of procuring inventory as & when required.
36	Knowledge worker	A worker working in modern society with lot of areas of knowledge.
37	Kaizen	The Japanese concept of continuous improvement.
38	Labour intensive	An organization or an activity mainly relying on labour force as it's investment / capital.
39	Learning organization	An organization where the worker's are always wanting to learn.
40	Liberalization	An economic policy of allowing foreign players to enter the local markets in competition with the indigenous ones.
41	Logistics	A term originally used in military organizations, for moving of troops & equipments, it refers to the detailed planning of the process of distribution or redistribution.
42	Mutual Funds	A method of raising finance for investing in some other capital issues.
43	Mission	An organization goal / objective behind its establishment.
44	Market niche	A unique place or gap in the market for a given product.
45	Mergers & Acquisitions	Mergers is a combination of two or more business to share risk & rewards no one party to obtain control over the other . Acquisition is the acquiring of share of a company by another by paying purchase consideration as a fair value.
46	Non performing assets	An asset created but not showing any results (a banking asset created by way of loans / advances now becoming unrecoverable.
47	Niche strategy	A marketing strategy adopted for a small segment.
48	Negotiable Instrument	An instrument in commercial transactions recognized by the Negotiable Instrument Act.
49	Organizational Behaviour	A branch of personal management considering interperson & behavioral aspects.
50	Outsourcing	A policy of an organization of depending on external agency for a functional area.
51	Organizational Development	Efforts made for the development of human factor in an organization.
52	Patent	A right on a product or invention claiming its originality or know-how.
53	Primary Market	The Market where the first sale of securities is made offer from the corporate body to the investors.
54	Portfolio	A branch of financial management dealing with the

	Management	organization.
55	Public Relations	Efforts made by an organization of establishing report with the stake holders & the general public.
56	Privatization	A policy of the state of disinvestments in the public sector organization by offering its shares to the public at large.
57	Quality circle	A small group of individuals of an organization, trying to solve there practical problems.
58	Recession	A phase in an economy when there is sharp decline of demand for goods & services.
59	Sensex	Sensitive index number of a stock market.
60	Subsidy	A financial support provided by the government.
61	Security market	A market where the corporate securities i.e. shares are bought & sold.
62	Surrender value	It is the left over value that the insurance company is expected to pay.
63	Speed capital	It is the initial amount of capital required for any business to invested by the owner.
64	Service Organization	An organization establish for rendering service is support of trade.
65	SWOT analysis	An analysis of an individual or organization about the strength, weaknesses, opportunities & Threads.
66	TQM	Total Quality Management.
67	Trade Cycle	A recurring sequence of changes in business activity, indicating period of prosperity, decline, depression etc.
68	Trade mark	A mark / logo of an organization treated as official seal.
69	Technology transfer	The transfer of a technology from an area in which it had been successfully applied to an area, which it has not yet been tried.
70	Tele Conferencing	A discussion of participants, geographically scattered
71	Underwrite	To ensure or guarantee to purchase the stock of shares.
72	Value Addition	Increase in the value of an item by adding inputs on it.
73	WTO	World Trade Organization established in 1995.
74	Yellow page	A pace reserved for commercial advertisers.
75	Zero based budgeting	The use of budgets which starts from a present base of zero and regard all items as being new rather than in continuation of existing ones. In practice, this means a budget has to justify each of expenditure every year.

Recommended Books	
RECOMMENDED BOOKS AND PERIODICALS. 1. Financial Management – I. M. Pandey. 2. Financial Management – Theory & practical – Prasanna Chandra 3. Financial Management – S. C. Kuchhal 4. Public Sector in India – Laxmi Nariyan 5. Indian Economy – Rudder Datt 6. Indian Economy – KPM Sundaram 7. Law & practice of banking – S. R. Davar 8. Chamber of Commerce and Trade Association in India – Dr. B. R. Sabade & M. V. Namjoshi 9. The Indian Financial System – Vasant Desai 10. Business Administration – Dr. Y. K. Bhushan 11. Stock exchange Official Directory – The Bombay Stock exchange Publicat	

Journals & Periodicals

1. World of Business and –The Maharashtra Chamber Of Commerce, Industries & Agriculture, Pune
2. Sampada Chamber patrika – The Maharashtra Chamber of Commerce & Industries, Mumbai
3. Vanijya Vishwa – Pune Merchants Chamber, Pune

UNIVERSITY OF PUNE, PUNE.
Syllabus for F.Y.B.Sc(Computer Science)
Subject: MATHEMATICS
(With effect from June 2013)

Introduction:

University of Pune has decided to change the syllabi of various faculties from June,2013. Taking into consideration the rapid changes in science and technology and new approaches in different areas of mathematics and related subjects Board of studies in Mathematics with concern of teachers of Mathematics from different colleges affiliated to University of Pune has prepared the syllabus of F.Y.B.Sc. (Computer Science) Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

Aims:

- i) Give the students a sufficient knowledge of fundamental principles ,methods and a clear perception of innumerable power of mathematical ideas and tools and know how to use them by modeling ,solving and interpreting.
- ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science.
- iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills , creative talent and power of communication necessary for various kinds of employment.
- iv) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

Objectives:

- (i) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays ,state important facts resulting from their studies.
- (ii) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
- (iii) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- (iv) A student be able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
- (v) A student should be made aware of history of mathematics and hence of its past, present and future role as part of our culture.



Eligibility: 12th science with mathematics or equivalent examination.

Structure of the course:

Sr.No.	Paper	Theory	Oral	Internal	Total
1	MTC 101 (Discrete Mathematics)	80 Marks	-	20 Marks	100 Marks
2	MTC 102 (Algebra and Calculus)	80 Marks	-	20 Marks	100 Marks
3	MTC 103 (Mathematics Practicals)	72 Marks	08 Marks	20 Marks	100 Marks

All 3 above courses are compulsory.

Medium of Instruction: English

Examination:

A) Pattern of examination: Annual.

B) Standard of passing : 40 Marks out of 100 marks for each papers.

But for MT 101 and MT 102 for passing a student should obtain minimum 32 marks out of 80 in the theory examination and overall total marks for theory and internal should be minimum 40.

C)Pattern of question papers: For MTC 101 and MTC 102

Q1. Attempt any 08 out of 10 questions each of 02 marks. [16 Marks]
(05 questions from each term)

Q2. Attempt any 04 out of 06 questions each of 04 marks. [16 Marks].
(Based on term I)

Q.3. Attempt any 02 out of 03 questions each of 08 marks. [16 Marks].
(Based on term I)

Q4. Attempt any 04 out of 06 questions each of 04 marks. [16 Marks].
(Based on term II)

Q.5. Attempt any 02 out of 03 questions each of 08 marks. [16 Marks].
(Based on term II)

The pattern of question paper for MTC 103 is given in the detailed syllabus.

D) External Students: Not allowed.

E)Verifation/Revaluation: Allowed for MTC 101,MTC 102.

Equivalence of Previous syllabus along with new syllabus:

Sr.No	New Courses	Old Courses
1	MTC 101 (Discrete Mathematics)	Paper I (Discrete Mathematics)
2	MTC 102 (Algebra and Calculus)	Paper II (Algebra and Calculus)
3	MTC 103 (Mathematics Practicals)	Paper III (Mathematics Practicals)

Qualifications for Teacher

M.Sc. Mathematics (with NET /SET as per existing rules



Details of Syllabus

MTC 101: Discrete Mathematics

First Term

Unit 1: Logic

07 Lectures

- 1.1 Revision : Propositional Logic, Propositional Equivalences.
- 1.2 Predicates and Quantifiers : Predicate, n -Place Predicate or n -ary Predicate, Quantification and Quantifiers, Universal Quantifier, Existential Quantifier, Quantifiers with restricted domains, Logical Equivalences involving Quantifiers.
- 1.3 Rules of Inference : Argument in propositional Logic, Validity Argument(Direct and Indirect methods) Rules of Inference for Propositional Logic, Building Arguments.

Unit 2 : Lattices and Boolean Algebra

10 Lectures

- 2.1 Poset, Hasse diagram.
- 2.2 Lattices, Complemented lattice, Bounded lattice and Distributive lattice.
- 2.3 Boolean Functions : Introduction, Boolean variable, Boolean Function of degree n , Boolean identities, Definition of Boolean Algebra.
- 2.4 Representation of Boolean Functions : Minterm, Maxterm Disjunctive normal form, Conjunctive normal Form.

Unit 3 : Counting Principles

10 Lectures

- 3.1 Cardinality of Set : Cardinality of a finite set.
- 3.2 Basics of Counting : The Product Rule, The Sum Rule, The Inclusion-Exclusion Principle.
- 3.3 The Pigeonhole Principle: Statement, The Generalized Pigeonhole Principle, Its Applications.
- 3.4 Generalized Permutations and Combinations : Permutation and Combination with Repetitions, Permutations with Indistinguishable Objects, Distributing objects into boxes : Distinguishable objects and distinguishable boxes, Indistinguishable objects and distinguishable boxes, Distinguishable objects and Indistinguishable boxes, Indistinguishable objects and Indistinguishable boxes

Unit 4 : Recurrence Relations

9 Lectures

- 4.1 Recurrence Relations : Introduction, Formation.
- 4.2 Linear Recurrence Relations with constant coefficients.
- 4.3 Homogeneous Solutions.
- 4.4 Particular Solutions.
- 4.5 Total Solutions.



Second Term

Unit 5 : Graphs

06 Lectures

- 5.1 Definition, Elementary terminologies and results, Graphs as Models.
- 5.2 Special types of graphs.
- 5.3 Isomorphism.
- 5.4 Adjacency and Incidence Matrix of a Graph.

Unit 6 : Operations on Graphs

04 Lectures

- 6.1 Subgraphs, induced subgraphs, Vertex deletion, Edge deletion.
- 6.2 Complement of a graph and self-complementary graphs.
- 6.3 Union, Intersection and Product of graphs.
- 6.4 Fusion of vertices.

Unit 7 : Connected Graphs.

09 Lectures

- 7.1 Walk, Trail, Path, Cycle : Definitions and elementary properties.
- 7.2 Connected Graphs : definition and properties.
- 7.3 Distance between two vertices, eccentricity, center, radius and diameter of a graph.
- 7.4 Isthmus, Cutvertex : Definition and properties.
- 7.5 Cutset, edge-connectivity, vertex connectivity.
- 7.6 Weighted Graph and Dijkstra's Algorithm.

Unit 8 : Eulerian and Hamiltonian Graphs

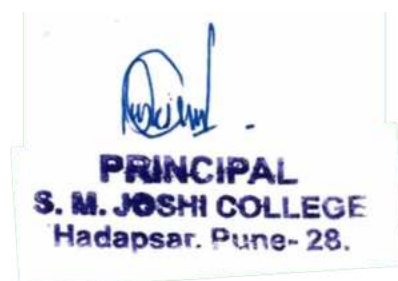
05 Lectures

- 8.1 Seven Bridge Problem, Eulerian Graph : Definition and Examples, Necessary and Sufficient condition.
- 8.2 Fleury's Algorithm.
- 8.3 Hamiltonian Graphs : Definition and Examples, Necessary Condition.
- 8.4 Introduction of Chinese Postman Problem and Travelling Salesman Problem.

Unit 9 : Trees

06 Lectures

- 9.1 Definition, Properties of trees.
- 9.2 Center of a tree.
- 9.3 Binary Tree : Definition and properties.
- 9.4 Tree Traversal : Ordered rooted Tree, Preorder traversal, inorder traversal and postorder traversal, Prefix Notation.
- 9.5 Spanning Tree : Definition, Properties, Shortest Spanning Tree, Kruskal's Algorithm.



Unit 10 : Directed Graphs

06 Lectures

- 10.1 Definition, Examples Elementary Terminologies and properties.
- 10.2 Special Types of Digraphs.
- 10.3 Connectedness of digraphs.
- 10.4 Network and Flows : definition and examples.

Text Book: Text book of Discrete Mathematics, Prepared by B.O.S. in Mathematics, University of Pune, Pune.(2013).

Reference Books:

- 1) Kenneth Rosen, Discrete Mathematics and It's Applications (Tata McGraw Hill)
- 2) C. L. Liu ,Elements of Discrete Mathematics, (Tata McGraw Hill)
- 3) John Clark and Derek Holton, A First Look at Graph Theory (Allied Publishers)
- 4) Narsingh Deo, Graph Theory with Applications to Computer Science and Engineering, (Prentice Hall).

MTC 102: Algebra and Calculus

First Term: (Algebra)

Unit 1: Relations and functions

11 Lectures

- 1.1 Ordered pairs, Cartesian product of Sets.
- 1.2 Relations, types of relations, equivalence relations. Partial orderings.
- 1.3 Equivalence Class, properties and partition of a set.
- 1.4 Transitive closure and Warshall's Algorithm.
- 1.5 Digraphs of relations, matrix representation and composition of relations.
- 1.6 Definition of function as relation, types of functions (one-one, onto and bijective)

Unit 2: Binary Operations and Groups.

9 Lectures

- 2.1 Definition of binary operation, examples, properties of binary operations.
- 2.2 Definition of Monoid, semigroup, examples.



2.3 Definition of group and examples, finite and infinite groups, permutation groups, subgroups, Cyclic groups.

Unit 3: Divisibility in Integers

16 Lectures

3.1 Well ordering principle

3.2 First and second Principle of Mathematical Induction, Examples

3.3 Division Algorithm (without proof)

3.4 Divisibility and its properties, prime numbers.

3.5 Definition G.C.D and L.C.M., Expressing G.C.D. of two integers as a linear combination of the two integers.

3.6 Euclidean Algorithm (Without proof).

3.7 Relatively prime integers, Euclid's Lemma and its generalization.

3.8 Congruence relations and its properties, Residue Classes: Definition, Examples, addition and multiplication modulo n and composition tables

3.9 Euler's and Fermat's Theorems. (Without proof). Examples

Second Term: (Calculus)

Unit 4: Continuity and Differentiability

12 Lectures

4.1 Continuity and Properties of continuous functions defined on $[a, b]$ (Without proof) and examples.

4.2 Differentiability

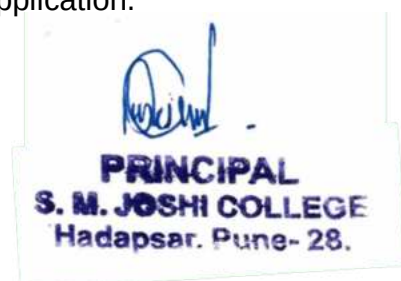
4.3 Theorem – Differentiability implies continuity but not conversely. Left hand derivative and Right hand derivative.

4.4 Intermediate value theorem (without proof).

4.5 Rolle's theorem (with proof and geometric interpretation)

4.6 Lagrange's Mean Value Theorem (with proof and geometric interpretation)

4.7 Cauchy's Mean Value Theorem (with proof), Verification and Application.



4.8 L' Hospital's Rule (without proof)

Unit 5: Successive Differentiation

05 Lectures

5.1 The n^{th} derivatives of standard functions.

5.2 Leibnitz's Theorem (with proof).

Unit 6: Taylor's and Maclaurin's Theorems

05 Lectures

6.1 Taylor's and Maclaurin's Theorems with Lagrange's and Cauchy's form of remainders (without proof).

6.2 Taylor's and Maclaurin's Series.

Unit 7 : Matrices and System of Linear Equations

14 Lectures

7.1 Revision: Elementary operations on matrices.

7.2 Echelon form of matrix

7.3 System of linear equations: Gauss Elimination Method, Gauss –Jordan Elimination Method, L.U. Decomposition Method

7.4 Rank of matrix, Row rank, Column rank

Text Book: Text book of Algebra and Calculus, Prepared by B.O.S. in Mathematics, University of Pune, Pune.(2013).

Reference Books:

- 1) Discrete Mathematics Structure – Bernard Kolman, Robert Busby, Sharon Cutler Ross, Nadeem-ur-Rehman, Pearson Education, 5th Edition
- 2) Elements of Discrete Mathematics – C.L.Liu (Tata McGraw Hill)
- 3) Calculus and Analytical Geometry- Thomas Finny
- 4) J.B. Fraleigh, A. First Course in Abstract Algebra, Third Ed., Narosa, New Delhi, 1990
- 5) H. Anton and C. Rorres, Elementary Linear Algebra with Applications, Seventh Ed., Wiley, (1994).



MTC 103: Mathematics Practicals

(Practicals based on the applications of articles in MTC 101 and MTC 102)

List of Practicals:

TERM I

1. Logic
 2. Lattices
 3. Boolean Algebra .
 4. Counting Principles.
 5. Recurrence Relations
 6. Miscellaneous.
 7. Relations and functions.
 8. Binary Operations
 9. Groups
 10. Divisibility in Integers I
 11. Divisibility in Integers II.
 12. Miscellaneous.
-

TERM II

13. Graphs and Operations on Graphs.
14. Connected Graphs.
15. Eulerian and Hamiltonian Graphs.
16. Trees
17. Directed Graphs.
18. Miscellaneous.
19. Continuity and Differentiability.
20. Mean value theorems and L'Hospital rule.
21. Successive Differentiation.
22. Taylor's and Maclaurin's Theorems.
23. Matrices and System of Linear Equations.
24. Miscellaneous.

Modalities For Conducting The Practical and The Practical Examination

- 1) There will be one 3 hour practical session for each batch of 15 students per week.
- 2) A question bank consisting of 100 problems in all for the whole year, distributed in four Sections: 50 questions for each term (25 questions on MT 101 and 25 on MT 102) will be the course work for this paper. Question Bank will be prepared by the individual subject teacher and the problems included should be changed every year, based on the list of practicals given above. The question bank of each year should be preserved by the subject teachers, which can be reviewed by the L.I.C. members visiting college.



3) The College will conduct the Practical Examination at least 15 days before the commencement of the Main Theory Examination. The practical examination will consist of written examination of 72 marks and oral examination of 08 marks.

4) There will be no external examiner; the practical exam will be of the duration of 3 hours.

5) The subject teacher will set a question paper based on pattern as follows:

- Q1.** (a) Any 1 out of 2 worth 8 marks on MTC101 (first term).
(b) Any 1 out of 2 worth 8 marks on MTC 102(First term).
Q2*. Any 5 out of 7 each of 4 marks on MTC 101.
Q3*. Any 5 out of 7 each of 4 marks on MTC 102.
Q4. (a) Any 1 out of 2 of 10 marks on MTC 101(second term).
(b) Any 1 out of 2 worth 10 marks on MTC 102(second term).

(*In Q2 and Q3, there will be 3 questions from first term and 4 questions from the second term or vice-versa.)

6) Each student will maintain a journal to be provided by the college.

7) The internal 20 marks will be given on the basis of journal prepared by student and the cumulative performance of student at practicals.

8) It is recommended that concept may be illustrated using computer software and graphing calculators wherever possible.

8) The subject teachers must include computer practicals based on use of free mathematical software's like Scilab, Maxima, mu-pad, etc. for solving problems in the miscellaneous practical mentioned above.

10) **Special Instruction:** Before starting each practical necessary introduction, basic definitions, intuitive inspiring ideas and prerequisites must be discussed.

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University of Pune
STATISTICS
For First Year B. Sc. (Computer Science) Degree Course
(Formerly known as B. C. S. Course)
Syllabus
(To be implemented from Academic Year 2013-14)
Submitted by: Board of Studies, Statistics

- 1) **Title of the Course:** First Year B. Sc. (Computer Science)
- 2) **Preamble:** Statistics is a branch of science that can be applied practically in every walk of life. Statistics deals with any decision making activity in which there is certain degree of uncertainty and Statistics helps in taking decisions in an objective and rational way. The student of Statistics can study it purely theoretically which is usually done in research activity or it can be studied as a systematic collection of tools and techniques to be applied in solving a problem in real life.

In last 5 to 7 years, computers are playing very crucial role in the society. The use of computers has horizontally spread and also penetrated vertically in the society. It has become a part and parcel of common man. Thus there is a huge demand for computer education.

The University of Pune had done a pioneering work in this area and Three year degree course B. Sc. (Computer Science) of University of Pune (formerly known as B.C.S.) is very popular among the student community and I. T. Industry. This course covers various subjects which are required directly or indirectly for becoming computer professional. Statistics is one such important subject which is required and is extensively used in a vast spectrum of computer based applications. Data Mining and Warehousing, Theoretical Computer Science, Reliability of a computer Programme or Software, Machine Learning, Artificial Intelligence, Pattern Recognition, Digital Image Processing, Embedded Systems are just few applications to name where Statistics can be extensively used.

- 3) **Introduction:** The syllabus of Statistics for First Year of this course covers basic concepts and terminology in Statistics and covers basic tools and methods required for data analysis. The teachers teaching this syllabus and students should give emphasis on understanding the concepts and ability to apply statistical tools and techniques and not on the theoretical discussion. It is



expected that at the end of the course, a student should be well equipped to learn and apply acquired techniques in computer based applications.

4) Eligibility: 12th Science with Mathematics

Students admitted to F.Y.B.Sc.(C.S.) will be taking this as one of the compulsory course. Admissions to F.Y.B.Sc.(C.S.) will be given as per the selection procedure / policies adopted by the respective college keeping in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5) Examination:

A) Pattern of examination and of question paper:

For Theory Papers (For Paper I and II):

Internal examination - 20 marks (10 marks for each semester)

Objective type/ short answer questions with maximum 2 marks for each question.

University Examination - 80 marks at the end of the year.

5 questions carrying 16 marks each.

Q1: Attempt all of the following: (2 marks each) (8 sub questions)

Q2, Q3, Q4, Q5: Attempt any four of the following (4 marks each) (any 4 out of 5 or out of 6)

For Practical paper in Statistics (Paper III):

Internal Evaluation of 20 marks -

(i) Statistics Journal & Attendance – 10 marks

(ii) Project Evaluation – 5 marks

(iii) Viva – 5 marks

External Examination of 80 marks – Total Duration 3 hours

(i) Questions based upon spreadsheet – 3 questions (1 question on diagrams) each of 10 marks should be asked. Total Duration – 1 hour, Total marks – 30.

(ii) Questions to be solved manually using scientific calculator – to solve any two questions out of 3 questions of 25 marks each. Total Duration – 2 hours, Total marks – 50.

B) Standard of Passing: In order to pass in the first year theory and practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks must be obtained in the University Theory Examination.)

C) ATKT Rules: Not applicable, since Statistics is one of the compulsory courses taken at F.Y. level.

D) Award of Class: Not applicable, since Statistics is one of the compulsory courses taken at F.Y. level.



E) External Students: There shall be no external students.

F) Pattern of question paper: As specified in A)

G) Verification/Revaluation: As per the University rules

6) Structure of the Course:

F. Y. B. Sc.(C.S.) Statistics

Paper	Course Title	Marks	Lectures
Paper - I	Statistical Methods I	100	Three Hours/Week per Paper (Total 36/Paper per term)
Paper - II	Statistical Methods II	100	
Practical Course	Practical Course	100	Three Hours / Week

Medium of Instruction: The medium of instruction for the course shall be English

7) Equivalence of Previous Syllabus: No equivalence required at F. Y. B. Sc. level, the course titles are same as previous syllabus.

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Course wise Detail Syllabus

Detailed Syllabus for Statistics Paper I (Statistical Methods I)

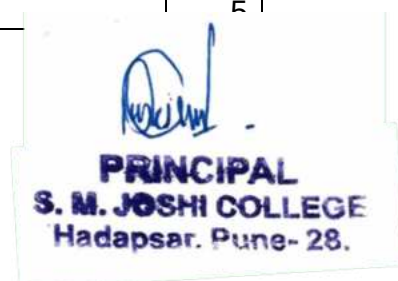
1.	Data condensation and Graphical methods 1.1 Raw data, attributes and variables, discrete and continuous variables. 1.2 Presentation of data using frequency distribution and cumulative frequency distribution. (Construction of frequency is not expected) 1.3 Graphical Presentation of frequency distribution –histogram, stem and leaf chart, less than and more than type ogive curves. 1.4 Numerical problems related to real life situations.	5

2.	Review/Revision of Descriptive Statistics 2.1 Measures of Central tendency: Mean, Mode, Median. Examples where each one of these is most appropriate. 2.2 Partition values: Quartiles, Box-Plot. 2.3 Measures of Dispersion: Variance, Standard Deviation, Coefficient of Variation. (Section 2.1 to 2.3 should be covered for raw data, ungrouped frequency distribution and exclusive type grouped frequency distribution)	7
3.	Moments 3.1 Raw and Central moments: definition, computations for ungrouped and grouped data (only up to first four moments). 3.2 Relation between raw and central moments upto fourth order. 3.3 Numerical problems related to real life situations.	3
4.	Measures of Skewness and Kurtosis 4.1 Concept of symmetric frequency distribution, skewness, positive and negative skewness. 4.2 Measures of skewness-Pearson's measure, Bowley's measure, β_1, γ_1. 4.3 Kurtosis of a frequency distribution, measure of kurtosis(β_2, γ_2) based upon moments, type of kurtosis: leptokurtic, platykurtic and mesokurtic. 4.5 Numerical problems related to real life situations.	4
5.	Discrete Random variable 5.1 Definition of random variable and discrete random variable. 5.2 Definition of probability mass function, distribution function and its properties. 5.3 Definition of expectation and variance, theorem on expectation. 5.4 Determination of median and mode using p.m.f. 5.5 Numerical problems related to real life situations.	8
6.	Standard Discrete Distributions 6.1 Discrete Uniform Distribution: definition, mean, variance. 6.2 Bernoulli Distribution: definition, mean, variance, additive property. 6.3 Binomial Distribution: definition, mean, variance, additive property. 6.4 Geometric Distribution (p.m.f $p(x) = pq^x$, $x = 0, 1, 2, \dots$): definition, mean, variance. 6.5 Poisson Distribution: definition, mean, variance, mode, additive property, limiting case of $B(n, p)$ 6.6 Illustration of real life situations. 6.7 Numerical problems related to real life situations.	15
7.	Correlation (for bivariate raw data) 7.1 Bivariate data, Scatter diagram. 7.2 Correlation, Positive Correlation, Negative Correlation, Zero Correlation 7.3 Karl Pearson's coefficient of correlation (r), limits of r ($-1 \leq r \leq 1$), interpretation of r, Coefficient of determination (r^2), Auto-correlation upto lags 2. 7.4 Numerical Problems.	6

8	Regression (for ungrouped data) 8.1 Regression: illustrations, appropriate situations for regression and correlation. 8.2 Linear Regression. 8.3 Fitting of straight line using least square method. 8.4 Properties of regression coefficients: $b_{xy} \cdot b_{yx} = r^2$, $b_{yx} \cdot b_{xy} < 1$, $b_{yx} = r(\sigma_y/\sigma_x)$ and $b_{xy} = r(\sigma_x/\sigma_y)$ 8.5 Non Linear regression models: second degree curve, growth curve models. i) $Y = ae^{bx}$ ii) $Y = ab^x$ iii) $Y = aX^b$ iv) logistic model $Y = k / (1+e^{a+bx})$ 8.6 Residual plot, mean residual sum of squares (m. s. s) 8.7 Numerical problems related to real life situations.	9
9	Multiple and Partial Correlation and Regression (for trivariate data) 9.1 Yule's notation and concept of multiple regression. 9.2 Fitting of multiple regression plane. 9.3 Partial regression coefficient, interpretation. 9.4 Multiple correlation coefficient, concept, definition, computation and interpretation. 9.5 Partial correlation coefficient, concept, definition, computation and interpretation.	8
10	Time Series 10.1 Meaning and Utility. 10.2 Components of Time Series. 10.3 Additive and Multiplicative models. 10.4 Methods of estimating trend: moving average method, least squares method and exponential smoothing method. 10.5 Elimination of trend using additive and multiplicative models. 10.6 Simple time series models: AR (1), AR (2). 10.7 Numerical problems related to real life situations.	7
Syllabus for 1 st term is upto Binomial Distribution in Topic 6.		

Detailed Syllabus for Statistics Paper II (Statistical Methods II)

1	Detailed Review / Revision of Theory of Probability 1.1 Counting Principles, Permutation, and Combination. 1.2 Deterministic and non-determination models. 1.3 Random Experiment, Sample Spaces (finite and countably infinite) 1.4 Events: types of events, Operations on events. 1.5 Probability - classical definition, probability models, axioms of probability, probability of an event. 1.6 Theorems of probability (with proof) i) $0 \leq P(A) \leq 1$ ii) $P(A) + P(A') = 1$ iii) $P(A) \leq P(B)$ when $A \subset B$ iv) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ 1.7 Numerical problems related to real life situations.	5



2	Advanced Theory of Probability 2.1 Concepts and definitions of conditional probability, multiplication theorem $P(A \cap B) = P(A) \cdot P(B A)$ 2.2 Bayes' theorem (without proof) 2.3 Concept of Posterior probability, problems on posterior probability. 2.4 Definition of sensitivity of a procedure, specificity of a procedure. Application of Bayes' theorem to design a procedure for false positive and false negative. 2.5 Concept and definition of independence of two events. 2.6 Numerical problems related to real life situations.	12
3	Continuous Random Variable 3.1 Definition of continuous random variable (r. v.), 3.2 Probability density function (p.d.f.), 3.3 Cumulative distribution function (c.d.f.), its properties. 3.4 Calculation of mean, mode, median, variance, standard deviation for continuous r. v. 3.5 Numerical problems related to real life situations.	6
4	Standard Continuous Probability Distributions 4.1 Uniform Distribution: statement of p.d.f., mean, variance, nature of probability curve. 4.2 Exponential Distribution: statement of p.d.f. of the form, $f(x) = (1/\theta) e^{(-x/\theta)}$, mean, variance, nature of probability curve, lack of memory property. 4.3 Normal Distribution: statement of p.d.f., identification of parameters, nature of probability density curve, standard normal distribution, symmetry, distribution of $aX+b$, $aX+bY+c$ where X and Y are independent normal variables, computations of probabilities using normal probability table, normal approximation to binomial and Poisson distribution, central limit theorem (statement only), normal probability plot. 4.4 Pareto Distribution: p.d.f. of the form $f(x) = \frac{\alpha}{x^{\alpha+1}}$, $x \geq 1, \alpha > 0$, mean, variance, applications. 4.5 Numerical problems related to real life situations.	13
	End of First term.	
5	Concepts and definitions related to testing of hypothesis 5.1 Definitions: population, statistic, SRSWR, SRSWOR, random sample from a probability distribution, parameter, statistic, standard error of estimator. 5.2 Concept of null hypothesis and alternative hypothesis, critical region, level of significance, type I and type II error, one sided and two sided tests, p-value.	5

6	Large Sample Tests 6.1 $H_0: \mu = \mu_0$ Vs $H_1: \mu \neq \mu_0, \mu < \mu_0, \mu > \mu_0$ (One sided and two sided tests) 6.2 $H_0: \mu_1 = \mu_2$ Vs $H_1: \mu_1 \neq \mu_2, \mu_1 < \mu_2, \mu_1 > \mu_2$ (One sided and two sided tests) 6.3 $H_0: P = P_0$ Vs $H_1: P \neq P_0, P < P_0, P > P_0$ (One sided and two sided tests) 6.4 $H_0: P_1 = P_2$ Vs $H_1: P_1 \neq P_2, P_1 < P_2, P_1 > P_2$ (One sided and two sided tests) 6.5 Numerical problems related to real life situations.	7
7	Tests based on t-distribution 7.1 $H_0: \mu = \mu_0$ Vs $H_1: \mu \neq \mu_0, \mu < \mu_0, \mu > \mu_0$ (One sided and two sided tests) 7.2 $H_0: \mu_1 = \mu_2$ Vs $H_1: \mu_1 \neq \mu_2, \mu_1 < \mu_2, \mu_1 > \mu_2$ (One sided and two sided tests) 7.3 Paired t-test. 7.4 Test of significance of correlation coefficient for bivariate raw data. 7.5 Test of significance of regression coefficients for bivariate raw data. 7.6 Numerical problems related to real life situations.	8
8	Test based on Chi-square distribution 8.1 Chi square test for goodness of fit 8.2 Test for independence of attributes (m X n contingency table) 8.3 Test for significance of variation for a population. 8.4 Numerical problems related to real life situations.	3
9	Non parametric tests 9.1 Run test 9.2 Sign test. 9.3 Kolmogrov - Smirnov test 9.4 Mann – Whitney test 9.5 Numerical problems related to real life situations.	6
10	Simulation 10.1 Introduction to Simulation, merits and demerits and pitfall. 10.2 Pseudo-random number generator ,requisites of a good random number generator, Testing these requirements by using various test of hypothesis using Run test, goodness of fit test, Sign test etc. 10.3 Model Sampling from uniform and exponential distribution. 10.4 Model sampling from Normal distribution using Box-Muller transformation. 10.5 Numerical problems related to real life situations.	7

Detailed Syllabus for Statistics Paper III (Practical)

A) Practicals to be done manually using scientific calculator

1	Measures of Central Tendency and Dispersion.
2	Problems on simple probability, conditional probability, Baye's theorem and independence of events.
3	Measures of skewness and kurtosis

4	Correlation and Linear Regression Analysis. (for bivariate raw data)
5	Fitting of second degree and exponential type models. (for bivariate raw data)
6	Multiple and Partial Correlation and Regression Analysis. (for trivariate data) + Using spreadsheet with use of readymade function.
7	Time Series (Moving Average and Fitting of AR(1) and AR(2) models).
8	Fitting of Binomial and Poisson distributions.
9	Fitting of Normal Distribution.
10	Model Sampling from Simple Continuous Distributions
11	Large Sample Tests.
12	Tests based upon t distribution.
13	Tests based upon chi square distribution.
14	Non parametric tests.

B) Practicals to be done using any spreadsheet (like MS-Excel in MS-Windows or Open-Office in Linux etc.)

1	Diagrammatic Representation and Descriptive Statistics for raw data
2	For a bivariate raw data, fitting various models and finding the "best fit". (3 problems to be solved in a slot)
3	Fitting of Geometric Distribution and Normal Distribution
4	Using random numbers, drawing of a sample from exponential distribution, normal distribution (Box Muller Transformation) etc.

C) Project –

Project is compulsory which is equivalent to 2 practicals.

Project will carry 5 marks as part of internal evaluation.

One project should be given to one practical batch of students.

The formal project report should be prepared by each student and it must be attached in Statistics journal.

10) Recommended books

Author Name	Year of Publication	Title	Publisher
Medhi J.	1992	Statistical Methods (An Introductory Text)	New Age International
Freund J.E.	2005	Modern Elementary Statistics	Pearson Publication
Trivedi K.S.	2001	Probability, Statistics, Design of Experiments and Queuing Theory with Applications of Computer Science	Prentice Hall of India, New Delhi

Gupta S. C. and Kapoor V. K.	1987	Fundamentals of Applied Statistics (3rd Edition)	S. Chand and Sons, New Delhi.
Ross S. M.	2006	A First Course In Probability 6th Edition	Pearson publication
Law A. M. and Kelton W. D.	2007	Simulation Modelling and Analysis	Tata McGraw Hill
Box G. E. P. and Jenkins G. M.	2008	Time Series Analysis, 4 th edition	Wiley
Brockwell P. J. and Davis R. A.	2006	Time Series Methods	Springer
Snedecor G. W. Cochran W. G.	1989	Statistical Methods	John Wiley & sons
Kulkarni M.B., Ghatpande S.B., Gore S.D.	1999	Common Statistical Tests	Satyajeet Prakashan, Pune
Kulkarni M.B., Ghatpande S.B.	2007	Introduction to Discrete Probability and Probability Distributions	SIPF Academy
Sarma K.V.S.	2001	Statistics Made Simple. Do it Yourself on P.C.	Prentice Hall

11) Qualification of Teacher: As per the University rules

University of Pune

**Three Year Degree Course in
B. Sc. Computer Science**



PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar. Pune- 28.

1) Title of the Course : B. Sc. Computer Science

F.Y.B.Sc. Computer Science Syllabus (To be implemented from Academic Year 2013-14)

2) Preamble:

B. Sc. Computer Science is a systematically designed three year course that prepares the student for a career in Software Industry. The syllabus of computer Science subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) forms the required basics for pursuing higher studies in Computer Science. The Syllabus also develops requisite professional skills and problem solving abilities for pursuing a career in Software Industry.

3) Introduction:

At **first year of under-graduation** basic foundation of two important skills required for software development is laid. A course in programming and a course in database fundamentals forms the preliminary skill set for solving computational problems. Simultaneously two practical courses are designed to supplement the theoretical training. The second practical course also includes a preliminary preparation for website designing in the form of HTML programming.

Alongwith Computer Science two theory and one practical course each in Statistics, Mathematics and Electronics help in building a strong foundation.

At **second year under-graduation**: The programming skills are further strengthened by a course in Data structures and Object oriented programming. The advanced topics in Databases and preliminary software engineering form the second course. Two practical courses alongside help in hands-on training. Students also undertake a mini project using software engineering principles to solve a real world problem. Simultaneously two theory and one practical course each in Mathematics and Electronics help in strengthening problem solving abilities.

At **third year under-graduation**: Six theory papers in each semester and practical courses cover the entire spectrum of topics necessary to build knowledge base and requisite skill set. Third practical course also includes project work which gives students hands on experience in solving a real world problem.

Objectives:

- To develop problem solving abilities using a computer
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To imbibe quality software development practices. To create awareness about process and product standards
- To train students in professional skills related to Software Industry.
- To prepare necessary knowledge base for research and development in Computer Science
- To help students build-up a successful career in Computer Science

4) Eligibility:

Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the Pune. Reservation and relaxation will be as per the Government rules.


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5 A) Examination Pattern:**First Year B. Sc. Computer Science****Subject : Computer Science**

Pattern of Examination: Annual

Theory courses (CS-101): Annual

(CS-102): Annual

Practical Course (CS-103): Annual

(CS-104): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Computer Science Paper I (CS-101)	Problem Solving Using Computers and 'C' Programmin g	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Paper II CS-102)	File Organizatio n and Fundament al of Databases	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Practical Paper I (CS-103)	Computer Science Practical Paper I	25 Practical slots of 4 lectures each	08	32	40 *
Computer Science Practical Paper II (CS-104)	Computer Science Practical Paper II	25 Practical slots of 4 lectures each	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practical)+ Grade(practical) = 300 marks +Grade
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on continuous assessment of lab work.
4. In case of Computer Science Practical Paper II, marks out of 100 will be converted to grades

Marks	Grade
75 and above	O


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65 and above	A
55 and above	B
50 and above	C
45 and above	D
40 and above	E
Below 40 (indicates Failure)	F

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2, 3, 4 and 5	4 out of 5/6– short answer type questions; answerable in 8 – 10 lines ; mix of theory and problems

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions.

Practical: Continuous assessment of Lab work and mini project.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 3 hours duration for each practical course. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Computer Science

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-211:Data Structures using 'C'	CS-221:Object Oriented Concepts using C++
2	Computer Science Paper II	CS-212: Relational Database Management System	CS-222:Software Engineering
3	Computer Science Paper III	CS-223:Data structures Practicals and C++ Practicals	
4	Computer Science Paper IV	CS-224:Database Practicals & Mini Project using Software Engineering tec	


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5	Mathematics Paper I	MT-211:Mathematics Paper I-Sem I	MT-221:Mathematics Paper I-Sem II
6	Mathematics Paper II	MT-212:Mathematics Paper II-Sem I	MT-222:Mathematics Paper II-Sem II
7	Mathematics Paper III	MT-223:Practical Course in Mathematics	
8	Electronics Paper I	EL-211:Electronics Paper I-Sem I	EL-221:Electronics Paper I-Sem II
9	Electronics Paper II	EL-212:Electronics Paper II-Sem I	EL-222:Electronics Paper II-Sem II
10	Electronics Paper III	EL-223:Practical Course in Electronics	
11	English	EN-211:Technical English-Sem I	EN-221:Technical English – Sem II

Pattern of examination: Semester

Theory courses (Sem I: CS-211 and CS212): Semester
 (Sem II: CS-221 and CS-222): Semester
 Practical Course (CS-223 and CS-224): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
Theory Paper I (CS- 211)	Data Structures using 'C'	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (CS 212)	Relational Database Management System	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper I (CS 221)	Object Oriented Concepts using C++	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (CS 222)	Software Engineering	Four lectures/Week (Total 48 per	04	16	


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		Semester)			
Practical paper I (CS 223) (First & Second Semester)	Data structures Practicals and C++ Practicals	Practicals of 4 lectures each 25 practicals / year)	08	32	40 **
Practical paper II (CS 223) (First & Second Semester)	Database Practicals & Mini Project using Software Engineeri ng technique s	Practicals of 4 lectures each 25 practicals / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals)+Grade(practical) = 300 marks+Grade
3. Internal marks for theory papers given on the basis of Continuous internal assessment

Theory examination will be of two hours duration for each theory course. There shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 questions, each of 1 marks	10 marks
Question 2 3	Sub-questions carrying 5 marks (2 out of 3)	10 marks each
Question 4	Sub-questions carrying marks depending on their complexity with options	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: Continuous assessment of practical performance

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.


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Third Year B. Sc. Electronic Science

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-331: System Programming	CS-341: Operating System
2	Computer Science Paper II	CS-332: Theoretical Computer Science	CS-342: Compiler Construction
3	Computer Science Paper III	CS-333: Computer Networks-I	CS-343: Computer Networks-II
4	Computer Science Paper IV	CS-334: Internet Programming- I	CS-344: Internet Programming- II
5	Computer Science Paper V	CS-335: Programming in Java-I	CS-345: Programming in Java-II
6	Computer Science Paper VI	CS-336: Object Oriented Software Engineering	CS-346: Computer Graphics
7	Computer Science Paper VII	CS-347: Practicals Based on CS-331 and CS-341 – Sem I & Sem II	
8	Computer Science Paper VIII	CS-348: Practicals Based on CS-335 and CS-344 – Sem I & Sem II and Computer Graphics using Java	
9	Computer Science Paper IX	CS-349: Practicals Based on CS-334 and CS-344 – Sem I & Sem II and Project	

Subject : Computer Science

Pattern of examination: Semester

Theory courses:

(Sem III: CS-331-CS-336): Semester (Sem IV: CS-341-CS-346): Semester

Practical Course:

(CS-347-CS-349): Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
CS-331	System Programmin g	48	4	16	


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CS-332	Theoretical Computer Science	48	4	16	20*
CS-333	Computer Networks-I	48	4	16	20*
CS-334	Internet Programming- I	48	4	16	20*
CS-335	Programming in Java-I	48	4	16	20*
CS-336	Object Oriented Software Engineering	48	4	16	20*
SEM IV					
CS-341	Operating System	48	4	16	20*
CS-342	Compiler Construction	48	4	16	20*
CS-343	Computer Networks-II	48	4	16	20*
CS-344	Internet Programming- I	48	4	16	20*
CS-345	Programming in Java-I	48	4	16	20*
CS-346	Computer Graphics	48	4	16	20*
Practical Papers					
CS 347 (Semester III & IV)	Practicals Based on CS-331 and CS-341 – Sem I & Sem II	25 practicals/ year	08	32	40 **
CS 348 (Semester III & IV)	CS-348:Practicals Based on CS-335 and Cs-344 – Sem I & Sem II and Computer Graphics using Java	25 practicals/ year	08	32	40 **


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CS 349 (Semester III & IV)	CS-349: Practicals Based on CS-334 and CS-344 – Sem I & Sem II and Project	25 practicals/ year	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50×6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers given on the basis of continuous internal assessment

Theory examination will be of two hours duration for each theory course. There shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 questions, each of 1 marks	10 marks
Question 2 and 3	Sub-questions carrying 5 marks (2 out of 3)	10 marks each
Question 4	Sub-questions carrying marks depending on their complexity with options	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions. Practicals: one internal assessment test + practical journals + attendance + activity.

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each year.


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(Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)

- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 13) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc. While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 22) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, the Question paper slips will be provided by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc. and T.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers: Papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.


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5G) Verification and Revaluation Rules:

As per university Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Computer Science Degree Program shall be three years.

a) All are Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 2 Practical (Annual)

S .Y.B.Sc.: 2 Theory per semester + 2 Practical (Annual)

T.Y.B.Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers**F.Y.B.Sc.Theory paper:**

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y / T.Y. - B.Sc.Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F.Y. / S.Y / T.Y. - B.Sc.Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

c) Medium of Instruction: The medium of instruction for the course shall be English.**7) Equivalence of Previous Syllabus:**

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Introduction to Computers and 'C' Programming	CS-101: Problem Solving Using Computers and 'C' Programming
Paper II: File Organization and Fundamental of Databases	CS 102: File Organization and Fundamental of Databases
Paper III: Computer Science Practical paper I	CS-103: Computer Science Practical paper I
Paper IV: Computer Science Practical paper II	CS-104: Computer Science Practical paper II

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Computer Science/M.C.A. or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.


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10) Detail Syllabus with Recommended Books:**Title :** Problem Solving Using Computers and 'C' Programming**Objective :-**

- i) To develop Problem Solving abilities using computers
- ii) To teach basic principles of programming
- iii) To develop skills for writing programs using 'C'

Syllabus**Chapter 1 Problem Solving using Computers [8]**

- 1.1 Problem-Solving
- 1.2 Writing Simple Algorithms
- 1.3 Algorithms
- 1.4 Flowcharts

Chapter 2 Programming Languages as Tools [3]

- 2.1 Machine language R6(1.5,1.6)
- 2.2 Assembly language
- 2.3 High level languages
- 2.4 Compilers and Interpreters

Chapter 3 Introduction to C [2]

- 3.1 History R3(2-1), R6(1.1)
- 3.2 Structure of a C program R3(2-2), R6(1.8)
- 3.3 Functions as building blocks R3(4-1,4-2)
- 3.4 Application Areas
- 3.5 C Program development life cycle R6(1.10)
- 3.6 Sample programs

Chapter 4 C Tokens [12]

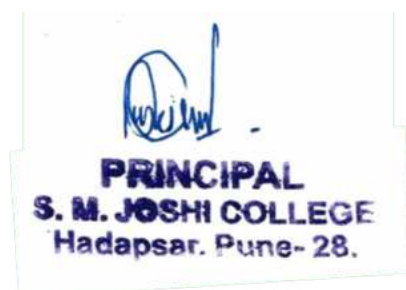
- 4.1 Keywords R6 (Ch 2, 3)
- 4.2 Identifiers
- 4.3 Variables
- 4.4 Constants – character, integer, float, string, escape sequences
- 4.5 Data types – built-in and user defined
- 4.6 Operators and Expressions Operator types (arithmetic, relational, logical, assignment, bitwise, conditional , other operators) , precedence and associativity rules.
- 4.7 Simple programs using printf and scanf

Chapter 5 Input and Output [3]

- 5.1 Character input and output R6(4.2 - 4.5)
- 5.2 String input and output
- 5.3 Formatted input and output

Chapter 6 Control Structures [10]

- 6.1 Decision making structures If, if-else, switch R3(5-2, 5-3), R6(5.2 - 5.8)
- 6.2 Loop Control structures While, do-while, for R6 (Ch 8)
- 6.3 Nested structures
- 6.4 break and continue



Chapter 7 Functions in C**[8]**

- 7.1 What is a function R3(4-2, 4-4)
- 7.2 Advantages of Functions
- 7.3 Standard library functions R3(5-4)
- 7.4 User defined functions :Declaration, definition, function call, parameter passing (by value), return keyword, R6 (Ch 9)
- 7.5 Scope of variables, storage classes
- 7.6 Recursion R3 (6-9)

Chapter 8 Arrays**[8]**

- 8.1 Array declaration, initialization R6(Ch 7)
- 8.2 Types – one, two and multidimensional “
- 8.3 Passing arrays to functions R3(8-3), R6(9.17)

Chapter 9 Pointers**[6]**

- 9.1 Pointer declaration, initialization R6(11.1 - 11.14)
- 9.2 Dereferencing pointers
- 9.3 Pointer arithmetic
- 9.4 Pointer to pointer
- 9.5 Arrays and pointers
- 9.6 Functions and pointers – passing pointers to functions, function returning pointers
- 9.7 Dynamic memory allocation R6(13.1-13.6)

Chapter 10 Strings**[6]**

- 10.1 Declaration and initialization, format specifiers R6(Ch 8)
- 10.2 Standard library functions
- 10.3 Strings and pointers
- 10.4 Array of strings
- 10.5 Command Line Arguments R3(Appendix I1-I2)

Chapter 11 Structures and Unions**[6]**

- 11.1 Creating structures R6(Ch 10)
- 11.2 Accessing structure members (dot Operator)
- 11.3 Structure initialization
- 11.4 Array of structures
- 11.5 Passing structures to functions
- 11.6 Nested structures
- 11.7 Pointers and structures
- 11.8 Unions
- 11.9 Difference between structures and unions

Chapter 12 File Handling**[6]**

- 12.1 Streams R3(7-1, 7-2)
- 12.2 Types of Files
- 12.3 Operations on files R6(12.1- 12.4), 12.6, 12.7
- 12.4 Random access to files

Chapter 13 C Preprocessor

- 13.1 Format of Preprocessor directive R6(14.1 - 14.3)
 13.2 File Inclusion directive
 13.3 Macro substitution, nested macro, argumented macro

References

1. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, ISBN:9788120305960, PHI Learning
2. How to Solve it by Computer, R.G. Dromey, ISBN:9788131705629, Pearson Education
3. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg ISBN:9788131500941, Cengage Learning India
4. Using The GNU Compiler Collection, Richard M. Stallman;The GCC Developer Community Pothi.com
5. Using the Gnu Compiler Collection, Richard M. Stallman, Gcc Developer community ISBN:9781441412768,Createspace
6. Programming in ANSI C, E. Balaguruswamy,ISBN:9781259004612,Tata McGraw Hill Publishing Co.Ltd.-New Delhi

Computer Science: Paper – II : File Organization and Fundamental of Databases

Title : File Organization and Fundamental of Databases

Objective :-

- i) To understand data processing using computers
- ii) To teach basic organization of data using files
- iii) To understand creations, manipulation and querying of data in databases

Syllabus

Chapter 1 File Organization [6]

R3

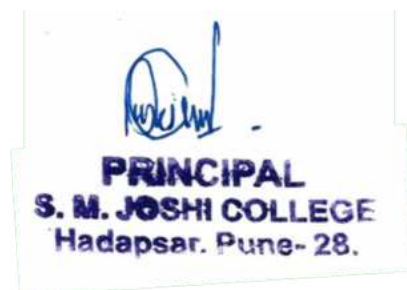
- 1.1 Introduction
- 1.2 Physical / logical files
- 1.3 Types of file organization (heap,sorted, indexed,hashed)
- 1.4 Choosing a file organization

Chapter 2 Introduction of DBMS

R1(Ch 1)

[6]

- 2.1 Overview
- 2.2 File system Vs DBMS
- 2.3 Describing & storing data (Data models (relational,hierarchical, network))
- 2.4 Levels of abstraction
- 2.5 Data independence
- 2.6 Structure of DBMS
- 2.7 Users of DBMS
- 2.8 Advantages of DBMS



Chapter 3 Conceptual Design (E-R model) R1(Ch 2), R3, R4 **[15]**

- 3.1 Overview of DB design
- 3.2 ER data model (entities , attributes, entity sets, relations, relationship sets)
- 3.3 Additional constraints (Key constraints, Mapping constraints, Strong & Weak entities, aggregation / generalization)
- 3.4 Conceptual design using ER modelling (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER)
- 3.5 Case studies

Chapter 4 Relational data model R1(Ch 3) **[6]**

- 4.1 Structure of Relational Databases (concepts of a table, a row, a relation, a Tuple and a key in a relational database)
- 4.2 Conversion of ER to Relational model
- 4.3 Integrity constraints (primary key, referential integrity, unique constraint, Null constraint, Check constraint)

Chapter 5 Relational algebra R1(Ch 3) **[7]**

- 5.1 Preliminaries
- 5.2 Relational algebra (selection, projection, set operations, renaming joins, division)

Chapter 6 SQL R1(Ch 4) **[20]**

- 6.1 Introduction
- 6.2 Basic structure
- 6.3 Set operations
- 6.4 Aggregate functions
- 6.5 Null values
- 6.6 Nested Subqueries
- 6.7 Modifications to Database
- 6.8 DDL commands with examples
- 6.9 SQL mechanisms for joining relations (inner joins, outer joins and their types)
- 6.10 Examples on SQL (case studies)

7 Relational Database Design R1(ch 7) **[20]**

- 7.1 Pitfalls in Relational-Database Design (undesirable properties of a RDB design like repetition, inability to represent certain information),
- 7.2 Functional dependencies (Basic concepts, F+, Closure of an Attribute set, Concept of a Super Key and a primary key



- (Algorithm to derive a Primary Key for a relation)
- 7.3 Concept of Decomposition
- 7.4 Desirable Properties of Decomposition (Lossless join & Dependency preservation)
- 7.5 Concept of Normalization
- 7.6 Normal forms (only definitions) 1NF, 2NF, 3NF, BCNF
- 7.7 Examples on Normalization

References

1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S. Sudarshan,
ISBN:9780071289597,Tata McGraw-Hill Education
2. Database Management Systems ,Raghu Ramakrishnan,ISBN:9780071254342,
Mcgraw-hill higher Education
3. Database Management Systems,Raghu Ramakrishnan and Johannes Gehrke,
McGraw-Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631
4. Database Systems, Shamkant B. Navathe, Ramez Elmasri,
ISBN:9780132144988,
PEARSON HIGHER EDUCATION
5. Beginning Databases with PostgreSQL: From Novice to Professional,
Richard Stones,
Neil Matthew, ISBN:9781590594780, Apress
6. PostgreSQL, Korry Douglas, ISBN:9780672327568, Sams
7. Practical PostgreSQL (B/CD),John Worsley, Joshua Drake,
ISBN:9788173663925
Shroff/O'reilly
8. Practical Postgresql , By Joshua D. Drake, John C Worsley (**O'Reilly publications**)
9. "An introduction to Database systems", Bipin C Desai, Galgotia Publications

Important to Note: It is absolutely necessary and essential that all the practicals for Paper III and Paper IV be conducted on Open Source Operating System like Linux. All the practicals related to C needs to be conducted using GCC compiler.

Paper III – Computer Science Practical Paper I

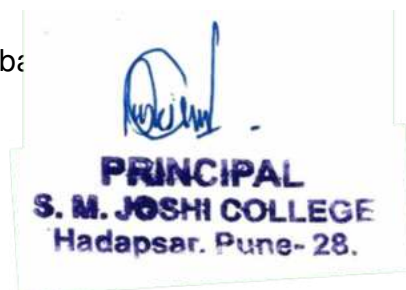
Title : Basic 'C' Programming and Database Handling practicals

Objective :-

- i) Design and implement a 'C' programs for simple problems
- ii) Understand appropriate use of data types and array structures
- iii) Understand use of appropriate control structures

Syllabus

1. Initial 3 practical slots (12 lectures) should be used for teaching basic operating systems commands and use of editors



2. Last 2 slots (8 lectures) are to be used for revision
 3. Remaining 80 lectures are to be utilised for the following 20 Assignments

Computer Science : Paper III : Basic 'C' Programming and Database Handling practicals[#]		
No	Topic	Lectures
1	Assignment to demonstrate use of data types, simple operators (expressions)	4
2	Assignment to demonstrate decision making statements (if and if-else, nested structures)	4
3	Assignment to demonstrate decision making statements (switch case)	4
4	Assignment to demonstrate use of simple loops	4
5	Assignment to demonstrate use of nested loops	4
6	Assignment to demonstrate menu driven programs.	4
7	Assignment to demonstrate writing C programs in modular way (use of user defined functions)	4
8	Assignment to demonstrate recursive functions.	4
9	Assignment to demonstrate use of arrays (1-d arrays) and functions	4
10	Assignment to demonstrate use of multidimensional array(2-d arrays) and functions	4
11	Assignment to create simple tables , with only the primary key constraint (as a table level constraint & as a field level constraint) (include all data types)	4
12	Assignment to create more than one table, with referential integrity constraint, PK constraint.	4
13	Assignment to create one or more tables with following constraints, in addition to the first two constraints (PK & FK) a. Check constraint b. Unique constraint c. Not null constraint	4
14	Assignment to drop a table from the database, to alter the schema of a table in the Database.	4
15	Assignment to insert / update / delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)	4


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16	Assignment to query the tables using simple form of select statement Select <field-list> from table [where <condition> order by <field list>] Select <field-list, aggregate functions > from table [where <condition> group by <> having <> order by <>]	4
17	Assignment to query table, using set operations (union, intersect)	4
18	Assignments to query tables using nested queries	4
19	Assignment to query tables , using nested queries (use of 'Except', exists, not exists clauses	4
20	Assignment related to small case studies (Each case study will involve creating tables with specified constraints, inserting records to it & writing queries for extracting records from these tables)	4

Paper IV – Computer Science Practical Paper II[#]

Title : HTML5 programming and Advanced 'C' Programming practicals

Objective :-

- i) Understanding basic HTML designing
- ii) Writing C programs using complex data structures such as pointers, structures etc.

Syllabus

1. Initial 3 practical slots (8 lectures) should be used for teaching basic internet usage including use of browsers
2. Last 2 slots (8 lectures) are to be used for revision
- 3. Remaining 80 lectures are to be utilised for the following 20 Assignments**

Computer Science : Paper IV : HTML 5 programming and Advanced 'C' Programming practicals		
No	Topic	Lectures
1	Creating simple HTML pages (use of different tags for changing fonts, foreground and background colors etc.))	4
2	HTML programming (use of lists, tables)	4
3	HTML programming using frames	4
4	HTML programming using hyperlinks	4
5	HTML programming (Creation of forms)	4


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6	HTML programming – Case Study 1	4
7	HTML programming – Case Study 1	4
8	HTML programming – Case Study 1	4
9	Assignment to demonstrate use of pointers	4
10	Assignment to demonstrate concept of strings (string & pointers)	4
11	Assignment to demonstrate array of strings.	4
12	Assignment to demonstrate use of bitwise operators.	4
13	Assignment to demonstrate structures (using array and functions)	4
14	Assignment to demonstrate structures and unions	4
15	Assignment to demonstrate command line arguments and preprocessor directives	4
16	Assignment to demonstrate file handling (text files)	4
17	Assignment to demonstrate file handling (binary files and random access to files)	4
18	C Programming – Case study 1	4
19	C Programming – Case study 2	4
20	C programming – Case Study 3	4

#The Lab Hand Book will define in detail the contents and provide guidelines for each practical Assignment.

University of Pune

Three Year B. Sc. Degree Course in Computer Science

Subject : Electronics



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1) Title of the Course :

F.Y.B.Sc.Electronics of Computer Science

(To be implemented from Academic Year 2013-14)

2) Preamble:

The systematic and planned curricula for first year and second year electronics shall motivate and encourage the students for pursuing higher studies in Electronics and computer and for becoming an enterprenur.

3) Introduction:

At **first year of under-graduation**: The basic topics related to the fundamentals of electronics are covered. Since electronics is an inherent part of technological advancements, the practical course is intended to achieve the basic skills required for circuit building and testing.

At **second year under-graduation**: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. Courses based on content of first year shall be introduced. Analog and digital circuit design concepts will be introduced at this stage.

Objectives:

- To provide indepth knowledge of scientific and technological aspects of electronics
- To familiarize with current and recent technological developments
- To enrich knowledge through programmes such as industrial visits, hobby projects, market survey, projects etc.
- To train students in skills related to electronics industry and market.
- To create foundation for research and development in Electronics
- To develop analytical abilities towards real world problems
- To help students build-up a progressive and successful career in Electronics

4) Eligibility:

1 First Year B.Sc.:

Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.

2 Second Year B.Sc.:

Keeping terms of First Year of B.Sc. Computer Science, with electronics as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.



Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B.Sc. Computer Science Subject : Electronics

Pattern of Examination: Annual

Theory courses (ELC-101 and ELC-102) : Annual

Practical Course (ELC-103) : Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Theory Paper I (ELC-101) (First term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper I (ELC-101) (Second term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)			
Theory Paper II (ELC-102) (First term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper II (ELC-102) (Second term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)			
Practical Paper III (ELC-103) (First & Second Term)	Practical	10 Practicals of 4 lectures in each term (20 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals study visit reports/ market survey/hobby projects etc.


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Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2 and 3 and 4	4 out of 6– short answer type questions, each of 4 marks; answerable in 8 – 10 lines
Question 5	2 out of 3 – long answer type questions; 8 marks each; answerable in analytical fashion or circuit/logic diagrams

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions. For practicals: one internal assessment test + marks for journals + attendance + hobby project - tour report etc.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 6 hours duration (2-Sessions). Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B.Sc. Computer Science

Subject : Electronics

Pattern of examination: Semester

Theory courses (SemI: ELC 211 and ELC 212): Semester
(Sem II: ELC 221 and ELC 222): Semester
Practical Course (ELC 223): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
Theory Paper I (ELC 211)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (ELC 212)	Paper II	Four lectures/Week	04	16	


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		(Total 48 per Semester)			
Theory Paper I (ELC 221)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (ELC 222)	Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Practical paper III (ELC 223) (First & Second Semester)	Paper III	12 Practicals of 4 lectures in each Semester (24 practicals / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 8 – 10 lines	10 marks each
Question 4	2 out of 3 sub-questions, each of 5 marks; long answer type questions (12-16 lines), problems, circuit/logic diagrams and designs	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions. For practicals: one internal assessment test + marks for journals + att report.


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Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 6 hours (2-Sessions) duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc.

5 D) External Students: There shall be no external students.

5 E) Setting Question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III papers shall be set by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5F) Verification and Revaluation Rules:

As per university Statutes and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.



6) Course Structure:

Duration: The duration of B.Sc. (Computer Science) Degree Program shall be three years. Electronics is offered at first and second year.

a) **Compulsory Papers** : All Theory and Practical Papers

b) **Optional Papers** : Nil

c) **Question Papers** :

F.Y.B.Sc.

Theory paper: University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

Practical Paper: University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y.B.Sc.

Theory paper: University Examination – 40 marks (at the end of each semester)

Internal Examination – 10 marks

Practical Paper: University Examination – 80 marks (at the end of 2nd semester)

Internal Examination – 20 marks

d) **Medium of Instruction:** The medium of instruction for the course shall be English.

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Electronic Devices, circuits and computer peripherals	ELC-101: Principles of Analog Electronics
Paper II: Fundamentals of Digital Electronics	ELC-102: Principles of Digital Electronics
Paper III: Practical	ELC-103: Practical

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Electronic Science or equivalent master degree in science with class/grades and NET/SET as per prevailing University /Government /UGC rules.



10) Detail Syllabus with Recommended Books:

Electronics Subject of F.Y. B.Sc.Computer Science

Paper I

ELC-101: Principles of Analog Electronics

Objectives:

1. To get familiar with basic circuit elements and passive components
2. To understand DC circuit theorems and their use in circuit analysis
3. To study characteristic features of semiconductor devices
4. To study elementary electronic circuits and applications
5. To understand basics of operational amplifiers.

Term I

Unit 1: Passive Components

(12)

Study of basic circuit elements and passive components (with special reference to working principle, circuit symbols, types, specifications and applications): Resistor, Capacitor, Inductor, Transformer, Cables, Connectors, Switches, Fuses, Relays, Batteries.

Unit 2: Basic Electrical Circuits and Circuit Theorems

(14)

Concept of Ideal Voltage and Current source, internal resistance, dc sources (voltage/current) and sinusoidal ac source (amplitude, wavelength, period, frequency, phase angle), Network terminology, Ohm's law, series and parallel circuits of resistors, capacitors and inductors, voltage and current dividers, Kirchhoff's Laws (KCL, KVL), Superposition theorem, concept of black box, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem (numerical problems with maximum two meshes), Charging-discharging of capacitor, AC applied to R, C and L, concept of impedance, LCR series resonant circuit, concept of phase difference, RC low pass and high pass filter

Unit 3: Semiconductor Diodes and Circuits

(10)

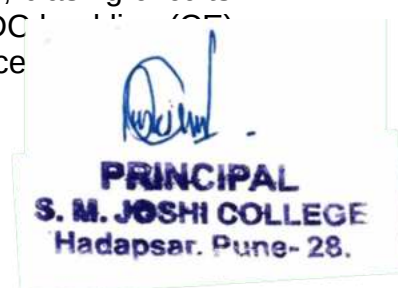
Study of semiconductor devices with reference to symbol, working principle, I-V characteristics, parameters, specifications: diode, zener diode, light emitting diode, photo diode, optocoupler, varactor diode, solar cell, clipper and clamper circuits Rectifiers (half and full wave), rectifier with capacitor-filter, Zener regulator, Block diagram of power supply

Term II

Unit 4: Bipolar Junction Transistor and Circuits

(14)

Bipolar Junction Transistor (BJT) symbol, types, construction, working principle, I-V characteristics, parameters, specifications, Concept of amplification, voltage and current amplifier, Transistor amplifier configurations - CB, CC and CE, biasing circuits - voltage divider, collector feedback bias and emitter feedback bias, DC load line, Q point and factors affecting the stability, transistor as a switch, concept



and class C amplifiers, emitter follower amplifier, Single stage RC coupled CE amplifier, concept of frequency response and bandwidth

Unit-5:UJT,FETs and Applications (10)

Symbol, types, construction, working principle, I-V characteristics, Specifications parameters of: Uni-Junction Transistor (UJT), Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor FET (MOSFET), comparison of JFET, MOSFET and BJT

Applications: JFET as voltage variable resistor, MOSFET as a switch

Unit 6: Operational Amplifier (12)

Symbol, block diagram, Opamp characteristics, basic parameters (ideal and practical) such as input and output impedance, bandwidth, differential and common mode gain, CMRR, slew rate, Concept of virtual ground, concept of feedback, Information about IC741

Opamp as inverting and non-inverting amplifier, voltage follower, adder, subtractor
Opamp as a comparator and Schmitt trigger

Text/ Reference Books:

1. Basic Electronics:Bernard Grob, McGraw Hill Publication, 8th Revised Edition, 2010
2. Electronic Principles:Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
3. Principles of Electronics: V.K. Mehta, S.Chand and Co.
4. A text book of electrical technology: B.L.Theraja, S.Chand and Co.
5. Basic Electronics and Linear Circuits: Bhargava N.N., Kulshreshtha D.C., Gupta S.C., Tata McGraw Hill.
6. A First Course in Electronics: Khan Anwar, K.K.Day, PHI learning Pvt.Ltd.
7. Electronic Devices and Circuits: Bolyestad, Tata McGraw Hill.
8. Electronic Devices and circuits: A. Motorshed, Prentice Hall of India.
9. Basic Electronic Devices and Circuits: R.Y.Borse, 1st Edition 2012, Adhyayan Publishers and Distributors, New Delhi.

Paper II

ELC-102: Principles of Digital Electronics

Objectives:

1. To get familiar with concepts of digital electronics
2. To learn number systems and their representation
3. To understand basic logic gates, boolean algebra and K-maps
4. To study arithmetic circuits, combinational circuits and sequential circuits
5. To study comparative aspects of logic families.

Term I

Unit 1: Number Systems and Logic Gates (12)

Introduction to decimal, Binary and hexadecimal number systems conversions, Signed and fractional binary number representations, and Graycodes, Alphanumeric representation in ASCII codes.



Positive and Negative Logic, Basic Logic gates (NOT, OR, AND) & derived gates (NAND, NOR, EX-OR) Symbol and truth table, Applications of Ex-OR gates as parity checker and generator.

Unit 2: Boolean Algebra and Karnaugh maps (12)

Boolean algebra rules and Boolean laws: Commutative, Associative, Distributive, AND, OR and Inversion laws, DeMorgan's theorem, Universal gates.

Min terms, Max terms, Boolean expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form., Simplifications of Logic equations using Boolean algebra rules and Karnaugh map (up to 3 variables).

Unit 3: Arithmetic Circuits (12)

Rules of binary addition and subtraction, subtraction using 1's and 2's complements, half adder, full adder, Half subtractor, Full subtractor, Four bit parallel adder, Universal adder / subtractor, Digital comparator, Introduction to ALU.

Term II

Unit 4: Combinational Circuits (14)

Multiplexer (2:1, 4:1), demultiplexer (1:2, 1:4) and their applications, Code converters - Decimal to binary, Hexadecimal to binary, BCD to decimal, Encoder & decoder 3x4 matrix keyboard encoder, priority encoder, BCD to seven segment decoder.

Unit 5: Sequential Circuits (14)

Flip flops :RS using NAND/NOR, latch, clocked RS, JK, Master slave JK, D and T.

Counters: Ripple Binary counter, up down counter, concept of modulus counters, Decade counter, Counters for high-speed applications (Synchronous counters) with timing diagrams.

Shift registers: SISO, SIPO, PISO, PIPO shift registers, ring counter, universal 4-bit shift register and Applications.

Unit 6: Logic Families (8)

Introduction to Integrated circuit technologies TTL, ECL, CMOS

IC parameters: Logic levels, switching speed, propagation delay, power dissipation, noise margins and fanout of TTL and CMOS.

TTL NAND & NOT gate, Open collector gates, Wired OR operation. CMOS - NOT, NAND, NOR gate, precautions while handling CMOS gates, tri-state logic.

Text/ Reference Books:

1. Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education



Paper III

ELC-103: Practical Course

- 1 The practical course consists of 20 experiments.
- 2 Any two of the following activities with proper documentation will be considered as equivalent of 4 experiments weightage in term work.
 - i. Preparatory experiments
 - ii. Hobby projects
 - iii. Internet browsing
 - iv. industrial visit / live work experience
 - v. PCB Making
 - vi. Market Survey of Electronic Systems
 - vii. Circuit Simulations and CAD toolsThese will be evaluated in an oral examination for 20% marks at internal and term end examination.

3. All the students are required to complete a minimum of 16 experiments (four from each group) from the following list.

Group A Any Four

1. Study of forward and Reverse biased characteristics of PN Junction Diode
2. Study of breakdown characteristics and voltage regulation action of Zener diode
3. Study of output characteristics of Bipolar Junction Transistor in CE mode
4. Study of output and transfer characteristics JFET/MOSFET
5. Study of I-V characteristics of UJT and Demonstration of UJT based relaxation oscillator .
6. Study of solar cell.

Group B Any four

1. Verification of network theorems: KCL / KVL, Thevenin, Norton.
2. Verification of network theorems: Maximum Power Transfer, Superposition theorem.
3. Design, build and test Low pass and High pass RC filters.
4. Study of low voltage Half-wave, Full-wave and Bridge rectifier circuits.
5. Study of amplification action of BJT.
6. Study of potential divider biasing of BJT and its use in DC motor driving.
7. Build and test Inverting and non inverting amplifier using OPAMP.
8. Build and test adder and subtractor circuits using OPAMP.
9. Study of clipping and clamping circuits.

Group C Any Four

* Minimum Two experiments may be carriedout with CMOS ICs

1. Basic Logic gates using Diodes and transistors
2. Interconversions and realizations of logic expressions using ICs
3. Study of RS, JK and D flip flops using NAND gates
4. Study of Up/Down Counter
5. Study of decade counter IC circuit configurations
6. Study of 4-bit Shift register IC



Group D Any Four

1. Build and Test 4 bit parity checker/ generator using X-OR gate IC
2. Build and Test Half Adder, Full Adder and Subtractor using basic gate
3. Build and Test 2:1 Multiplexer and 1:2 Demultiplexer using gates
4. Build and Test 3X4 matrix Keyboard Encoder
5. Build and Test a Debounce switch using NAND or NOR gate IC
6. Build and Test Diode matrix ROM
7. Study of Four bit Universal Adder/Subtractor / ALU

Preparatory Experiments

1. Identification of Components / Tools
 - Minimum 10 different types of components must be given
 - Identification based on visual inspection / data sheets be carried out
2. Use of Multimeters (Analog and Digital)
 - Measurement of AC/DC voltage and Current – on different ranges
 - Measurement of R & C
 - Testing of Diodes & Transistors
 - Measurement of h_{fe}
 - Use of Multimeter in measurement of Variation of Resistance of LDR.
 - Thermister
3. Study of Signal Generator/CRO
 - Understand how to use Signal Generator/CRO
 - Study of front panel controls
 - Measurement of amplitude and frequency of Sine/Square waveform
 - Measurement of Phase with the help of RC circuit
 - Demonstration of Lissajous figures
 - Demonstrate the use of Component testing facility

Hobby Project Examples

Build and Test gadgets like

- Water level Indicator
- Photo relay / smoke detector
- Burglar Alarm
- Fan regulator
- Logic Probe
- Experiments with some software's like PSPICE / LTSPICE



University of Pune

**Two Year M.Sc. Degree Course in
Chemistry**

M.Sc. Chemistry

(Credit and Semester based Syllabus to be implemented from Academic Year 2013-14)



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1) Title of the Course: M.Sc. Chemistry

2) Preamble of the Syllabus:

Master of Science (M.Sc.) in Chemistry is a post graduation course of University of Pune. The credit system to be implemented through this curriculum, would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities.

The students pursuing this course would have to develop in depth understanding of various aspects of the subject. The conceptual understanding, development of experimental skills, designing and implementation of novel synthetic methods, developing the aptitude for academic and professional skills, acquiring basic concepts for structural elucidation with hyphenated techniques, understanding the fundamental biological processes and rationale towards computer assisted drug designing are among such important aspects.

3) Introduction:

Salient Features of the Credit System:

1. Master's degree course in Chemistry would be of 100 credits, where one credit course of theory will be of one clock hour per week running for 15 weeks and one credit for practical course will consist of 15 of laboratory exercise including the revision and setting up the practical. Thus, each credit will be equivalent to 15 hours.
2. Student will have to take admission in Chemistry Department and complete 75 credits incorporated in the syllabus structure of Chemistry. The remaining 25 credits shall be chosen from courses offered by the Chemistry Department or other Departments of the University/College with credit system structure.
3. Except practical credits wherever applicable, students may be allowed to complete less courses per semester on the condition they complete the degree in maximum of four years. This facility will be available subject to the availability of concerned courses in a given semester and with a maximum variation of 25 credits (in case of fresh credits) per semester.
4. Every student shall complete 100 credits in a minimum of four semesters. All Semesters will have average 25 credits each.
5. The student will be declared as failed if s/he does not pass in all credits within a total period of four years. After that such students will have to seek fresh admission as per admission rules prevailing at that time.
6. Academic calendar showing dates of commencement and end of teaching, internal assessment tests and term end examination will be prepared and duly notified before commencement of each semester every year.
7. Project course should not be greater than 5% of the total credits of the degree course. Project course is equivalent to 4 credits.



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Instructions for the Students

The students seeking admission to M.Sc. Chemistry course is hereby informed that they are supposed to adhere to the following rules:

1. A minimum of 75 % attendance for lectures / practical is the pre-requisite for grant of term.
2. There shall be tutorial / practical / surprise test / home assignment / referencing of research papers / seminar / industrial visits / training course as a part of internal assessment in each semester. The students are supposed to attend all the tests. The students should note that re-test will not be given to the student absent for the test/s.
3. The students opting for dissertation course shall follow the rules framed for the same.
4. Industrial / Institute - Visit and or Industrial Workshops / Laboratory Workshops / Training Programme is a compulsory component of the syllabus. The students are supposed to attend all the Industrial Workshops / Laboratory Workshops / Training Programme organized by the department. The students shall attend these programmes at their own cost.

4) Eligibility:

The candidate should have a B.Sc. degree with Chemistry as principal subject **OR** B.Sc. (General) degree with Chemistry (Electronics) as one of the subsidiary subjects.

Admission: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune.

Reservation and relaxation will be as per the government rules.

5) Examination

[A] Pattern of Examination

Evaluation of Students:

- 1) The In-semester and End-Semester examinations will be of 50 marks each.
- 2) Student has to obtain 40% marks in the combined examination of In-Semester and End-Semester assessment with minimum passing of 30% passing in both assessments separately.
- 3) A student cannot register for third semester if s/he fails to complete the 50% credits of the total expected within two semesters.
- 4) Internal marks will not change. Student cannot repeat internal assessment. If student misses internal assessment examination, s/he will have second chance with the permission of the concerned teacher. But it will not be right of the student. It will be the discretion of the concerned teacher and internal departmental assessment committee. In case s/he wants to repeat Internal, s/he can do so only by registering for the said courses during 5th/6th semester whichever is applicable.
- 5) There shall be revaluation of answer script of end semester examination, but not of internal assessment papers.
- 6) Internal assessment answer scripts may be shown to the concerned student but not end semester answer script.



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i. **In-semester Examination:** Internal assessment for each course would be continuous and dates for each tutorials/practical tests will be pre-notified in the time table for teaching or placed separately as a part of time table. Department / College Internal Assessment Committee will coordinate this activity

a) **Theory Courses:** Conducting written tests should not be encouraged. More focus should be on non-written tests. Students should be encouraged to conduct various academic activities. A teacher must select a variety of the procedures for internal assessment suggested as follows.

- a) Mid-term test
- b) On-line test
- c) Computer based examination
- d) Open book test (concerned teacher will decide the allowed books)
- e) Tutorial
- f) Surprise test
- g) Oral
- h) Assignments
- i) Review of research paper
- j) Seminar presentation
- k) Journal/Lecture/Library notes

Student has to preserve the documentation of the internal assessment except midterm test answer script. It is the responsibility of the student to preserve the documents.

b) **Practical Courses:** It is a continuous evaluation process. Practical courses will be evaluated on the basis of the following

1. Performance assessment of each experiment on the basis of attendance, punctuality, journal completion, practical skills, results, oral and analysis.
2. Test on practical may be conducted before the end-semester examination.
3. Assessment of each experiment shall be done for each practical weekly.
4. Assessment of the Activity will be based on any one of the following per practical course.
 - i. Experimental and analytical skills
 - ii. Synthesis of compounds
 - iii. Evaluation of physical constants, purity of compounds
 - iv. Fundamental understanding of instrumental techniques
 - v. Recording and analysis of spectral data
 - vi. Economic utilization of chemicals
 - vii. Basic understanding of the experiment

The student strength of practical batch should be eight. Note that one practical session of 4 hour duration of one practical batch.

Project Course: Project will be evaluated by In-Charge of project batch in concern with project guide. Assessment will be done weekly in the respective batch. Evaluation will be on the basis of weekly progress of project work, progress report, referencing, oral, results and documentation.



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- ii. **End-Semester Examination:** End-Semester examination for 50 marks per course would be held about two weeks after completion of teaching for the semester. Paper setting and assessment for a particular course would be the responsibility of the course In-charge, and these activities would be coordinated by the Department Examination Committee. The Department Examination committee would undertake preparation of the result-sheets for the student

[B] Standard of Passing

Student has to obtain 40% marks in the combined examination of In-Semester and End-Semester assessment with minimum passing of 30% passing in both assessments separately.

[C] ATKT Rules

A student cannot register for third semester if s/he fails to complete the 50% credits of the total credits expected to be ordinarily completed within two semesters.

[D] Award of Class

Grades will be awarded from grade point average (GPA) of the credits.

GPA Rules:

1. The formula for GPA will be based on Weighted Average. The final GPA will not be printed unless a student passes courses equivalent to minimum 100 credit hours (Science). Total credits hours means the sum of credit hours of the courses which a student has passed.
2. A seven point grade system [guided by the Government of Maharashtra Resolution No. NGO – 1298 / [4619] / UNI 4 dt. December 11, 1999 and University regulations] will be followed. The corresponding grade table is attached herewith.
3. If the GPA is higher than the indicated upper limit in the third decimal digit then the student be awarded higher final grade (e.g. a student getting GPA of 4.492 may be awarded 'A')
4. For Semester I, II, III examinations, only the grade points will be awarded for each subject. Final GPA along with final grade will be awarded only at the end of IV semester. There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. The revaluation result will be adopted if there is a change of at least 10% marks and in the grade of the course.
5. After the declaration of result, for the improvement of Grade, the student can reappear for the examination of 30 credits worth theory courses.
6. Grade improvement programme will be implemented at the end of the academic year. A student can opt for grade improvement programme only after the declaration of final semester examination i.e. at the end of next academic year after passing M.Sc. (Chemistry) examination and within two years of completion of M.Sc. (Chemistry). A student can appear for grade improvement programme only once.


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Grade and Grade Point Average		
Marks	Obtained Grade	Grade Points
100 – 75	‘O’ Outstanding	06
74 – 65	‘A’ Very Good	05
64 – 55	‘B’ Good	04
54 – 50	‘C’ Average	03
49 – 45	‘D’ Satisfactory	02
44 – 40	‘E’ Pass	01
39 and less	‘F’ Fail	00

Final Grade Points	
Grade Points	Final Grade
5.00 – 6.00	O
4.50 – 4.99	A
3.50 – 4.49	B
2.50 – 3.49	C
1.50 – 2.49	D
0.50 – 1.49	E
0.00 – 0.49	F

Common Formula for Grade Point Average (GPA):

$$\text{GPA} = \frac{\text{Total of Grade Points earned} \times \text{Credit hours for each course}}{\text{Total Credit hours}}$$

B Grade is equivalent to at least 55% of the marks

[E] **External Students:** There shall be no external students.

[F] Setting of Question Paper / Pattern of Question Paper

For core (compulsory) theory courses, end semester question papers set by the University of Pune and centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject.

Theory examination will be of 2 hours duration for each theory course of 5 credits. There will be **two sections** for each paper. Each section will be of **25 marks** and the pattern of question paper shall be:

Question 1 (10 Marks)	5 compulsory sub-questions, each of 2 marks; answerable in 2-3 lines
Question 2 (10 Marks)	2 out of 4 – short answer type questions of 5 marks each; answerable in 8 – 10 lines
Question 3 (5 Marks)	1 out of 2 – numerical problem type question; note, spectral analysis, functioning of instrumental technique with components


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[G] Verification / Revaluation

There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. The revaluation result will be adopted if there is a change of at least 10% marks and in the grade of the course. There shall be revaluation of answer script of end semester examination, but not of internal assessment papers.

6) Structure of Course

Basic structure/pattern (Framework) of the proposed postgraduate syllabus for the two year integrated course leading to M.Sc. (Chemistry) in the colleges affiliated to Pune University.

a) Compulsory Papers

Theory: CHP-110, CHP-210, CHI-130, CHI-230, CHO-150, CHO-250,
CHA-290

Practical: CHP-107, CHI-147, CHO-247

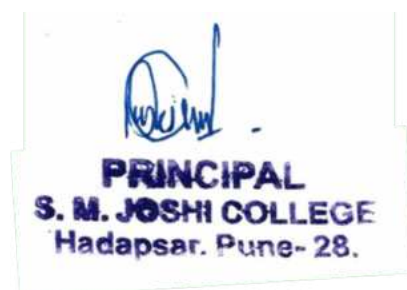
M.Sc. Chemistry - Course structure & Credits Distribution

Semester	Course Code	Course Title	No. of Units	No. of credits
Sem-I	CHP-110	Fundamentals of Physical Chemistry-I	05	05
	CHI-130	Molecular Symmetry & Chemistry of p-block elements	05	05
	CHO-150	Basic organic chemistry	05	05
	CHP-107	Practical Course (Physical Chemistry)	18 Practical Sessions	05
	CHI-147	Practical Course (Inorganic Chemistry)	18 Practical Sessions	05
Sem-II	CHP-210	Fundamentals of Physical Chemistry-II	05	05
	CHI-230	Coordination and Bioinorganic Chemistry	05	05
	CHO-250	Synthetic organic chemistry and spectroscopy	05	05
	CHA-290	General Chemistry	05	05
	CHO-247	Practical Course (Organic Chemistry)	18 Practical Sessions	05

b) Question Papers and papers etc.:

Theory

In-Semester Examination: 50 Marks
End-Semester Examination: 50 Marks



Practical

In-Semester Examination: 50 Marks

End-Semester Examination: 50 Marks

c) **Medium of Instructions:** English.

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
CH-110	CHP-110
CH-130	CHI-130
CH-150	CHO-150
CH-107	CHP-107
CH-127	CHI-127
CH-210	CHP-210
CH-230	CHI-230
CH-250	CHO-250
CH-290	CHA-290
CH-247	CHO-247

8) University Terms:

Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only for duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teacher:

- M.Sc. (Chemistry) degree with NET/SET qualification.
- Recognition of Pune University as a post graduate teacher, by papers.
- Other criteria as per the guidelines of UGC and University of Pune.


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M. Sc. Chemistry Part-I

Physical Chemistry

Semester - I

CHP-110: Fundamentals of Physical Chemistry

(5 Credits)

SECTION-I

(2.5 Credits, 30 L, 8 T)

(a) Thermodynamics

(18 L, 5 T)

i) Chemical Thermodynamics

(8 L)

Recapitulation- Free energy change and equilibria, Calculation of ΔH , ΔS , ΔG and K . Effect of temperature and pressure dependence for various types of chemical reaction partial molar quantities, concept of activity, dependence of activity and activity coefficients on pressure and temperature, fugacity and its dependence on pressure and temperature, fugacity in a mixture.

ii) Molecular Thermodynamics

(10 L)

Molecular energy levels, Boltzmann distribution law, partition functions and ensembles, translational, rotational and vibrational partition functions of diatomic molecules, Obtaining energy, heat capacity, entropy, free energy, equilibrium constants from partition functions, equipartition of energy, Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein statistics.

(b) Quantum Chemistry

(12 L, 3 T)

Failures of classical mechanics, black body radiation, photoelectric effect, specific heats of solids, Atomic spectra, wave particle duality, uncertainty principle, wave function and its interpretation, well behaved functions, orthonormal functions, Linear and hermitian operators, Schrodinger equation, particle in a box, degeneracy, quantum mechanical harmonic oscillator (no derivation), sketching of wavefunction and its square, quantum tunneling, Bohr correspondence principle, hydrogen-like atoms (no derivation), atomic orbitals.



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(Reference 1-3)

SECTION-II

(2.5 Credits, 30 L, 7

T)

(a) Chemical kinetics and reaction dynamics

(30 L)

i) Recapitulation- zero, first, second, third, nth order rate equation, molecularity and how to determine order of reaction, fractional order reactions. (2 L)

ii) Complexities in simple kinetics – Reversible reactions (cases dealing with first order opposed by first and second order; second order opposed by first or second order etc.), parallel (side) reactions, consecutive (sequential) reactions, principle of microscopic reversibility, steady state approximation, elucidating mechanism using SSA. (10 L)

iii) Theories of Reaction Rates- Arrhenius theory, collision theory and transition state theory, enthalpy, free energy and entropy of activation, correlation of steric factor in collision theory and entropy of activation. (8 L)

iv) Debye Huckel Limiting law, primary and secondary salt effects. (3 L)

(Ref. 1-3)

v) Enzyme catalysis- Michaelis-Menten mechanism, limiting rate, Lineweaver Burk and Eadie plots, enzyme inhibition, competitive, partially competitive and Non-competitive inhibition.

(Reference 4) (7 L)

References

1. Atkins' Physical Chemistry, P. W. Atkins and De Paula, 8 th edition (2010).
2. Physical Chemistry, T. Engel and P. Reid, Pearson Education (2006).
3. Physical Chemistry a Molecular approach, D. Mcquarie and J. Simon (University Science) 2000.
4. Physical Chemistry for Biological Sciences by Raymond Chang (Universal Books) 2000


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Inorganic Chemistry

Semester - I

CHI-130: Molecular Symmetry & Chemistry of p-block elements (5 credits)

SECTION-I: Molecular Symmetry and its Applications

(2.5 Credits, 30 L, 7 T)

(a) Definitions and Theorems of Group Theory: Defining properties of a group, group multiplication table, some examples of group, subgroups, classes

(b) Molecular Symmetry and Symmetry Groups: Symmetry elements and operations, Symmetry planes and reflections, the inversion centre, proper axes and proper rotations, improper axes and improper rotation, products of symmetry operations, equivalent symmetry elements and equivalent atoms, general relations symmetry elements and symmetry operations, symmetry elements and optical isomerism, symmetry point groups, classes of symmetry operations, classification of molecular point groups.

(c) Representations of Groups: Matrix representation and matrix notation for geometric transformation, The Great Orthogonality Theorem and its consequence, character tables (No mathematical part)

(d) Group theory and quantum mechanics: Wave function as basis for irreducible representations

(e) Symmetry Adapted Linear Combinations: Projection operators and their use of construct SALC (Construction of SALC for sigma bonding for molecules belonging point groups: D_{2h} , D_{3h} , D_{4h} , C_{4v} , T_d , O_h , normalization of SALC.

(f) Molecular Orbital Theory: Transformation properties of atomic orbital, MO's for Sigma bonding AB_n molecules, tetrahedral AB_4 and O_h AB_6 cases.

(g) Application of Group theory to Infrared Spectroscopy: Introduction, selection rules, polyatomic molecules, possible vibrations in a linear molecule, bending modes, symmetry of vibrations and their IR activity, Group vibration concept and its limitations, IR symmetry of some compounds, IR spectra of complex compounds.



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References:

- 1) Chemical Applications of Group Theory, Third Edⁿ., Author - F. A. Cotton (Wiley, New York)
- 2) Symmetry and spectroscopy of molecules, Second Ed. 2009: Author- K. Veera Reddy, (New Age International Publication)
- 3) Group Theory and its Chemical Applications, P.K. Bhattacharya

Section-II: Chemistry of Main group elements

(2.5 Credits, 30 L, 8 T)

1. Hydrogen and its compounds: Hydrides: Classification, electron deficient, electron precise and electron rich hydrides. PH_3 , SbH_3 , AsH_3 , Selenides, Tellurides (3L)
2. Alkali and alkaline earth metals: Solutions in non-aqueous Media, Application of crown ethers in extraction of alkali and alkaline earth metals (2L)
3. Organometallic Compounds of Li, Mg, Be, Ca, Na: Classification, Synthesis, Properties, Uses and Structure (5L)
4. Boron Group: Boron Hydrides, preparation, structure and Bonding with reference to LUMO, HOMO, interconversion of lower and higher boranes, Metalloboranes, Carboranes, Reactions of Organoboranes (5L)
5. Carbon Group: Allotropes of Carbon, C_{60} and compounds (fullerenes), Intercalation compounds of Graphite, Carbon nanotubes, synthesis, properties, structure-single walled, multi walled, applications (4L)
6. Organometallic compounds of Si, Sn, Pb, Ga, As, Sb, Bi. Structures, synthesis, Reactions (4L)
7. Nitrogen Group: Nitrogen activation, Boron nitride, Oxidation states of nitrogen and their interconversion, PN and SN Compounds, NO_x and their redox chemistry (4L)
8. Oxygen Group: Metal Selenides and Tellurides, oxyacids, and oxoanions of sulphur & nitrogen. Ring, Cage and Cluster compounds of p-block elements. Silicates, including Zeolites (3L)
9. Halogen Group: Interhalogens, pseudohalogen, Synthesis, Properties and Applications, Structure, Oxyacids and Oxoanions of Halogens, Bonding


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References:

- 1) Inorganic Chemistry : Shriver & Atkins (4th edition 2003, Oxford)
- 2) Concise Inorganic Chemistry, J. D. Lee, Fourth Edn.(Chapman and Hall)
- 3) Inorganic chemistry: principle of structures and reactivity, Huheey, Keiter, Keiter, Medhi, Pearson Education, Fourth Edn.(2007).
- 4) Inorganic Chemistry: Catherine Housecroft
- 5) Inorganic Chemistry: Messler & Tarr, Pearson Publishers 3rd Edition
- 6) Organometallic Chemistry-A Unified Approach: R. C. Mehrotra & A. Singh



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Organic Chemistry

Semester - I

CHO-150: Basic organic chemistry

(5 Credits)

Section-I

(2.5 credits, 30 L, 7 T)

1. Structure and reactivity:

[12 L, 3T]

- a) Chemical bonding and basis of reactivity- Chemical bond, delocalization, conjugation, resonance, hyperconjugation, tautomerism, inductive effects, MOT and VBT approach.
- b) Bonding other than covalent bonding: Ionic, hydrogen bond, inclusion compounds, rotaxanes, catenanes, cyclodextrins, cryptands, fullerenes, crown ethers.
- c) Acidity and basicity: various structural effects, hard and soft acid and base concept.
- d) Aromaticity: Benzenoid and non-benzenoid compounds, Huckels rule, antiaromaticity, Application to carbocyclic and heterocyclic systems, annulenes, azulenes, Current concepts of aromaticity.
- e) Structure and stability of reactive intermediates, carbenes, nitrenes, carbocations, carbanions and free radicals.

2. Stereochemistry:

[18 L, 4 T]

- a) Stereochemical principles, enantiomeric relationship, distereomeric relationship, R and S, E and Z nomenclature in C, N, S, P containing compounds, Prochiral relationship, stereospecific and stereoselective reactions, optical activity in biphenyls, spiranes, allenes and helical structures.
- b) Conformational analysis of cyclic and acyclic compounds.

Section-II

3. Organic reactions:

(2.5 credits, 30 L, 8 T)

a) Substitution reaction:

[12 L, 3 T]

Aliphatic nucleophilic substitution- S_N1 , S_N2 , SET and S_NV mechanism, NGP by pi and sigma bonds, classical and non-classical carbocations, phenonium ions, norbornyl system, carbocation rearrangement in NGP, S_Ni mechanism, nucleophilic in allylic, Trigonal and vinylic carbon, effect of structure, nucleophilicity



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solvent on rate of S_N1 and S_N2 reactions, ambident nucleophile and regioselectivity.

b) Aromatic Electrophilic substitution [6 L, 2 T]

Arenium ion mechanism, orientation and reactivity, energy profile diagram, ortho, para, ipso attack, orientation in other ring systems, naphthalene, anthracene, six and five membered heterocycles, diazonium coupling. Important reactions like Friedel crafts alkylation and acylation, Nitration, halogenation, formylation, chloromethylation, sulphonation.

c) Aromatic nucleophilic substitution

[2L]

S_NAr , S_N1 , Benzyne and S_NR1 reactions, reactivity: effect of substrate structure, leaving group and attacking nucleophile.

d) Addition reactions [5 L, 1 T]

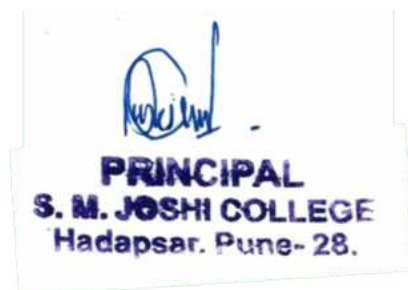
Addition to C-C multiple bonds - mechanism and stereochemical aspects of addition reaction involving electrophile, nucleophile and free radicals, Regio and chemo selectivity, orientation and reactivity, conjugate addition.

e) Elimination reactions [5 L, 1 T]

E1, E2, E1cb mechanisms, orientation and stereochemistry in elimination reaction, reactivity effect of structure, attacking and leaving group, competition between elimination and substitution, syn eliminations.

References:

1. Organic Chemistry –by J. Clayden, N. Greeves, S. Warren and P. Wothers (Oxford)
2. Advanced Organic Chemistry –by J. March 6th Edition
3. Advance Organic Chemistry (part A) –by A. Carey and R.J. Sundberg
4. Stereochemistry of carbon compound-by E.L. Eliel
5. Stereochemistry of organic compound-by Nasipuri
6. Guide book to Reaction Mechanism –Peter Sykes



M. Sc. Chemistry Part-I

Physical Chemistry

Semester – II

CHP-210: Fundamentals of Physical Chemistry II

(5 Credits)

SECTION-I

(2.5 Credits, 30 L, 8 T)

Molecular Spectroscopy

(30 L)

i) *Recapitulation*- Electromagnetic region, units and dimensions, Width of spectral lines, collision, Doppler and natural broadening, intensity of spectral lines (4 L)

ii) *Rotation spectra*- Classification of molecules based on moment of inertia, rigid rotor, most intense line, isotopic effect on the rotational spectra, non-rigid rotator, diatomic molecules, linear triatomic molecules, symmetric top molecules, stark effect. (5 L)

iii) *Infra red spectroscopy*- Diatomic molecule, selection rule, anharmonicity, Morse potential, justifying the form of Morse potential, combinations of overtones, and hot bands in polyatomic molecules. (7 L)

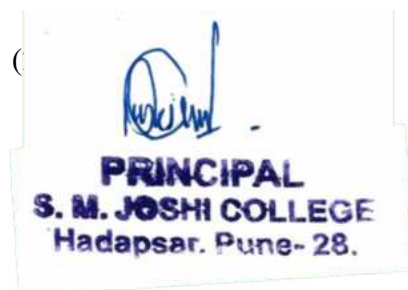
iv) *Vibrational rotational Spectra*, fine structure in diatomic molecules, break down of the Born-Oppenheimer approximation, effect due to nuclear spin, parallel and perpendicular vibrations. (4 L)

v) *Raman Spectroscopy*- Classification and Quantum theory, polarizability ellipsoid, Rotational and Vibrational Raman Spectra, structure elucidation from combined Raman and IR data (4 L)

vi) *Electronic spectroscopy of molecules*- Born-Oppenheimer approximation, sequence and progression, term symbols, Frank-Condon principle, rotational fine structure, fortat parabolae, predissociation, dissociation energies, Birge-Sponer extrapolation, oscillator strength, solvent effects, photoelectron spectroscopy. (6 L)

References

1. Fundamentals of molecular spectroscopy: C.N. Banewell and E.Mc. Cash 4th edition (1994).
2. Atikins' Physical Chemistry, P. W. Atkins and Depaula (8 th edition) (



SECTION-II

(2.5 Credits, 30 L, 7 T)

1. Nuclear and radiation Chemistry

(12 L, 3 T)

- i) Types and detection of ionizing radiations- α , β , γ decay and their energetic, GM and Scintillation counters. (6L)
- ii) Applications of radioisotopes- Typical reactions involved in preparation of radioisotopes: ^3H , ^{14}C , ^{22}Na , ^{32}P , ^{35}S and ^{137}I , Physicochemical applications-Diffusion coefficients, Surface area, Solubility, Analytical applications, NAA, agricultural and IDA. (6L)

2. Chemical Bonding

(12 L, 3T)

Valence Bond theory, hybrid orbitals, geometry and hybridization, Molecular Orbital Theory of di- and tri- atomic molecules, linear variation method, Approximations underlying Huckel theory, charge density, pi-(mobile) bond order, Aromaticity, Applications of Huckel theory.

3. Crystallography

(6 L, 1T)

Unit Cell, types of crystals, Miller Indices, Bragg Equation, Crystal structure determination from X-ray data, Bravais Lattices.

References

1. Elements of Nuclear Chemistry, H.J. Arnikaar, 4 th edition, New Age Publishers (2008).
2. Source book of Atomic Energy, S. Glasstone, D.Van Norton Company.
3. Chemical applications of radioisotopes, H.J.M Brown Buffer and Jammer Ltd.
4. Physical Chemistry, T. Engel and P. Reid, Pearson Education (2006).
5. Atkins Physical Chemistry, P. W. Atkins and DePaula (Oxford, Eighth Edition)



Inorganic Chemistry

Semester – II

CHO-230: Coordination and Bioinorganic Chemistry

(5 Credits)

SECTION-I: Coordination Chemistry

(2.5 Credits, 30 lectures, 7 T)

1. Concept & Scope of Ligand Fields (1L)
2. Free ion Configuration, Terms and States, Energy levels of transition metal ions, free ion terms, term wave functions, spin-orbits coupling. (7 L)
3. Ligand Field Theory of Coordination Complexes (8 L)
Effect of ligand field on energy levels of transition metal ions, weak cubic ligand field effect on Russell- Saunders terms, strong field effect, correlation diagrams, Tanabe-Sugano Diagrams, Spin-Pairing energies. (3 T)
4. Electronic spectra of Transition Metal Complexes (8 L)
Introduction, Band intensities, band energies, band width & shapes, spectra of 1st, 2nd & 3rd row ions and rare earth ion complexes, spectrochemical & nephelauxetic series, charge transfer & luminescence, spectra, calculations of Dq , B , β parameters.
5. Magnetic Properties of Coordination Complexes (6 L)
Origin magnetism, types of magnetism, Curie law, Curie-Weiss Law, Magnetic properties of complexes-paramagnetism 1st & 2nd Ordered Zeeman effect, quenching of orbital angular momentum by Ligand fields, Magnetic properties of A, E & T ground terms in complexes, spin free spin paired equilibria.

References:

1. Ligand field theory & its applications: B.N. Figgis & M.A. Hitchman (2000) Wiley VCH Publ.
2. Symmetry and spectroscopy of molecules, Second Edⁿ, by K. Veera Reddy, New Age International Publication, 2009.
3. Elements of magnetochemistry, R. L. Datta and Syamal, Second Edⁿ, Afiliated East West Press Pvt. Ltd. 2007.



Section-II: Bioinorganic Chemistry

(2.5 Credits 30 Lectures, 8 T)

1. Overviews of Bioinorganic Chemistry (1 L)
2. Principles of Coordination Chemistry related to Bioinorganic Research and Protein, Nucleic acids and other metal binding biomolecules. (6 L)
3. Biochemistry of Na, K and Ca w.r.t. Na/K pumps, Calmodulin and blood coagulation. (8 L)
4. Biochemistry of following elements:
 - (a) Iron: Ferritin, Transferrin, Fe-S clusters, Porphyrin based systems (6 L)
 - (b) Manganese: Photosynthesis (2 L)
 - (c) Copper : Type-I, Type-II proteins (7 L)

Reference Books:

1. Principle of Bioinorganic Chemistry: S.J. Lippard and J.M. Berg
2. Bioinorganic Chemistry: Inorganic Elements in Chemistry of Life: W.Kaim and B. Schwederski
3. Bioinorganic Chemistry: Bertini, Gray, Lippard and Valentine
4. Bioinorganic Chemistry: R.J.P. Williams
5. Bioinorganic Chemistry: Robert Hay
6. Bioinorganic Chemistry: M.N. Hughes



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Organic Chemistry

Semester – II

CHO-250: Synthetic organic chemistry and spectroscopy (5 Credits)

SECTION – I: Synthetic Organic Chemistry (2.5 Credits 30 Lectures, 8 T)

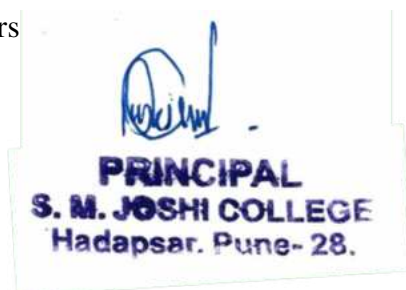
1. **Oxidation reactions:** [7]
CrO₃, PDC, PCC, KMnO₄, MnO₂, Swern, SeO₂, Pb(OAc)₄, Pd-C, OsO₄, mCPBA, O₃, NaIO₄, HIO₄
2. **Reduction reactions:** [5]
Boranes and hydroboration reactions, R₃SiH, Bu₃SnH, MPV, H₂/Pd-C, Willkinsons, NaCNBH₃, NH₂NH₂, DIBAL
3. **Rearrangements:** [8]
Beckmann, Hofmann,, Curtius, Smith, Wolff, Lossen, Bayer-villiger, Sommelet, Favorskii, Pinacol-pinacolone, Benzil-benzilic acid, Calsien, Cope, Fries
4. **Ylides:** [4]
Phosphorus, Nitrogen and Sulphur ylides
5. **Addition to carbon-heteroatom multiple bonds:** [6]
Grignard, organo zinc, organo copper, organo lithium, reagents to carbonyl and unsaturated carbonyl compounds.

SECTION-II: Spectroscopy (2.5 Credits 30 Lectures, 7 T)

- a) UV: Factors affecting UV absorption and interpretation of UV spectra [2]
- b) IR: Ideas about IR frequencies, interpretation of IR spectra [4]
- c) PMR: Fundamentals of NMR, CW and FT-NMR, factors affecting chemical shift, integration coupling (1st order analysis) [10]
- d) Introduction of CMR and mass spectrometry [6]
- e) Problems on UV, IR and PMR [6]

References:

1. Organic Chemistry – J. Clayden, N. Greeves, S. Warren and P. Wothers
2. Modern Synthetic reactions- H.O. House



3. Organic Synthesis – M.B. Smith
4. Advanced Organic Chemistry (part A & B)– A. Carey and R.J. Sundberg
5. Stereochemistry conformations and mechanism by P.S. Kalsi
6. Organic chemistry –by Cram, Hammond, Pine and Handrikson
7. Introduction to spectroscopy – D.I. Pavia, G.M. Lampman, G.S. Kriz, 3rd Edition
8. Spectroscopic methods in organic molecules – D.H. Williams & I Fleming McGraw Hill
9. Mechanism and Structure in Organic Chemistry - E.S. Gould



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Analytical Chemistry

Semester – II

CHA-290: General Chemistry (Any two parts except B)

(5 Credits)

PART-A: Modern Separation Methods and Hyphenated Techniques

(2.5 Credits, 30 L, 8 T)

1. Mass Spectrometry

(10 L)

Principle, Instrumentation, Ionization methods- Electron bombardment ionization, Arc and spark ionization, Photo-ionization, Thermal ionization, Chemical ionization, Mass analyzers-Magnetic, Double focusing, Time of flight, Quadrupolar, Ion cyclotron resonance analyzer, Correlation of mass spectra with molecular structure and molecular weight, Isotopic Abundances, Fragmentation patterns, Quantitative analysis, Applications and Problems. Fourier transform mass spectrometry, Tandem mass spectrometry, inductively coupled Plasma-mass spectrometry, Secondary ion-mass spectrometry and ion microprobe mass analyzer.

Ref. 1, Pages 647-696; Ref. 2, Pages 465-506

2. Gas Chromatography

(10 L)

Theory and Instrumentation of GC, Sample injection- Split and splitless injection, Column types, Solid/Liquid Stationary phases, Column switching techniques, Basic and specialized detectors, elemental detection, chiral separations, Pyrolysis gas chromatography, High temperature techniques, Optimization of experimental conditions, Gas chromatographs and chemical analysis, Interfacing of gas chromatography with mass spectrometry, Applications of GLC, Use of GC-MS to identify a drug metabolites in blood, High Speed gas chromatography, Gas- solid chromatography and problems,

Ref. 2, Pages 540-569; Ref. 3, Pages 125-143; Ref. 4, Pages 947-970.

3. High Performance Liquid Chromatography (HPLC)

(10 L)

Theory and instrumentation of HPLC, Optimization of column performance, Gradient elution and related procedures, Derivatization, Mobile phase delivery system, sample injection, separation column, detectors, Interfacing HPLC with mass spectrometry, Structure types of column packing, adsorption chromatography, Bonded phase chromatography, reverse phase chromatography, ion-pair chromatography, ion exchange chromatography, size exclusion chromatography, Affinity chromatography, Chiral Chromatography, Chromatographic Separation of fullerenes, Supercritical fluid chromatography, Comparison of HPLC and GC, HPLC-MS, Applications and



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Ref. 2: Pages 580-650, Ref. 4: Pages 974-992.

References:

1. Introduction to Instrumental Analysis, R. D. Braun, Mc Graw-Hill. Inc.1987.
2. Instrumental Methods of Chemical analysis, H. H. Willard, L. L. Merritt Jr., J. A. Dean & F. A. Settle Jr., 6th Edition, Wadsworth Publishing Company, USA,1986
3. Handbook of Instrumental Techniques for Analytical Chemistry, F. A. Settle editor, Prentice Hall Inc. A Simon and Schuster Company, New Jersey, 1997.
4. Fundamentals of Analytical Chemistry, D. A. Skoog, D. M. West, F. J. Holler, S. R. Crouch, 7th Edition, Thomson Asia Pte. Ltd, Singapore,2004

PART-B: (Compulsory for Drug Chemistry Students)

Basic Biochemistry

(5 Credits, 60 L, 15 T)

1. Introduction to Biochemistry: Scope of the subject in pharmaceutical sciences, Biochemical reactions, Highlights of prokaryotics and Eucaryotic cell metabolism.
2. Biochemical Morphology: Prokaryotes and Eukaryotes, Cell structure, sub-cellular components: Nucleus, plasma membranes, endoplasmic reticulum, Lysosome, Peroxisomes, Golgi apparatus, Mitochondria.
3. Biomembrane: Structure, functions and composition, Model proposed , Fuction and properties of membrane, Transport hypothesis, Active and passive facilitated transport, Na⁺, K⁺, H⁺, pumps, glucose transport, Excitable membrane, drug transport.
4. Biomolecules:
Proteins: Introduction, functional, classification of aminoacids, classification, physicochemical properties, Optical activity, Reaction with ninhydrin, Formaldehyde,Aminoacids, Essential and non essential amino acids, efficiacy, structure, peptide bond, end group analysis, Helix,B-sheet structure, tertiary, quartarnary structure,globular proein, fibrous protein, amino acid therapy, Protein engineering

Carbohydratyes: complex carbohydrate, structure of Chitin, Starch, Glycogen + Metabolism

Lipids: definition, classification, functions, types of fattyacids, and its biological role and metabolism.

5. Enzymes: Introduction, classification according to the reaction catalysis and source) structure of enzyme, co factures, active sites, Binding sites, Km, Vmax, Enzyme kinetics


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plot, effect of substrate, pH ionic strength, Concentration, Temperature on the rate of enzyme reactions, Enzyme inhibition(competitive, uncompetitive, non competitive and irreversible), Enzyme biotechnology. Manufacturing of medicinal compounds by enzymatic reactions, Penicillin acylase for the production 6-APA, Therapeutical uses of enzymes.

6. Nucleic acids: Chemical composition as genetic material, Nucleosides, Nucleotides, Structure, Biochemical function, Replication, Transcriptions, Translation, Flow of Genetic Information, Genetic code, Gene, Genome ,Gene expression, Genetic disorder, DNA recombination, Gene therapy.
7. Nutrition: General ideas about the role of Nutrients and nutritional diseases.
8. Vitamins: Structure and biochemical fuction of fat soluble vitamins(A,D,E,K) and water soluble vitamins C, B1, B2, B6,D12 and H vitamine, Pantothenic acid, Lipoic acid.

References:

1. Principals of biochemistry, Albert Lehninger (CBS Publisher and Distributers Pvt. Delhi.
2. Biochemistry Lubert Stryer, W. H. (Freeman and company New York)
3. Haper's Biochemistry by R.K. Murray, D. I. Granner, P. A. Mayes, (Prentice Hall International inc.)
4. Practical Clinical Biochemistry, Harold Varley, (CBS Publisher and Distributers Pvt. Delhi.
5. Molecular Biology, J.D. Watson (The Benjamin/ Cumming Company, Inc.)

PART- C: Concept of Analytical Chemistry

(2.5 Credits, 30 L, 8 T)

1. Data Handing and Spreadsheets in Analytical Chemistry

(6 L)

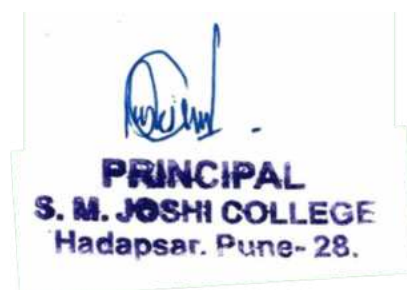
Accuracy and Precision, determinate errors, Indeterminate errors, Significant errors, rounding off, ways of expressing accuracy, Standard Deviations, Propagation of errors, Confidence limits, Tests of Significance, Rejection of results and Problems.

Ref. 2: Pages 65-99.

2. Sampling, Standardization and Calibration

(8 L)

Analytical Samples and Methods of Sampling, Sample Handling, Gross sample, Gross sample, Preparation of Laboratory samples, Automated Sample Handling, Comparisons with standard and Numerical Problems.



Ref. 1: Pages 175-200.

3. Introduction to analytical separations (8 L)

Separation by precipitation, separation of species by distillation, separation by extraction, separation by ion exchange chromatography and problems.

Ref. 1: Pages 906-946

4. Chemical aspects to Nanomaterials (8 L)

Nano-science and nano-technology, Effect of making into small, general themes and classification nano-materials, applications of nano-materials, challenges in nano science and nanotechnology. Characterization of nanomaterials using XRD, SEM-EDAX, TEM, PL.

Ref. 3: Pages 1-22

References:

1. Fundamentals of Analytical Chemistry, D. A. Skoog, D. M. West, F. J. Holler, S. R. Crouch, 5th Edition, Thomson Asia Pte. Ltd, Singapore, 2004.
2. Analytical Chemistry, G.D. Christian, 6 th Edition.
3. Nano Science and nanotechnology in engineering, by V. K. Varadhan, A. S. Pillai, D. Mukharjee, M. Dwivedi and L. Chen, World Scientific Publishing Company, Pvt. Ltd.

PART- D: Industrial Methods of Analysis (2.5 Credits, 30 L, 8 T)

1. Chemometrics: (12 L)

Concentration of solution based on volume and mass unit, calculations of ppm , ppb and dilution of the solutions , Concept of mmole, Stoichiometry of chemical reactions, Concept of gmole, Limiting reactants, theoretical and practical yield, solubility and solubility equilibria, effect of presence of common ion, Calculations of pH of acids, bases and acidic and basic buffers, Concept of formation constant, Stability and instability constants, stepwise formation constants and Numerical problems.

2. Quality in Analytical Chemistry (6 L)

Quality systems in chemical laboratories, cost and benefits of quality system, types of quality standards for laboratories, total quality management, quality audits, and quality reviews , response of laboratory staff for quality and problems.


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3. Process Instruments and Automated Analysis

(12 L)

Introduction, industrial process analyzer, methods based on bulk properties, Infra-red process, oxygen analyzers, On-line potentiometric analyzers, chemical sensors, process gas chromatography, continuous online process control, automatic chemical analyzers, automatic elemental analyzers, Numerical problems.

Ref 3: Pages: 786-828.

References:

1. Vogel's Text book of Quantitative Analysis.
2. Analytical Chemistry, G.D. Christian, 6 th Edition.
3. Instrumental Methods of Chemical analysis, H. H. Willard, L. L. Merritt Jr., J. A. Dean & F. A. Settle Jr., 6th Edition, Wadsworth Publishing Company, USA, 1986

PART- E: Organometallic and Inorganic Reaction Mechanism

(2.5 Credits, 30 L, 8 T)

(Recommended for M. Sc. other than Inorganic specialization)

1) Organometallic Chemistry

(12 L)

Organic ligands and nomenclature, 18 electron rule: counting electrons, why 18 electron rule, sq. pl. complexes, ligands in organometallic chemistry: Carbonyl complexes, ligands similar to CO, hydride and dihydride complexes, ligands having extended pi system, bonding between Metal Atoms and organic pi systems: linear pi system, cyclic pi system, Fullerene complexes, complexes containing M-C, M=C and M≡C bonds: alkyl and related complexes, carbene complexes, carbene complexes, spectral analysis and characterization of organometallic complexes: IR and NMR, examples.

2) Organometallic Reactions and Catalysis

(8 L)

Reactions involving gain and loss of ligands: ligand dissociation and substitution, oxidative addition, reductive elimination, nucleophilic displacement, reactions involving modification of ligands: insertion, carbonyl insertion, 1-2 insertion, hydride elimination, abstraction, organometallic catalysis: Hydroformylation, Monsanto acetic acid process, Wacker Process, Hydrogenation by Willkinsons catalyst, Olefin metathesis, heterogeneous catalysis: Ziegler Natta Polymerization, Water gas reduction.



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3) Coordination Compounds: Reactions and Mechanism

(12 L)

History and principles, Substitution reactions: Inert and labile complexes, mechanism of substitution, Kinetics Consequences of reaction pathway: dissociation, interchange, association, Experimental evidences in Octahedral Substitution: dissociation, linear free energy relationship, associative mechanism, the conjugate base mechanism, the kinetic chelate effect, Stereochemistry of reactions: substitution in trans complexes, substitution in cis complexes, isomerisation of chelate rings, substitution reactions in Sq. Pl. Complexes: Kinetics and stereochemistry of substitution, evidences of associative reactions, The trans effect and its explanation, oxidation reduction reaction: Inner and outer sphere reactions, conditions for low and high oxidation numbers, Reactions of coordinated ligands: Hydrolysis (of esters, amides and peptides), templet reactions, electrophelic substitution.

Reference Book:

- 1) Inorganic Chemistry: Gary Miessler and Donald A. Tarr, Third Ed., Pearson (Chapter-12, 13 and 14 pages: 422 to 561)

Part F: Mathematics for Chemists

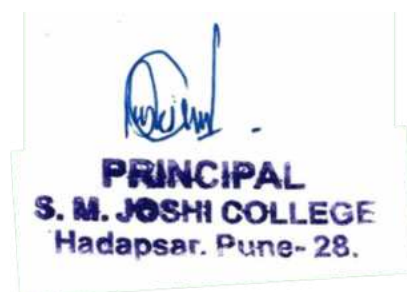
(2.5 Credit; 30 L, 8 T)

(Recommended for M. Sc. other than Physical Chemistry specialization)

1. Functions: Differential and integral calculus, limits, derivatives, physical significance, basic rules of differentiation, maxima and minima, application in chemistry, exact and inexact differentiation, Taylor & McLaurin Theorem, curve sketching, partial differentiation, rules of integration, separation of variable, substitution, partial function method to solve to indefinite integrals in chemistry. (16 L)
2. Differential Equations: Separation of variables, homogeneous, exact, linear equations of second order, series solution method. (6 L)
3. Error Probability, analysis, Least square fit, Permutations and Combinations, probability (4 L)
4. Vectors Matrices, and Determinants: (4 L)
Vectors, dot, Cross and triple products, introduction to matrix algebra, addition and multiplication of matrices, inverse, adjoints and transport of matrices, unit and diagonal matrices.

References:

- 1) Chemical Maths Book, E. Steiner, Oxford University Press (1996).



- 2) Mats For Chemists Vol 1 and 2, Martin MCR Cockett and G. Doggett, Cambridge (2003).
- 3) Mathematical Preparation for Physical Chemistry, F. Daniels, McGraw Hill (1972)

Part F: Pericyclic, Photochemistry and Free radical

(2.5 Credit; 30 L, 8 T)

(Recommended for M. Sc. other than Organic Chemistry specialization)

1. Pericyclic reactions

[12]

Electrocyclisation, cycloaddition, sigmatropic and Alder-ene reactions. Analysis of pericyclic reactions by construction of correlation diagrams, by FMO approach and by aromatic transition state concept.

2. Free radicals

[06]

Generation, stability and general reactions like displacement, addition and rearrangements.

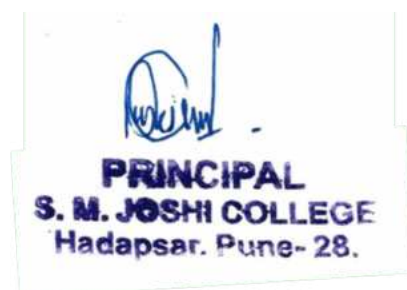
3. Photochemistry

[12]

Basic concepts in Photochemistry, Jablonski diagram, quenching, triplet excitation, photosensitization, photoenolization, photoisomerisation; photochemistry alkenes, dienes, carbonyl compounds and benzene derivatives.

References:

1. Conversation of orbital symmetry – Woodward and Hoffmann
2. Organic Chemistry – Morrison and Boyd
3. Organic Chemistry – Warren, Clayden, Greeves and Wothers
4. Advanced Organic Chemistry – Carey, Sandburg Vol. A.
5. Organic reactions and Orbital Symmetry - T. L. Gilchrist and R. C. Storr
6. Excited states in Organic Chemistry – J. D. Coyle and J. A. Barltrop
7. Orbital Symmetry – A problem solving approach. R. F. Lehr and A. P. Marchand
8. Principles of Organic Synthesis – Norman, Coxon



M.Sc.-I: Practical

CHP-107: Physical Chemistry Practical

(5 Credits)

A) Conductometry: (Atleast three)

1. Hydrolysis of NH_4Cl or CH_3COONa or aniline hydrochloride.
2. Determination of λ_0 or λ_α and dissociation constant of acetic acid.
3. Hydrolysis of ethyl acetate by NaOH .
4. Determination of ΔG , ΔH , and ΔS of silver benzoate by conductometry.
5. Determination of critical micellar concentration (CMC) and ΔG of micellization of sodium dodecyl sulphate (SDS).

B) Potentiometry: (at least three)

1. Stability Constant of a complex ion.
2. Solubility of a sparingly soluble salt.
3. To determine the ionic product of H_2O
4. Estimation of halide in mixture.

C) pH metry:

1. Determination of the acid and base dissociation constant of an amino acid and hence the isoelectric point of the acid.
2. Determination of dissociation constants of tribasic acid (phosphoric acid)

D) Polarography:

1. Determination of half wave potential $E_{1/2}$ and unknown concentration of an ion.
2. Amperometric titration of $\text{Pb}(\text{NO}_3)_2$ with $\text{K}_2\text{Cr}_2\text{O}_7$.

E) Colorimetry:

1. Analysis of a binary mixture.
2. Copper EDTA photometric titration.

F) Radioactivity: (at least two)

1. Estimation of Mn in tea leaves by NAA.
2. Half-life of a radioactive nuclide and counting errors.
3. Determination of E_{max} of β radiation and absorption coefficients in Al.

G) Chemical Kinetics: (at least two)



1. Kinetic decomposition of diacetone alcohol by dilatometry.
2. Determination of an order of a reaction.
3. Brönsted primary salt effect.

H) Non-Instrumental: (at least five)

- 1) Determination of surface excess of amyl alcohol or TX-100 surfactant by Capillary rise method.
- 2) Statistical treatment of experimental data.
- 3) Determination of molecular weight by steam distillation.
- 4) Glycerol radius by viscosity.
- 5) Partial Molar Volume (Polynometry) Determination of the densities of a series of solutions and to calculate the molar volumes of the components.
- 6) Surface area analysis by BET method e.g. industrial pigment.
- 7) Analysis of crystal structure from single crystal X-ray pattern.

References:

1. Practical physical chemistry, A. Findlay, T.A. Kitchner (Longmans, Green and Co.)
2. Experiments in Physical Chemistry, J.M. Wilson, K.J. Newcombe, A.r. Denko. R.M.W. Richett (Pergamon Press)
3. Senior Practical Physical Chemistry, B.D. Khosla and V.S. Garg (R. Chand and Co., Delhi.).
4. Experimental Physical Chemistry by D. P. Shoemaker, Mc. Growhill, 7th Edition, 2003.
5. Physical chemistry by Wien (2001)



CHI-107: Inorganic Chemistry Practical

(5 Credits)

Part-I: Ore analysis (at least two of the following) (Ref. -1)

- Determination of Silica and Manganese in pyrolusite ore.
- Determination of Copper and iron from chalcopyrite ore.
- Determination of silica and iron from hematite ore.

Part-II: Alloy Analysis (at least two of the following) (Ref. -1)

- Determination of tin and lead from solder.
- Determination of iron and chromium from mild steel.
- Determination of copper and nickel from cupronickel.

Part-III: Inorganic Synthesis and Purity with respect to metal (any five) (Ref. – 2)

- $\text{Mn}(\text{acac})_3$
- Chloro penta-ammine cobalt (III) chloride
- Nitro penta-amminecobalt (III) chloride
- Nitrito penta-amine cobalt (III) Chloride.
- Potassium tri-oxalato aluminate
- Tris(ethylene di ammine) Ni(II) thiosulphate.
- Bis[TrisCu(I)thiourea]

Part-IV: Ion – exchange chromatography (Any one experiment) (Ref. -1 and 3)

- Separation of mixture of $\text{Zn}(\text{II})$ and $\text{Cd}(\text{II})$ using Amberlite IRA 400 anion exchanger and quantitative estimation of separated ions $\text{Zn}(\text{II})$ and $\text{Cd}(\text{II})$
- Separation of mixture of $\text{Zn}(\text{II})$ and $\text{Mg}(\text{II})$ using Amberlite IRA 400 anion exchanger and quantitative estimation of separated ions $\text{Zn}(\text{II})$ and $\text{Mg}(\text{II})$

Part-V: Spectrophotometry (all two experiments)

- Estimation of phosphate from waste water by calibration curve method (Ref. -4)
- Determination of equilibrium constant of M – L systems $\text{Fe}(\text{III})$ – Salicylic acid or $\text{Fe}(\text{III})$ –Sulphosalicylic acid or $\text{Fe}(\text{III})$ – β -resorcilic acid by Job's continuous variation method. (Ref.-3)



- c. Determination of iron by solvent extraction techniques in a mixture of Fe(III) + AL(III) or Fe(III) + Ni(III) using 8-hydroxyquinoline reagent.

(Ref. -1)

or

- c) Determination of Cu(II) by solvent extraction as Dithiocarbamate/8-Hydroxyquinoline complex (Ref-1,3)

Part-VI: Inorganic characterization techniques (any one of the following)

- a. Solution state preparation of $[\text{Ni}(\text{en})_3]\text{S}_2\text{O}_3$, $[\text{Ni}(\text{H}_2\text{O})_6]\text{Cl}_2$, $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$. Record absorption spectra in solution of all three complexes and analyse it. Arrange three ligands according to their increasing strength depending on your observations. (Ref. -5)
- b. Determination of magnetic susceptibility (χ_g and χ_m) of mercury tetracyanato cobalt or $\text{Fe}(\text{acac})_3$ or Ferrous ammonium sulfate by Faraday or Gouy method. (Ref. -3)

Part-VII: Synthesis of Nano materials (any one of the following)

- a) Synthesis of nano size ZnO, its characterization by UV-Visible spectroscopy and removal of dye by ZnO-photocatalysis (Ref-2)
- b) Synthesis of nano size $\alpha\text{-Fe}_2\text{O}_3$ and study of adsorption of phosphate on it (Ref-2)

Part-VIII: Conductometry (any one of the following).

- a) Verification of Debye Huckle theory of ionic conductance for strong electrolytes KCl , BaCl_2 , K_2SO_4 , $\text{K}_3[\text{Fe}(\text{CN})_6]$ (Ref. -3)
- b) Structural determination of metal complexes by conductometric measurement. (Ref-3)
- c) To study complex formation between Fe(III) with sulfosalicylic acid by conductometry (Ref-3).

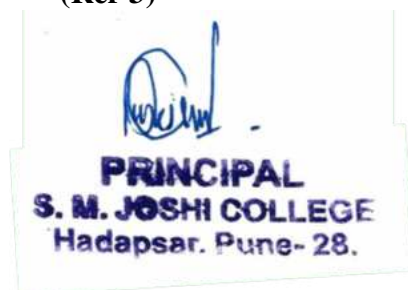
Part-IX: (any one of the following)

- a) Synthesis and photochemistry of $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3] \cdot 3\text{H}_2\text{O}$. (Ref-4)
- b) Kinetics of substitution reaction of $[\text{Fe}(\text{Phen})_3]^{2+}$ (Ref-3)

Part-X: Table work

- a) Data analysis, error analysis, least squares method.

(Ref-3)



Reference Books:

- 1) Text book of Quantitative Analysis, A.I. Vogel 4th edⁿ (1992).
- 2) Experimental Inorganic Chemistry, Mounir A. Malati, Horwood Series in Chemical Science (Horwood publishing, Chichester) 1999.
- 3) Experiments in Chemistry, D. V. Jahagirdar, Himalaya Publishing House
- 4) General Chemistry Experiments, Anil. J Elias, University press (2002)
- 5) Ligand Field Theory, B. N. Figgis.

CHO-247: Organic Chemistry Practical

(5 Credits)

1. **Use of chemistry software like MOPAC, ISIS draw, Chem office**
2. **Purification techniques** (Demonstrations)
 - a) Purification of solvents and reagents using techniques like crystallization, distillation, steam distillation, vacuum distillation, drying and storage of solvents, sublimation etc.
 - b) Chromatography: TLC, Column, paper
 - c) Solvent extraction using soxhlet extractor
3. **Three component mixture separation using ether.** (8 mixtures minimum including amino acid)
4. **Single stage preparations (5 preparations)**
 - a) 2-Methoxy naphthalene to 1-formyl-2- methoxy naphthalene
 - b) Toluene to 4-methyl acetophenone
 - c) Anthranilic acid to 2-iodo /2-choro benzoic acid
 - d) Cyclohexanol to cyclohexanone
 - e) Benzophenone to diphenyl methane
 - f) Benzyl cyanide to henyl acetic acid
 - g) Benzaldehyde to chalcone
 - h) Gycine to Benzoylglycine
 - i) Nitrobenzene to m-di-nitrobenzene
 - j) m-di-nitrobenzene to m-nitroaniline
 - k) Benzoic acid to ethylbenzoate



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M.Sc. Drug Chemistry

Practical

CHD-128: INORGANIC AND ANALYTICAL CHEMISTRY PRACTICALS

(5 Credits)

1. Inorganic synthesis and characterization by physical or chemical methods:
 - a) Cis-trans potassium diaquo dioxalate chromate (III)
 - b) Chloropentammino cobalt (III) chloride.
2. Colorimetry;
Keg of M-L systems such as:
 - i) Fe (III) Salicylic acid
 - ii) Fe (III) Sulphosalicylic acid
 - iii) Fe (III) resorcilic acid by Job's method and Mole ratio method
3. Photometric titration of systems such as:
 - a) Cu^{2+} - EDTA
 - b) Fe^{2+} - Sulphosalicylic acid
 - c) Co^{2+} - R-nitroso salt.
4. Potentiometry:
 - a) Complexometric determination using disodium EDTA of
 - i) Co^{2+}
 - jj) Al^{3+}
 - iii) Cu^{2+}
- 5 Solvent extraction of Al / Mo usmg 8-hydroxy quinoline complex and determination by spectrophotometry
6. Solvent extraction of ferric thiocyanate complex and determination by colorimetry.
7. Separation and estimation of Fe and Al on a cation exchanger.
8. Separation and estimation of copper and cobalt on cellulose column.
9. Analysis of Vitamin C in juices and squashes.
10. Analysis of Vitamin A in food products.
11. Simultaneous determination by titanium and vanadium Pt and Pd using hydrogen peroxide by spectrophotometry.


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12. Estimation of Na, K and Ca in binary mixture by flame photometry using Li as Internal standard and using standard addition method.
13. Determination of the strength of the following by fluorimetry, beryllium, aluminium, vitamin B1, vitamin B2.
14. Determination of the strength of commercial phosphoric acid/vinegar by conductometric titration.
15. Analysis of malathion by colorimetry or polarography.
16. Estimation of nitrile, fluoride, dissolved chlorine, chloride, iron, chromium, manganese colorimetrically.
17. Estimation of Hg, Pb, Cd spectrophotometrically/complexometrically.
18. Estimation of sulphadiazine.
19. Estimation of mixtures of benzoic acid and salicylic acid in pharmaceutical preparations
20. Determination of iron, calcium and phosphorous in milk powder.
21. Partition coefficient.

References:

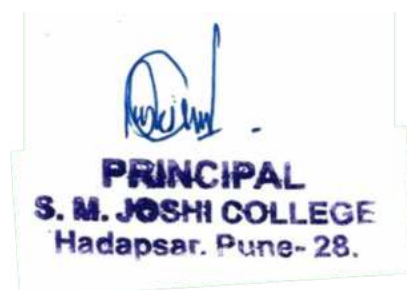
- 1) A textbook of Qualitative Inorganic Analysis 3rd Edn., A. I Vogel, ELBS.
- 2) A Textbook of Practical Organic Chemistry, 4th Edn., A. I. Vogel, ELBS.
- 3) Standard Methods of Chemical Analysis, 6th Edn.; A series of volumes edited by F. J. Weicher, Robert E. Krieger Publishing co.
- 4) Pharmacopoeia of India.

CHD-108: Practical Course in Separation, Purification & Analytical techniques in Drug

Chemistry

(5 Credits)

1. Purification of solvents and reagents
2. Mixture separation Two and Three components.
3. Isolation of Natural products from Clove, Cinnamon by steam distillation. Also use Soxhlet apparatus for one natural product.
4. Chromatographic techniques as TLC, Column chromatography
5. Biomolecule separation and identification using Gel Electrophoresis, Paper chromatography Immunoelectrophoresis.



6. Separation and Identification of active drug ingredients from commercial pharmaceutical preparations.
7. Try to use spectral data whenever possible.
8. Any current techniques as per need and demand.

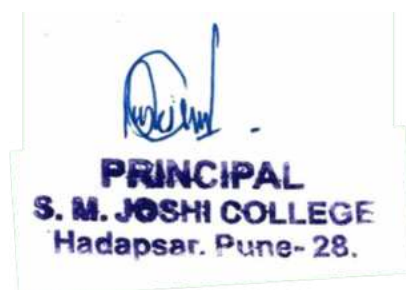
CHD-248: ORGANIC CHEMISTRY PRACTICALS

(5 Credits)

1. Techniques: Crystallization, fractional crystallisation, fractional distillation, vacuum distillation, sublimation, steam distillation.
2. Single stage preparation involving different type of reactions (minimum 8 preparations).
3. Two-stage preparations (minimum 2 preparation).
4. Three-stage preparations (minimum 2 preparations).
5. Derivatives of functional groups such as acetyl, benzoyl, 2, 4-DNP, oxime, anilide, amide and aryloxy acetic acid (minimum one of each type)

Typical preparations from which the single and two stage preparations can be chosen are:

1. Toluene — p-nitrotoluene — p-nitrobenzoic acid — p-amino benzoic acid
2. Benzene — Acetophenone — Acetophenone oxime — Acetanilide
3. Benzaldehyde — Benzoin — Benzil — Benzillic acid
4. Nitrobenzene — m-dinitrobenzene — m-nitroaniline — m-nitrophenol
5. Phthalic acid — phthalic anhydride — phthalimide — Anthranilic acid
6. Anthranilic acid — phenylglycine — orthocarboxylic acid — indigo
7. Acetophenone — Benzalacetophenone — epoxide
8. Cyclohexanone — Cyclohexanone oxime — caprolactam
9. Phthalic anhydride — o-benzoylbenzoic acid — anthraquinone.
10. O-Chlorobenzoic acid — N-phenylanthranilic acid — acridone.
11. Chlorobenzene — 2,4-dinitrochlorobenzene — 2,4-dinitrophenol
12. Bromobenzene — triphenylcarbinol — tritylchloride
13. Resorcinol — resacetophenone — 4-ethyl resorcinol
14. Phenol — allylphenyl ether — o-allylphenol
15. Phenol — salicylaldehyde — coumarin



SAVITRIBAI PHULE PUNE UNIVERSITY
(Formerly University of Pune)

Booklet of Practical Skeleton Papers for
F. Y. B. Sc. Botany Practical Examination
New Syllabus-CBCS Pattern (June 2019 onwards)

General Guidelines:

1. This booklet is only the guideline.
2. This booklet includes skeleton papers, guidelines to the examiner to set the practical question paper and scheme of marking for semester I and II.
3. Examiners are advised to set question paper for each batch separately on the basis of skeleton and guidelines supplied with booklet.
4. The experts should be made available for the preparation of prerequisites to conduct the practical examination.
5. Student must attend the excursion and submit the excursion report along with duly certified journal.
6. Use of calculator is allowed in practical examination.
7. Each batch should have two examiners. Both the examiners will set question paper/batch. Remuneration for practical paper setting and paper assessment is as per rates of remuneration for examination work SPPU, Pune 2019


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SAVITRIBAI PHULE PUNE UNIVERSITY

F. Y. B. Sc. Semester Practical Examination in Botany

SEMESTER-I

New Syllabus-CBCS Pattern (June 2019 onwards)

Time: 10:00 am onwards (Not less than 3 hours)

Max. Marks: 35

1. Assign the specimen 'A' to its respective plant group on the basis of characters. Describe, Sketch and label thallus structure and show the preparations to the examiner. (08)
2. Make a temporary stained preparation of T. S. of specimen 'B'. Identify on the basis of anatomical features. Show the preparation to the examiner. (07)
3. Describe any two whorls of the specimen 'C'. (04)
4. Perform as per instructions (12)
 - D. Identify the form and comment on its type.
 - E. Identify and describe the type of inflorescence.
 - F. Comment on the step of the cultivation of edible Mushroom.
 - G. Identify and describe the type of fruit.
5. Visit report (04)


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SAVITRIBAI PHULE PUNE UNIVERSITY

F. Y. B. Sc. Semester Practical Examination in Botany

SEMESTER-I

New Syllabus-CBCS Pattern (June 2019 onwards)

Time: 10:00 am onwards

Max. Marks: 35

Guidelines to the Examiner

1. Specimen A: Thallus of *Spirogyra/Agaricus/Riccia*.
2. Specimen B: Dicotyledonous/ Monocotyledonous **Root/Stem/Leaf**.
3. Specimen C: Any suitable flower for **Calyx/Corolla/Perianth/Androecium/Gynoecium**.
4. Identify and describe as per instructions.
 - D. Any one form of Lichen.
 - E. Any one type of inflorescence.
 - F. *Agaricus/Pleurotus*(*spawn /specimen/pleurotus bed*)
 - G. Any one type of fruit.
5. Visit report on Botanical Excursion.



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SAVITRIBAI PHULE PUNE UNIVERSITY

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SEMESTER-I

New Syllabus-CBCS Pattern (June 2019 onwards)

Time: 10:00 am onwards

Max. Marks: 35

Scheme of Marking

1. Specimen A:

Diagnostic Features	: 02
Identification	: 01
Classification with reason	: 02
Sketch and label	: 01
Preparation	: 02

2. Specimen B:

Stained preparation	: 02
Identification	: 02
Comments	: 03

3. Specimen C: Any suitable flower for **Calyx/Corolla/Perianth/Androecium/Gynoecium**.

Morphological terms	: 02
Diagnostic Features	: 02

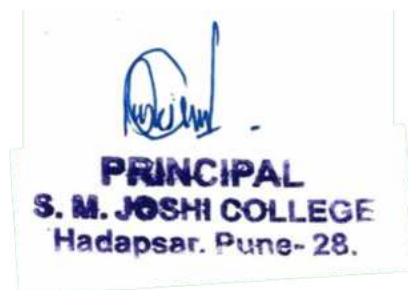
4. Identify and describe as per instructions.

D.	Identification	: 01
	Description	: 02
E.	Identification	: 01
	Description	: 02

F.	Identification	: 01
	Description	: 02

G.	Identification	: 01
	Description	: 02

5.	Excursion report	: 04



SAVITRIBAI PHULE PUNE UNIVERSITY

F. Y. B. Sc. Semester Practical Examination in Botany

SEMESTER-II

New Syllabus-CBCS Pattern (June 2019 onwards)

Time: 10:00 am onwards (Not less than 3 hours)

Max. Marks: 35

1. Assign the specimen 'A' to its respective plant group on the basis of characters. Describe, Sketch and label sporophyte structure and show the preparations to the examiner. (07)
2. Identify the given sample 'B' with suitable confirmation test. Write in brief procedure of extraction. (08)

OR

2. Make a cytological preparation of given material 'B' and show the preparation to the examiner. (08)
3. Set up the physiology experiment. Write the requirement and procedure. Show the result to the examiner. Comment on physiological phenomenon in given material 'C'. (07)

OR

3. Estimate amount of chlorophyll from the given data 'C'. (07)
4. Perform as per instructions (09)
 - D. Give common, botanical name and economic importance of the specimen.
 - E. Give common, botanical name and economic importance of the specimen.
 - F. Identify and comment on the type of cell.
5. Visit report (04)


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SAVITRIBAI PHULE PUNE UNIVERSITY

F. Y. B. Sc. Semester Practical Examination in Botany

SEMESTER-II

New Syllabus-CBCS Pattern (June 2019 onwards)

Time: 10:00 am onwards

Max. Marks: 35

Guidelines to the Examiner

1. Specimen A: Thallus of *Nephrolepis/Cycas*.
2. Specimen B: DNA Sample./DNA sample CT

OR

2. Specimen B: Any suitable plant material for Mitosis/ Meiosis.
Preferably (onion buds, Rhoeo Buds,-Meiosis, Onion root tips (Mitosis)
3. Specimen C: Any suitable plant material for Plasmolysis.(Rhoeo leaves)

OR

3. Specimen C: Data for Chlorophyll estimation.
4. Identify and describe as per instructions.
 - D. Any one economic importance of Pteridophyte/Gymnosperms.
 - E. Any one economic importance of angiosperm-Food/Fodder/ Fibers/Horticulture/ Medicines
 - F. Any suitable material/specimen to show Prokaryotic/Eukaryotic plant cell.
5. Visit report on Botanical Excursion.



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SAVITRIBAI PHULE PUNE UNIVERSITY
F. Y. B. Sc. Semester Practical Examination in Botany
SEMESTER-II
New Syllabus-CBCS Pattern (June 2019 onwards)

Time: 10:00 am onwards

Max. Marks: 35

Scheme of Marking

1. Specimen A:
- | | |
|---------------------|------|
| Diagnostic Features | : 02 |
| Identification | : 01 |
| Sketch and label | : 02 |
| Preparation | : 02 |

2. Specimen B:
- | | |
|-------------|------|
| Requirement | : 02 |
| Procedure | : 02 |
| Result/Test | : 02 |
| Conclusion | : 02 |

OR

- Specimen B:
- | | |
|----------------------|------|
| Requirement | : 02 |
| Slide preparation | : 02 |
| Stage identification | : 02 |
| Description | : 02 |

3. Specimen C:
- | | |
|-------------|------|
| Observation | : 02 |
| Comment | : 03 |
| Conclusion | : 02 |

4. Identify and describe as per instructions.
- | | | |
|----|----------------|------|
| D. | Identification | : 01 |
| | Description | : 02 |
| E. | Identification | : 01 |
| | Description | : 02 |
| F. | Identification | : 01 |
| | Description | : 02 |

5. Excursion report : 04


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Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Botany

(Faculty of Science & Technology)

F.Y.B.Sc. Botany

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020

Title of the Course: B. Sc Botany

1. Structure of Course:

Structure B.Sc. Botany syllabus					
Year	Semester	Course Type	Course code	Course Name	Credits
1	1	Compulsory Course	BO 111	Plant life and utilization I	2
			BO 112	Plant morphology and Anatomy	2
			BO 113	Practical based on BO 111 & BO 112	1.5
	2	Compulsory Course	BO 121	Plant life and utilization II	2
			BO 122	Principles of plant science	2
			BO 123	Practical based on BO 121 & BO 122	1.5
2	3	Compulsory Course	BO 231	Botany Theory Paper 1	2
			BO 232	Botany Theory Paper 2	2
			BO 233	Botany Practical Paper	2
	4	Compulsory Course	BO 241	Botany Theory Paper 1	2
			BO 242	Botany Theory Paper 2	2
			BO 243	Botany Practical Paper	2
3	5	Discipline Specific Elective Course	BO 351	Botany Theory Paper 1	2
			BO 352	Botany Theory Paper 2	2
			BO 353	Botany Theory Paper 3	2
			BO 354	Botany Theory Paper 4	2
			BO 355	Botany Theory Paper 5	2
			BO 356	Botany Theory Paper 6	2
			BO 357	Botany Practical Paper 1	2
			BO 358	Botany Practical Paper 2	2
			BO 359	Botany Practical Paper 3	2
		Skill Enhancement course	BO 3510	Botany Theory Paper 7	2
			BO 3511	Botany Theory Paper 8	2
3	6	Discipline Specific Elective Course	BO 361	Botany Theory Paper 1	2
			BO 361	Botany Theory Paper 2	2
			BO 362	Botany Theory Paper 3	2
			BO 363	Botany Theory Paper 4	2
			BO 364	Botany Theory Paper 5	2
			BO 365	Botany Theory Paper 6	2
			BO 366	Botany Practical Paper 1	2
			BO 367	Botany Practical Paper 2	2
			BO 368	Botany Practical Paper 3	2
		Skill Enhancement course	BO 3610	Botany Theory Paper 7	2
			BO 3611	Botany Theory Paper 8	2

2. Equivalence of Previous Syllabus:

Old Course (2013 Pattern)	New Course (2019 CBCS Pattern)
Fundamentals of Botany: PAPER – I Term- I: Plant Diversity	BO 111 Plant life and utilization I
Botany Theory Paper II Term I – Industrial Botany	BO 112 Plant morphology and Anatomy
Fundamentals of Botany: PAPER - I Term- II: Morphology and Anatomy	BO 121 Plant life and utilization II
Botany Theory Paper II Term- II – Industrial Botany	BO 122 Principles of plant science
F. Y. B. Sc. Botany Practical Paper - III based on Theory Paper I and Paper II	BO 113 Practical based on BO 111 & BO 112 and BO 123 Practical based on BO 121 & BO 122

SEMESTER-I: PAPER-I**BO-111: PLANT LIFE AND UTILIZATION I (30 Lectures)****CREDIT-I****15 Lectures (15 Hours)****1. INTRODUCTION****3 L**

General outline of plant kingdom (**Lower Cryptogams**: Thallophytes- Algae, Fungi & Lichens; **Higher Cryptogams**: Bryophytes and Pteridophytes; **Phanerogams**: Gymnosperms and Angiosperms- Dicotyledons and Monocotyledons). Distinguishing characters of these groups and mention few common examples from each.

2. ALGAE**9 L**

- 2.1: Introduction
- 2.2: General Characters
- 2.3: Classification (Bold and Wynne 1978) up to classes with reasons
- 2.4: Life Cycle of *Spirogyra* w.r.t. Habit, Habitat, Structure of thallus, structure of typical cell, Reproduction- Vegetative, Asexual and Sexual, systematic position with reasons
- 2.5: Utilization of Algae in Biofuel Industry, Agriculture, Pharmaceuticals, Food and Fodder

3. LICHENS**3 L**

- 3.1: Introduction
- 3.2: General Characters
- 3.3: Nature of Association, forms- Crustose, Foliose and Fruticose.
- 3.4: Utilization of lichens.

CREDIT-II**15 Lectures (15 Hours)****4. FUNGI****9 L**

- 4.1: Introduction
- 4.2: General Characters
- 4.3: Classification (Ainsworth, 1973)
- 4.4: Life Cycle of Mushroom- *Agaricus bisporus* w.r.t. Habit, Habitat, Structure of thallus, Structure of Sporocarp, Structure of Gill, Reproduction- Asexual and sexual, Systematic position.
- 4.5: Utilization of Fungi in Industry, Agriculture, Food and Pharmaceuticals.

5. BRYOPHYTES**6 L**

- 5.1: Introduction
- 5.2: General Characters
- 5.3: Classification (G.M. Smith 1955)
- 5.4: Life Cycle of *Riccia* w.r.t. Habit, habitat, external and internal structure of thallus, Reproduction- vegetative, asexual and sexual- Structure of sex organs, fertilization, structure of mature sporophyte, structure of spore, systematic position with reasons.
- 5.5: Utilization: Bryophytes as ecological indicators, agriculture, fuel, industry and medicine.

(Development of sex organs not expected for all the above mentioned life cycles)

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4. Dube, H.C. (1990). An Introduction to Fungi. Vikas Publishing House Pvt. Ltd., Delhi.
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10. Vashista, B.R., Sinha, A.K. and Singh, V.B. (2005). Botany for degree students- Algae, S. Chand Publication.
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SEMESTER-I: PAPER-II**BO-112: PLANT MORPHOLOGY AND ANATOMY (30 Lectures)****CREDIT-I****15 Lectures (15 hours)****1. MORPHOLOGY:****2 L**

1.1: Introduction, definition, descriptive and interpretative morphology.

1.2: Importance in identification, nomenclature, classification, phylogeny and Plant breeding.

2. MORPHOLOGY OF REPRODUCTIVE PARTS:**2.1: INFLORESCENCE:****3 L**

2.1.1 Introduction and definition

2.1.2 Types:

a) Racemose -Raceme, Spike, Spadix, Corymb, Umbel, Catkin and Capitulum.

b) Cymose -Solitary, Monochasial- Helicoid and scorpioid; Dichasial and Polychasial.

c) Special types -Verticillaster, Cyathium and Hypanthodium.

2.1.3 Significance

2.2: FLOWER:**7 L**

2.2.1 Introduction and definition

2.2.2 Parts of a typical flower: Bract, Pedicel, Thalamus- forms, Perianth- Calyx and Corolla, Androecium and Gynoecium.

2.2.3 Symmetry: Actinomorphic and zygomorphic, Sexuality- Unisexual and bisexual, Insertion of floral whorls on thalamus- Hypogyny, Epigyny and perigyny, Merous condition-Trimerous, tetramerous and pentamerous.

2.2.4 Floral whorls:

a) **Calyx:** Nature- Polysepalous, Gamosepalous; Aestivation- types, Modifications of Calyx- Pappus, Petaloid and Spurred.b) **Corolla:** Forms of Corolla-

i) Polypetalous- Cruciform and Papilionaceous.

ii) Gamopetalous- Infundibuliform, Bilabiate, Tubular and Campanulate.

iii) Aestivation- types and significance.

c) **Perianth:** Nature- Polytepalous, Gamotepalous.d) **Androecium:** Structure of typical stamen, Variations- cohesion and adhesion.e) **Gynoecium:** Structure of typical carpel, number, position, cohesion and adhesion; placentation- types and significance.**2.3: FRUITS:****3 L**

2.3.1 Introduction and definition

2.3.2 Types of fruits:

a) **Simple:** Indehiscent - Achene, Cypsela, Nut and Caryopsis.
Dehiscent - Legume, Follicle and Capsule,b) **Fleshy:** Drupe, Berry, Hesperidium and Pepo.c) **Aggregate:** Etaerio of Berries and Etaerio of Follicles.d) **Multiple fruits:** Syconus and Sorosis.

CREDIT- II**15 Lectures (15 Hours)****3. ANATOMY:****2 L**

3.1 Introduction and definition

3.2 Importance in Taxonomy, Physiology, Ecological interpretations, Pharmacognosy and Wood identification.

4. TYPES OF TISSUES:**8 L**

Outline with brief description, simple and complex tissues.

4.1: **Meristmatic tissues:** Meristem, characters and types based on origin, position and plane of division, functions.4.2: **Permanent tissues:** Simple tissues - parenchyma, collenchymas, chlorenchyma and sclerenchyma.4.3: **Complex/Vascular tissues:** Components of xylem and phloem, types of vascular bundles and functions.4.4: **Epidermal tissues:** Epidermis, structure of typical stomata, trichomes, motor cells; functions.**5. INTERNAL ORGANIZATION OF PRIMARY PLANT BODY:****5 L**

5.1: Internal structure of dicotyledon and monocotyledon root.

5.2: Internal structure of dicotyledon and monocotyledon stem.

5.3: Internal structure of dicotyledon and monocotyledon leaf.

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15. Singh, Gurucharan (2005). Systematics- Theory and Practice. Oxford IBH.
16. Sutaria, R.N.A. Text Book of Systematic Botany.
17. Tayal, M.S. (2012). Plant Anatomy. Rastogi Publications.

BO 113: PRACTICALS BASED ON BO 111 & BO 112 (1.5 CREDITS)

1. Study of Life Cycle of *Spirogyra*. 1 P
2. Study of Life Cycle of *Agaricus*. 1 P
3. Study of Life Cycle of *Riccia* 1 P.
4. Study of forms of Lichens- Crustose, Foliose and fruticose. 1 P
5. Study of Mushroom Cultivation. 1 P
6. One day visit to study Algae, Fungi, Bryophytes and Lichens. 1 P
7. Study of Inflorescence. 2 P
 - a. Racemose: Raceme, Spike, Spadix, Catkin, Corymb, Umbel and Capitulum
 - b. Cymose: Solitary cyme, Uniparous cyme: helicoid and scorpioid, Biparous cyme and Multiparous cyme.
 - c. Special type: Verticillaster, Hypanthodium and Cyathium.
8. Study of flower with respect to Calyx, Corolla and Perianth, Androecium and Gynoecium. 2 P
9. Study of fruits with suitable examples. 2 P
 - a) Simple fruit: Dry: Achene, Cypsella and Legume; Fleshy: Berry and Drupe.
 - b) Aggregate fruit: Etaerio of follicles and Etaerio of Berries.
 - c) Multiple fruit: Syconus and Sorosis.
10. Study of internal primary structure of dicotyledonous root and stem e.g. Sunflower. 1 P
11. Study of internal primary structure of monocotyledonous root and stem e.g. Maize. 1 P
12. Study of internal primary structure of dicotyledonous and monocotyledonous leaf e.g. Sunflower and Maize. 1 P

SEMESTER-II: PAPER-I**BO-121: PLANT LIFE AND UTILIZATION-II (30 Lectures)****CREDIT-I****15 Lectures (15 hours)**

- 1. INTRODUCTION:** Introduction to plant diversity- Pteridophytes, Gymnosperms and Angiosperms with reference to vascular plants. 3 L
- 2. PTERIDOPHYTES:** General characters, Outline classification according to Sporne (1976) up to classes with reasons. Life cycle of *Nephrolepis* w.r.t. Habit, habitat, distribution, morphology, anatomy of stem and leaf, Reproduction – vegetative and sexual. 10 L
- 3. Utilization and economic importance of Pteridophytes.** 2 L

CREDIT-II**15 Lectures (15 hours)**

- 1. GYMNOSPERMS:** General characters, Outline classification according to Sporne (1977) up to classes with reasons. Life cycle of *Cycas* w.r.t. Habit, Habitat, Distribution, Morphology and Anatomy of Stem, leaf and reproductive organs- Male cone, Microsporophyll, microspores and megasporophyll, megaspore; structure of seed; Utilization and economic importance of gymnosperms. 8 L
- 2. ANGIOSPERMS:** General characters, Outline of classification of Bentham and Hooker's system up to series, comparative account of monocotyledons and dicotyledons. 4L
- 3. Utilization and economic importance of Angiosperms:** In food, fodder, fibers, horticulture and medicines. 3L

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1. Bendre, Ashok and Kumar, Ashok (1993). A Text Book of Practical Botany, Rastogy Publications, Meerut.
2. Chamberlain, C.J. (1934). Gymnosperms- Structure and Evolution. Chicago.
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5. Dutta, S.C. (1988). Systematic Botany. Wiley Eastern Ltd., New Delhi.
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16. Sundar Rajan, S. (1999). Introduction to Pteridophyta. New Age International Publishers, New Delhi.
17. Vashishta, P.C., Sinha, A.R. and Kumar, Anil (2006). Gymnosperms. S. Chand and Comp. Ltd. New Delhi.
18. Vashista, B.R., Sinha A.K. and Kumar, A. (2008). Botany for degree students- Pteridophyta, S. Chand and Comp. Ltd. New Delhi.

SEMESTER-II: PAPER-II**BO-122: PRINCIPLES OF PLANT SCIENCE (30 Lectures)****CREDIT-1: PLANT PHYSIOLOGY AND CELL BIOLOGY****15 Lectures (15 Hours)**

1. Introduction, definition and scope of plant physiology. 1 L
2. Diffusion – definition, importance of diffusion in plants, imbibition as a special type of diffusion. 1 L
3. Osmosis – definition, types of solutions (hypotonic, isotonic, hypertonic), endosmosis, exo-osmosis, osmotic pressure, turgor pressure, wall pressure, importance of osmosis in plants. 2 L
4. Plasmolysis – definition, mechanism and significance. 1 L
5. Plant growth - introduction, phases of growth, factors affecting growth, 2 L
6. Structure of plant cell, differences between prokaryotic and eukaryotic cell. 2 L
7. Plant cell wall – components of primary cell wall, structure and functions. 1 L
8. Ultrastructure and functions of chloroplast 2 L
9. Cell cycle in plants- importance of cell cycle in plants, divisional stages of mitosis and meiosis. 3 L

CREDIT-II: MOLECULAR BIOLOGY**(15 Lectures) 15 Hours**

1. Introduction and scope of molecular biology, central dogma of molecular biology. 2 L
2. Structure of DNA, nucleoside and nucleotide 2 L
3. Watson Crick model of DNA and its characteristic features, types of DNA (A, B and Z DNA). 3 L
4. Types of chromosomes. 2 L
5. Structure and types of RNA. 3 L
6. DNA replication- Types of replication (conservative, semi-conservative and dispersive), enzymes involved, leading and lagging strands, Okazaki fragments. 3 L

REFERENCES:

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13. Watson, James D., Baker, Tania; Bell, Stephen P.; Alexander Gann; Levine, Michael and Lodwick, Richard (2008). Molecular Biology of the Gene. 6th Edition, Pearson Education, Inc. and Dorling Kindersley Publishing, Inc. USA.
14. Weaver, R. (2011). Molecular Biology. 5th Edition, Publisher- McGraw Hill Science. USA.

BO 123: PRACTICALS BASED ON BO 121 & BO 122 (1.5 CREDITS)

1. Study of life cycle of <i>Nephrolepis</i> .	1 P
2. Study of life cycle of <i>Cycas</i> .	1 P
3. Study of Bentham and Hooker's system of classification outline up to series with example	1 P
4. Study of comparative account of Dicotyledonous and Monocotyledonous plants w.r.t to external morphological characters.	1 P
5. Study of utilization and economic importance of Angiosperms- food, fodder, fibers, horticulture and medicines.	1 P
6. One day visit to study diversity of vegetation.	2 P
7. To observe characteristic features of prokaryotic and eukaryotic plant cell.	1 P
8. Staining of suitable nuclear material by Basic Fuchsin	1 P
9. Study of mitosis- preparation of slides using onion root tips to observe divisional stages.	1 P
10. Study of meiosis- preparation of slides using <i>Tradescantia</i> / <i>Rhoeo</i> / Maize / Onion flower buds to observe divisional stages.	2 P
11. Estimation of chlorophyll-a and chlorophyll-b by using suitable plant material.	1 P
12. Plasmolysis- endosmosis, exosmosis, incipient plasmolysis using <i>Rhoeo</i> leaf peeling and Demonstration of Osmosis- curling experiment.	1 P
13. Study of DPD by using suitable plant sample	1 P



Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Microbiology

(Faculty of Science & Technology)

F. Y. B. Sc. (Microbiology)

2019 Pattern

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020

Title of the Course: B. Sc. (Microbiology)

Preamble:

Microbiology is a broad discipline of biology which encompasses five groups of microorganisms i.e., bacteria, protozoa, algae, fungi, viruses. It studies their interaction with their environments as well as how these organisms are harnessed in human endeavour and their impact on society. The study has its extensions in various other conventional and advanced fields of biology by employing microbes as study models. Since inception of microbiology as a branch of science, it has remained an ever-expanding field of active research, broadly categorized as pure and applied science. Microorganisms were discovered over three fifty years ago and it is thought that a huge diversity yet remains to be explored.

Knowledge of different aspects of Microbiology has become crucial and indispensable to the society. Study of microbes has become an integral part of education and human progress. There is a continuous demand for microbiologists as work force – education, industry and research. Career opportunities for the graduate students are available in industry and research equally.

Introduction:

In the post globalization world higher education has to play a significant role in creation of skilled human resources for the well-being of humanity. The barriers among the academic fields seem to have dissolved. However, the disparities in the field of curriculum aspect, evaluation and mobility exist. With the changing scenario at local and global level, the syllabus restructuring should keep pace with developments in the education sector. Choice Based Credit System (CBCS) is being adopted and implemented to address the issues related to traditional system and it also aims to maintain the best of earlier curriculum. The student is at the centre of CBCS. The present curriculum focuses on students' needs, skill development, interdisciplinary approach to learning and enhancing employability.

Microbiology curricula are offered at two levels viz. undergraduate and postgraduate. The undergraduate curricula are prepared to impart basic knowledge of the respective subject from all possible angles. In addition, students are to be trained to apply this knowledge in day-to-day applications and to get a glimpse of research.

Objectives to be achieved:

- To enrich students' knowledge and train them in the pure microbial sciences
- To introduce the concepts of application and research in Microbiology
- To inculcate sense of scientific responsibilities and social and environment awareness
- To help students build-up a progressive and successful career

Course Structure:

- For First year: Student has to select 4 different subjects among the subjects offered by the College /Institute.
- For Second year: Student has to select 3 different subjects among 4 subjects chosen in first year.
- For Third year: Student has to select only 1 subject among the 3 subjects opted in second year.
- CGPA will be calculated based on core 132 credits only.
- Each theory credit is equivalent to 15 clock hours of teaching (12 hrs classroom+3 hrs of tutorials-active learning method) and each practical credit is equivalent to 30 clock hours of teaching in a semester.
- For the purpose of computation of workload, the following mechanism may be adopted as per UGC guidelines:
 - Each theory Lecture time for FY, SY, TY is of 1 lecture = 50 min
 - Each practical session time for FY is of 3-hour 15 min = 195 min
 - Each practical session time for SY & TY is of 4-hour 20 min = 260 min

Eligibility for Admission:**First Year B.Sc.:**

- a. Higher Secondary School Certificate (10+2) or its equivalent Examination with English and Biology; and two of the science subjects such as Physics, Chemistry, Mathematics, Geography, Geology, etc.

OR

- b. Three Years Diploma in Pharmacy Course of Board of Technical Education conducted by Government of Maharashtra or its equivalent.

OR

- c. Higher Secondary School Certificate (10+2) Examination with English and vocational subject of + 2 level (MCVC) - Medical Lab. Technician (Subject Code = P1/P2/P3)

Admissions will be given as per the selection procedure / policies adopted by the respective college keeping in accordance with conditions laid down by the University of Pune.

Reservation and relaxation will be as per the Government rules.

Medium of Instruction: English

Award of Credits:

- Each course having 4 credits shall be evaluated out of 100 marks and student should secure at least 40 marks to earn full credits of that course.
- Each course having 2 credits shall be evaluated out of 50 marks and student should secure at least 20 marks to earn full credits of that course.
- GPA shall be calculated based on the marks obtained in the respective subject, provided that student should have obtained credits for that course.

Evaluation Pattern:

- Each course carrying 100 marks shall be evaluated with Continuous Assessment (CA) and University Evaluation (UE) mechanism.
- Continuous assessment shall be of 30 marks while University Evaluation shall be of 70 marks. To pass in a course, a student has to secure minimum 40 marks provided that he should secure minimum 28 marks in University Evaluation (UE).
- Each course carrying 50 marks shall be evaluated with Continuous Assessment (CA) and University Evaluation (UE) mechanism.
- Continuous assessment shall be of 15 marks while University Evaluation shall be of 35 marks.
- To pass in a course, a student has to secure minimum 20 marks provided that he/she should secure minimum 14 marks in University Evaluation (UE).
- For Internal examination minimum two tests per paper of which one has to be a written test 10 marks
- Methods of assessment for Internal exams: Seminars, Viva-voce, Projects, Surveys, Field visits, Tutorials, Assignment, Group Discussion, etc (on approval of the head of the centre)

ATKT Rules:

- Minimum number of credits required to take admission to Second Year of B. Sc.: 22
- Minimum number of credits required to take admission to Third Year of B.Sc.: 44

1. In addition to the compulsory credits of 132, the student has to earn additional 8 credits from following groups by taking/participating/conducting respective activities.
2. Courses in Group-I are compulsory.
3. The student can earn maximum 04 credits from an individual group from Group 2 to Group-9. These extra credits will not be considered for GPA calculation; however, these are mandatory for the completion and award of B. Sc. Degree.

Group 1: Physical Education (at F. Y.B. Sc. Sem. I)-01 credit

Physical Education (at F. Y.B. Sc. Sem. II)-01credit (Note: Group I is compulsory for all the students as stated above.)

Group 2: Sport representation at Collegelevel-01 credit

Sport representation at University/Statelevel-02 credits

Group 3: National Social Service Scheme (participation in Camp): 01 credits

N.C.C. (with participation in annual camp)-01credit

N. C. C. (with B certificate/C certificate award)-02 credits

N.S.S./N.C.C. Republicdayparadeparticipation-04 credits

Group 4: Avishkar participation; Extension activity participation, Cultural activity participation-01 credit, Avishkar selection at University level-02 credits.

Avishkar winner at state level-04credits

Group 5: Research paper presentation at State/National level-01 credits. Research paper presentation at international level-02 credits

Group 6: Participation in Summer school/programme; Short term course (not less than 1-week duration) -03 credit.

Group 7: Scientific Survey, Societal survey, -02 credits.

Group 8: Field Visits; Study Tours; Industrial Visits; Participation in curricular/ co curricular competitions -01 Credit.

Group 9: Online certificate Courses /MOOC Courses/ Career Advancement Course up to 04 credits (Minimum10 Hrs. / credit)

Completion of Degree Course:

- A student who earns 140 credits, shall be considered to have completed the requirements of the B. Sc. degree program and CGPA will be calculated for such student.

Titles of Papers and Scheme of Study Evaluation**F. Y. B.Sc. Microbiology**

Semester	Paper Code	Paper	Paper title	Credits	Lectures/Week			Evaluation		
					Th.	Tut.	Pr.	CA	UE	Total
I	MB 111	I	Introduction to Microbial World	2	2			15	35	50
	MB 112	II	Basic Techniques in Microbiology	2	2			15	35	50
	MB113	III	Practical Course based on theory papers MB 111 and MB112	1.5			3	15	35	50
II	MB121	I	Bacterial Cell and Biochemistry	2	2			15	35	50
	MB122	II	Microbial cultivation and growth	2	2			15	35	50
	MB123	III	Practical Course based on theory papers MB121 and MB122	1.5			3	15	35	50

S. Y. B. Sc. Microbiology

Semester	Paper Code	Paper	Paper title	Credits	Lectures/Week			Evaluation		
					Th	Tut	Pr.	CA	UE	Total
III	MB 231	I	Medical Microbiology and Immunology	2	2			15	35	50
	MB 232	II	Bacterial Physiology and Fermentation	2	2			15	35	50
	MB 233	III	Practical Course based on theory papers MB 231 and MB 232	2			4	15	35	50
IV	MB 241	I	Bacterial Genetics	2	2			15	35	50
	MB 242	II	Air, Water and Soil Microbiology	2	2			15	35	50
	MB 243	III	Practical Course based on theory papers MB241 and MB 242	2			4	15	35	50

**T. Y. B. Sc. Microbiology Proposed Structure
Semester V**

Semester	Theory/ Practical / Skill Enhancement	Paper	Paper Title	Marks	Lecture
Sem V	Discipline Specific Elective Course Theory	MB 351 TC	Medical Microbiology- I	50	2 Credits /per TC
		MB 352 TC	Immunology- I	50	
		MB 353 TC	Enzymology	50	
		MB 354 TC	Genetics	50	
		MB 355 TC	Fermentation technology- I	50	
		MB 356 TC	Agricultural Microbiology	50	
	Discipline Specific Elective Course Practical	MB 357 PC	Practical Course I	50	2 Credits /per PC
		MB 358 PC	Practical Course II	50	
		MB 359 PC	Practical Course III	50	
	Skill Enhancement course	MB 3510	Marine microbiology	50	2 Credits
		MB 3511	Dairy Microbiology	50	2 Credits
Sem VI	Discipline Specific Elective Course Theory	MB 361 TC	Medical Microbiology- II	50	2 Credits /per TC
		MB 362 TC	Immunology- II	50	
		MB 363 TC	Metabolism	50	
		MB 364 TC	Molecular Biology II	50	
		MB 365 TC	Fermentation technology II	50	
		MB 366 TC	Food Microbiology	50	
	Discipline Specific Elective Course Practical	MB 367 PC	Practical Course I	50	2 Credits /per PC
		MB 368 PC	Practical Course II	50	
		MB 369 PC	Practical Course III	50	
	Skill Enhancement courses	MB 3610	Waste management	50	2 Credits
		MB 3611	Nanobiotechnology	50	2 Credits

Equivalence of Previous Syllabus: F. Y. B. Sc. Microbiology

Semester	Old Course (2013 Pattern)		New Course (2019 Pattern)	
	Course Number	Course title	Course Number	Course title
I	Theory Paper I	Introduction to Microbiology	MB 111	Introduction to Microbial World
	Theory Paper II	Basic Techniques in Microbiology	MB 112	Basic Techniques in Microbiology
	—	Practical Course (Term I & II)	MB 113	Practical Course based on theory paper I (MB 111) and Paper II (MB 112)
II	Theory Paper I	Introduction to Microbiology	MB 121	Bacterial Cell and Biochemistry
	Theory Paper II	Basic Techniques in Microbiology	MB 122	Microbial cultivation and growth
	—	Practical Course (Term I & II)	MB 123	Practical Course based on theory paper I (MB 121) and Paper II (MB 122)

External Students

There shall be no external students.

University Terms

Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 80 percent attendance at theory and practical course and satisfactory performance during the term.

Current curriculum orientation

To accommodate more advanced topics in the syllabi, it is necessary to understand the basic science knowledge level of the students that have chosen the Microbiology discipline. Curricula of courses of state and central boards of higher secondary level were reviewed to avoid reiterations of previous syllabi.

At **first year of under-graduation**, students will be provided the basic includes – characteristics of microbial world. The microorganisms will be studied on morphological, structural characterization, isolations techniques from natural

environments and their prominent features. The methodology to develop keen observation i.e., different microscopy techniques, staining techniques and nutritional requirements will be taught in detail, including these aspects at laboratory level as well. Introduction to biochemical characterization of components of micro-organism e.g., proteins, lipids, nucleic acids and carbohydrates and instrumental techniques to estimate these components qualitatively and quantitatively from micro-organisms or other natural sources will be the focus for second theory paper. Relevant experimentation on these topics will be included in practical course. In practical course, students will be trained in preparing laboratory manuals, standard operating practices and logbooks.

At **second year under-graduation** includes paper on principles of taxonomy and classification of major groups of microorganisms. The said paper will also include the physiological studies on these groups of micro-organisms. Second paper will deal with Air and Water Microbiology; role of micro-organisms in environment in regard to pollution and biodegradation; water and sewage treatment. Practical for the second-year students will be designed to be flexible incorporating project themes on environment, agriculture and pollution aspects to acquire laboratory skills. Practical at this level will also include application of biostatistics principles, computers for data analysis, interpretation, introduction to scientific writing and report preparation. These aspects can be better while carrying out the mini projects.

At **third year under-graduation**, the six theory papers will deal with broad areas of microbiology. Five such areas are – Medical microbiology, Microbial physiology, Microbial (prokaryotic and eukaryotic) genetics, Immunology and Fermentation technology. The sixth course will be Applied Microbiology that will include – Dairy Microbiology, Food Microbiology, Fermentation Technology, Agriculture Biotechnology, Fungal Biotechnology, etc. The practicals at third year will be planned more intensively, with exposure to applied fields and hands-on training.

Qualification of Teachers:

With minimum undergraduate and postgraduate degree in Microbiology (B. Sc. and M. Sc. Microbiology) and qualified as per UGC regulations.

Semester I
MB 111: Introduction to Microbial World

Credit	Topic	No. of Lectures (36)
Credit I	1. Amazing world of Microbiology	
	a. Development of microbiology as a discipline -Discovery of microscope and Microorganisms (Anton von Leeuwenhoek and Robert Hooke), Abiogenesis v/s biogenesis (Aristotle's notion about spontaneous generation, Francesco Redi's experiment, Louis Pasteur's & Tyndall's experiments)	4
	b. Golden Era of Microbiology	
	i. Contributions of - Louis Pasteur (Fermentation, Rabies, Pasteurization and Cholera vaccine-fowl cholera experiment) Robert Koch (Koch's Postulates, Germ theory of disease, Tuberculosis and Cholera-isolation and staining techniques of causative agent) Ferdinand Cohn (Endospore discovery)	4
	ii. Discovery of viruses (TMV and Bacteriophages), River's Postulates, Contribution of Joseph Lister (antiseptic surgery), Paul Ehrlich (Chemotherapy), Elie Metchnikoff (Phagocytosis), Edward Jenner (Vaccination) and Alexander Fleming (Penicillin) in establishment of fields of medical microbiology and immunology, Discovery of Streptomycin by Waksman	4
	iii. Contribution of Martinus W. Beijerinck (Enrichment culture technique, Rhizobium), Sergei N. Winogradsky (Nitrogen fixation and Chemo-lithotrophy) in the development of the field of soil microbiology	2
	c. Modern Era of Microbiology	2
	Carl Woese classification based on 16S r RNA Signification and Application of Human Microbiome, Nano-biotechnology and Space Microbiology	
	d. Nobel laureates in Life Sciences of 21st Century	2
	<i>(Project Based Learning: Assignments should be given to students)</i>	

Credit II	2. Types of Microorganism and their differentiating characters a. Prokaryotes, Eukaryotes, three domain and five domain system of classification b. Bacteria (Eubacteria and Archaeobacteria) c. Protozoa d. Fungi e. Algae f. Viruses, Viroids and Prions g. Actinomycetes 3. Beneficial and Harmful effects of microorganisms: a. Medical Microbiology (Enlist diseases caused by various microorganisms, vaccines and antibiotics) b. Environmental Microbiology (Eutrophication, red tide, Sewage treatment, bioremediation) c. Food and Dairy Microbiology (Food spoilage, food borne diseases, Probiotics and fermented food) d. Agriculture Microbiology (Plant diseases and Biofertilizers and Bio-control agents) e. Industrial Microbiology (Production of antibiotics, enzymes, solvents and contaminants-bacteria and phages) f. Immunology (Normal flora, Three lines of defence)	 2 1 1 1 1 2 1 1 2 1 1 2 2

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Semester I

MB 112: Basic Techniques in Microbiology

Credit	Topic	No. of Lectures (36)
I	1. Units of measurement – Introduction to Modern SI units	1
	2. Microscopy	
	a. Bright field microscopy:	3
	• Electromagnetic spectrum of light • Structure, working of and ray diagram of a compound light microscope; concepts of magnification, numerical aperture and resolving power. • Types, ray diagram and functions of – condensers (Abbe and cardioid) eyepieces and objectives • Concept of aberrations in lenses - spherical, chromatic, comma and astigmatism	
	b. Principle, working and ray diagram of	
	• Phase contrast microscope • Fluorescence Microscopy • Electron Microscopy – TEM, SEM	2 1 3

	3. Staining Techniques: a. Definition of Stain; Types of stains (Basic and Acidic), Properties and role of Fixatives, Mordants, Decolourisers and Accentuators 2 b. Monochrome staining and Negative (Relief) staining 1 c. Differential staining - Gram staining and Acid-fast staining 2 d. Special staining- Capsule, Cell wall, Spore, Flagella, Lipid granules, metachromatic granules 3	
II	4. Sterilization and Disinfection a. Sterilization - Physical Agents - Heat, Radiation, Filtration 3 - Checking of efficiency of sterilization (Dry and Moist) – Biological and Chemical Indicators 4 b. Disinfection: - Chemical agents and their mode of action - Aldehydes, Halogens, Quaternary ammonium compounds, Phenol and phenolic compounds, 4 - Heavy metals, Alcohol, Dyes, Detergents and Ethylene oxide. 4 - Characteristics of an ideal disinfectant 1 - Checking of efficiency of disinfectant - Phenol Coefficient (Rideal–Walker method) 2	

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F. Y. B. Sc. Microbiology Practicals Syllabus

Semester I Practical Course MB 113 (Implemented from 2019) Based on theory paper I (MB 111) and Paper II (MB 112)		
Expt. No.	Topics	No. of Practicals
1	a. Safety measures and Good Laboratory Practices in microbiology laboratory. b. Introduction, operation, precautions and use of common microbiology laboratory instruments: Incubator, Hot air oven, Autoclave, Colorimeter, Laminar air flow hood, Clinical centrifuge.	2
2	a. Construction (mechanical and optical), working and care of bright field microscope. b. Permanent slide observation: Algae, Fungi and Protozoa c. Wet mount slide preparation and its observation for: Bacteria, Algae, Fungi and Protozoa.	3
3	a. Introduction and use of common laboratory glass wares: Test tubes, culture tubes, suspension tubes, screw capped tubes, Petri plates, pipettes (Mohr and serological) micropipettes, Pasteur pipettes, Erlenmeyer flask, volumetric flask, glass spreader, Durham's tube, Cragie's tube and inoculating needles (wire loop, stab needles). b. Learning basic techniques in Microbiology: Wrapping of glassware, cotton plugging, cleaning and washing of glassware, biological waste disposal.	2
4	Basic staining techniques: a. Monochrome staining b. Negative staining c. Gram staining of bacteria	3
5	Observation of motility in bacteria using: Hanging drop method and swarming growth method.	2
6.	Checking of efficacy of chemical disinfectant: Phenol Coefficient by Rideal-Walker method.	2
	TOTAL	

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Semester II
MB 121: Bacterial Cell and Biochemistry

Credits	Topic	No. of Lectures (36)
I	1. Bacterial Cytology	1
	Microbial cell size, shape and arrangements	
	2. Structure, chemical composition and functions of the following components in bacterial cell:	
	a. Cell wall (Gram positive, Gram negative)	2
	b. Concept of Mycoplasma, Spheroplast, protoplast, L-form	1
	c. Cell membrane	2
	d. Endospore (spore formation and stages of sporulation)	1
	e. Capsule	1
	f. Flagella	2
	g. Fimbriae and Pili	1
	h. Ribosomes	1
II	3. Chemical Basis of Microbiology	
	a. Atom, Biomolecules, types of bonds (covalent, co-ordinate bond, non-covalent) and linkages (ester, phospho-diester, peptide, glycosidic)	2
	b. Chemistry of Biomolecules: Structure, organization and functions	1
	4. Carbohydrates: Definition, classification	
	a. Monosaccharides: Classification based on aldehyde and ketone groups; structure of Ribose, Deoxyribose, Glucose, Galactose and Fructose.	1
	b. Disaccharides: Glyosidic bond, structure of lactose and sucrose.	1
	c. Polysaccharides: Structure and types	
	Examples-Starch, glycogen, Peptidoglycan, chitin	

	5. Lipids: Definition, classification a. Simple lipids – Triglycerides, Fats and oils, waxes. b. Compound lipids – Phospholipid, Glycolipids c. Derived lipids – Steroids, Cholesterol 6. Proteins: Definition, classification a. General structure of amino acids, peptide bond. b. Types of amino acids based on R group c. Structural levels of proteins: primary, secondary, tertiary and quaternary d. Study of Hemoglobin, flagellin and cytoskeletal proteins 7. Nucleic acids: Definition, classification a. DNA – structure and composition b. RNA – Types (m-RNA, t-RNA, r-RNA), structure and functions. 8. Classification of Bacteria: Introduction to Bergey's Manual of Determinative and Systemic Bacteriology 9. Classification of Viruses: ICTV nomenclature	2 1 1 1 1 2 2 1

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Semester II
MB 122: Microbial cultivation and growth

Credit	Topic	No. of Lectures (36)
I	1. Cultivation of Microorganisms:	
	a. Nutritional requirements and nutritional classification.	3
	b. Design and preparation of media: Common ingredients of media and types of media.	3
	c. Methods for cultivating photosynthetic, extremophilic and chemo-lithotrophic bacteria, anaerobic bacteria, algae, fungi, actinomycetes and viruses.	4
	d. Concept of Enrichment, Pure Culture, Isolation of culture by streak plate, pour plate, spread plate.	3
	e. Maintenance of bacterial and fungal cultures using different techniques.	3
	f. Culture collection centres and their role.	1
	g. Requirements and guidelines of National Biodiversity Authority for culture collection centres.	1
II	2. Bacterial growth:	
	a. Kinetics of bacterial growth (Exponential growth model)	3
	b. Growth curve and Generation time	2
	c. Diauxic growth	1
	d. Measurement of bacterial growth- Methods of enumeration:	4
	e. Microscopic methods (Direct microscopic count, counting cells using improved Neubauer, Petroff-Hausser's chamber)	
	f. Plate counts (Total viable count)	

g.	Turbidometric methods (including Nephelometry)	1
h.	Estimation of biomass (Dry mass, Packed cell volume)	1
i.	Chemical methods (Cell carbon and nitrogen estimation)	1
j.	Factors affecting bacterial growth [pH, Temperature, Solute Concentration (Salt and Sugar)] and Heavy metals.	4

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Semester II Practical Course MB 123 based on theory paper I (MB 121) and Paper II (MB 122)		
Expt. No.	Topics	No. of Practicals
1	i. Preparation of simple laboratory nutrient media (Nutrient agar/broth, MacConkey's agar).	1
	ii. Checking sterilization efficiency of autoclave using a biological indicator (<i>B. stearothermophilus</i>)	1
	iii. Preparation of Winogradsky's column and observation of different types of microorganisms using bright field microscope.	1
2	Special staining techniques: i. Endospore staining ii. Capsule staining	2
3	Isolation of bacteria: Streak plate technique (Colony and cultural characteristics)	1
4	Enumeration of bacteria from fermented food / soil / water by: i. Spread plate method ii. Pour plate method	2
5	Study of normal flora of skin: i. Cultivating and observing different morpho-forms of bacteria from skin. ii. Study of effect of washing on skin with soap and disinfectant on it's microflora.	2
6	To study the effect of different parameters on growth of <i>E. coli</i>: i. pH, temperature, sodium chloride concentration ii. Study of oligodynamic action of heavy metal	3
7	Preservation of cultures on: Slants, soil and on grain surfaces; revival of these cultures and lyophilized cultures.	1
	TOTAL	14

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2. Atlas R. M. (2010). Handbook of Microbiological Media. Ukraine: Taylor and Francis.
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5. Jain A., Agarwal J. and Venkatesh V. (2018). Microbiology Practical Manual. 1st Edition. E-Book. Elsevier Health Sciences, India.
6. Karwa A. S., Rai M. K. and Singh H. B. (2012). Handbook of Techniques in Microbiology: A Laboratory Guide to Microbes. Scientific Publishers, Jodhpur, Rajasthan, India
7. Kumar V. (2012). Laboratory Manual of Microbiology. India: Scientific Publishers.
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Savitribai Phule Pune University [SPPU]

B.Sc. (Chemistry)

(Three Years Integrated Degree Program)

Choice Based Credit System [CBCS]

From Academic Year

2019-2020

First Year (F.Y. B. Sc.)

Board of Studies (Chemistry)

Savitribai Phule Pune University [SPPU]

Pune-41107

Structure of F. Y. B. Sc. Chemistry

Semester	Course	Discipline Specific Core Course (DSCC)*
I	Theory	CH-101 : Physical Chemistry (2 credit , 36 L)
	Theory	CH-102 : Organic Chemistry (2 credit, 36 L)
	Practical	CH-103 : Chemistry Practical –I (1.5 Credit, 46.8 L)
II	Theory	CH-201 :Inorganic Chemistry (2 credit , 36 L)
	Theory	CH-202 : Analytical Chemistry (2 credit, 36 L)
	Practical	CH-203 : Chemistry Practical –II (1.5 Credit, 46.8 L)

***N.B.:**

- Each lecture (L) will be of 50 minutes.
- Each practical of 3h 15 min and 12 practicals per semester
- 12 weeks for teaching 03 weeks for Contentious assessments
- For details refer UG rules and regulations (CBCS for Science program under science & Technology) given in Appendix

Savitribai Phule Pune University, Pune

F.Y.B.Sc. Chemistry Syllabus

(CBCS Semester Pattern)

From Academic Year 2019-2020

Equivalence with Previous Syllabus

New Course (2019 Semester Pattern) (50 min /L)	Old Course (2013 Annual Pattern) (48 min /L)
CH-101 : Physical Chemistry (2 credit , 36 L) 50 Marks	Paper I : Physical and Inorganic Chemistry (72 L) 100 Marks
CH-201 :Inorganic Chemistry (2 credit , 36 L) 50 Mark	
CH-102 : Organic Chemistry (2 credit, 36 L) 50 Marks	Paper II : Organic and Inorganic Chemistry (72 L) 100 Marks
CH-202 : Analytical Chemistry (2 credit, 36 L) 50 Marks	
CH-103 : Chemistry Practical-I (1.5 Credit, 46.8 L) 50 Marks	Paper III : Chemistry Practical 100 Marks
CH-203 : Chemistry Practical-II (1.5 Credit, 46.8L) 50 Marks	

Preamble:

The syllabus of Chemistry for First year has been redesigned for Choice based Credit System (CBCS) to be implemented from 2019-2020.

In CBCS pattern semester system has been adopted for FY, SY and TY which includes Discipline Specific Core Course (DSCC) at F Y level, Ability Enhancement Compulsory Course (AECC), Discipline Specific Elective Course (DSEC) and Skill Enhancement Course (SEC). DSCC courses have been introduced at FY level and AECC courses at SY level along with DSEC. At TY level DSEC and SEC courses have been introduced.

Syllabus for Specific Core Courses of Chemistry (2 Theory and 1 Practical) subject for F. Y. B. Sc. is to be implemented from the year 2019-20. Syllabus for S. Y. and T. Y. B. Sc. will be implemented from the year 2020-21 and 2021-22 respectively as per structure approved.

Learning Objectives:

1. To understand basic concept of physical, organic and Inorganic chemistry.
2. To impart practical skills and learn basics behind experiments.
3. To prepare background for advanced and applied studies in chemistry.

SEMESTER-I

CH- 101: Physical Chemistry (2 Credits, 36 Lectures of 50 min.)

1. Chemical Energetics

Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation. Statement of Third Law of thermodynamics and calculation of absolute entropies of substances, problems [11]

2. Chemical Equilibrium:

Introduction: Free Energy and equilibrium - Concept, Definition and significance

The reaction Gibbs Energy, Exergonic and endergonic reaction. The perfect gas equilibrium, the general case of equilibrium, the relation between equilibrium constants, Molecular interpretation of equilibrium constant. The response of equilibria to conditions- response to pressure, response to temperature, Van't Hoff equation, Value of K at different temperature, Problems [11]

3. Ionic Equilibria

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts– applications of solubility product principle. [14]

Learning Outcome

1. Chemical Energetics

1. Students will be able to apply thermodynamic principles to physical and chemical process
2. Calculations of enthalpy, Bond energy, Bond dissociation energy, resonance energy
3. Variation of enthalpy with temperature –Kirchhoff's equation
4. Third law of thermodynamic and its applications

2. Chemical Equilibrium

Knowledge of Chemical equilibrium will make students to understand

1. Relation between Free energy and equilibrium and factors affecting on equilibrium constant.
2. Exergonic and endergonic reaction
3. Gas equilibrium, equilibrium constant and molecular interpretation of equilibrium constant
4. Van't Hoff equation and its application

3. Ionic equilibria

Ionic equilibria chapter will lead students to understand

1. Concept to ionization process occurred in acids, bases and pH scale
2. Related concepts such as Common ion effect hydrolysis constant, ionic product, solubility product
3. Degree of hydrolysis and pH for different salts, buffer solutions

CH- 102: Organic Chemistry (2 Credits, 36 Lectures of 50 min.)

Fundamentals of Organic Chemistry

Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule. [09]

Stereochemistry

Introduction, classification, Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Conformations with respect to ethane, butane and cyclohexane. Configuration: Geometrical - *cis* – *trans*, and E / Z Nomenclature (for upto two C=C systems). Optical isomerism Enantiomerism, Diastereomerism and Meso compounds). Concept of chirality (upto two carbon atoms). Threo and erythro; D and L; nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) [14]

Aliphatic Hydrocarbons

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Alkanes: (Up to 5 Carbons) *Preparation:* Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation.

Alkenes: (Up to 5 Carbons) *Preparation:* Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); *cis* alkenes (Partial catalytic hydrogenation) and *trans* alkenes (Birch reduction). *Reactions:* *cis*-addition (alk. KMnO_4) and *trans*-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymercuration-demercuration, Hydroboration-oxidation.

Alkynes: (Up to 5 Carbons) *Preparation:* Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalide *Reactions:* formation of metal acetylides, addition of bromine and alkaline KMnO_4 , ozonolysis and oxidation with hot alk. KMnO_4 . [13]

Learning Outcome

1. The students are expected to understand the fundamentals, principles, and recent developments in the subject area.
2. It is expected to inspire and boost interest of the students towards chemistry as the main subject.
3. To familiarize with current and recent developments in Chemistry.
4. To create foundation for research and development in Chemistry.

Reference Books

1. Graham Solomon, T.W., Fryhle, C.B. & Snyder, S.A. *Organic Chemistry*, John Wiley & Sons (2014).
 2. McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
 3. Sykes, P. *A Guidebook to Mechanism in Organic Chemistry*, Orient Longman, New Delhi (1988).
 4. Eliel, E.L. *Stereochemistry of Carbon Compounds*, Tata McGraw Hill education, 2000.
 5. Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
 6. Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.
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 8. Samuel Glasstone, *Thermodynamics for Chemists*, Affiliated East West Private Limited.
 9. B S Bahl, G D Tuli, Arun Bahl, *Essentials of Physical Chemistry*
 10. Peter Atkins and Julio de Paula, *Elements of Physical Chemistry*, Sixth edition (2013), Oxford press
 11. Ball D. W., *Physical Chemistry*, Thomson Press , India (2007)
 12. Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
 13. Atkins' *Physical Chemistry –Thermodynamics and Kinetics*, 11th Edition, Oxford Press
 14. Thomas Engel, Philip Reid; *Physical Chemistry*, Pearson Education (2006)
 15. J. N. Gurtu, A. Gurtu; *Advanced Physical Chemistry*, Pragati Edition
 16. Mortimer R. G., *Physical Chemistry*, 3rd Edition, Elsevier, Noida (UP)
 17. Samuel H. Maron and Carl F. Prutton, *Principles of physical Chemistry*, 4th Edition, Collier Macmillan Ltd.
-

CH- 103: Chemistry Practical Course I

(1.5 Credits, 46.8 Lectures of 50 min.)

Section A: Chemical and Lab Safety (Compulsory)

1. Toxicity of the compounds used in chemistry laboratory.
2. Safety symbol on labels of pack of chemicals and its meaning
3. What is MSDS sheets? Find out MSDS sheets of at least hazardous chemicals ($K_2Cr_2O_7$, Benzene, cadmium nitrate, sodium metal, etc.)
4. Precautions in handling of hazardous substances like Conc. acids, ammonia, organic solvents, etc.

Section B: Physical Chemistry

a. Thermochemistry (Any three)

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO_3 , NH_4Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of ΔH .

b. Ionic equilibria (Two experiments)

1. Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.

OR

1. Measurement of the pH of buffer solutions and comparison of the values with theoretical values.
2. Preparation of buffer solutions (Any One)
 - (i) Sodium acetate-acetic acid and determine its buffer capacity
 - (ii) Ammonium chloride-ammonium hydroxide and determine its buffer capacity

Section C: Organic Chemistry (Five experiments)

1. To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing up to two extra elements) (Three)
2. Separation of constituents of mixtures by Chromatography: Measure the R_f value in each case (Two)
 - (a) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acids) / pigments from plant extract/ 2 organic compounds by paper chromatography
 - (b) Identify and separate the sugars present in the given mixture by paper chromatography.

Note: Combination of two compounds/plant extract to be given

Reference Books:

1. Svehla, G. *Vogel's Qualitative Inorganic Analysis*, Pearson Education, 2012.
2. Mendham, J. *Vogel's Quantitative Chemical Analysis*, Pearson, 2009.
3. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Text book of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
4. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
5. Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R.Chand & Co.: New Delhi (2011).
6. Prof. Robert H. Hill Jr., David C. Finster *Laboratory Safety for Chemistry Students*, 2nd Edition Wiley ISBN: 978-1-119-02766-9 May 2016
7. *Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards*, Updated Version, ISBN 978-0-309-13864-2 | DOI 10.17226/12654, THE NATIONAL ACADEMIES PRESS Washington, D.C.

Learning Outcome

1. Importance of chemical safety and Lab safety while performing experiments in laboratory
 2. Determination of thermochemical parameters and related concepts
 3. Techniques of pH measurements
 4. Preparation of buffer solutions
 5. Elemental analysis of organic compounds (non instrumental)
 6. Chromatographic Techniques for separation of constituents of mixtures
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SEMESTER-II

CH-201: Inorganic Chemistry (2 Credits, 36 Lectures of 50 min.)

1. Atomic Structure

Origin of Quantum Mechanics: Why study quantum mechanics? Quantum mechanics arose out of interplay of experiments and Theory Energy quantization- i) Black body radiation ii) The photoelectric effect iii) Wave particle duality-a) The particle character of electromagnetic radiation b) the wave character of particle, iv) diffraction by double slit v) atomic spectra, Review of-Bohr's theory and its limitations, Heisenberg Uncertainty principle.

Quantum mechanics: Time independent Schrodinger equation and meaning of various terms in it, Significance of ψ and ψ^2 , Schrödinger equation for hydrogen atom. Radial and angular parts of the hydrogenic wavefunctions (atomic orbitals) and their variations for $1s$, $2s$, $2p$, $3s$, $3p$ and $3d$ orbitals (Only graphical representation). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to $1s$ and $2s$ atomic orbitals. Significance of quantum numbers, orbital angular momentum and quantum numbers ml and ms . Shapes of s , p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (ms). [14]

2. Periodic table and Periodicity of Elements

Periodic table: periodic table after 150 years, review on the eve of international year of periodic table[IYPT].

Periodicity of elements: Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations

Long form of periodic table-s, p, d and f block elements,

Detailed discussion of following properties of elements with reference to s and p block

- Effective nuclear charge, shielding or screening effect
- Atomic and ionic radii
- Crystal radii
- Covalent radii
- Ionization energies
- Electronegativity, Pauling's / electronegativity scale
- Oxidation states of elements

[10]

3. Chemical Bonding

Attainment of stable electronic configurations, Types of Chemical bonds: Ionic, covalent, coordinate and metallic bonds

Ionic Bond: General characteristics of ionic bonding, Types of ions, Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the co solubility of ionic compounds. Statement of Born-Landé equation for calculation

Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

Covalent bond: Valence Bond Approach, Hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. VSEPR theory, Assumptions, need of theory, application of theory to explain geometries of molecules such as i) ClF_3 ii) Cl_2O iii) BrF_5 iv) XeO_3 v) XeOF_4 [12]

Learning Outcome

1. Atomic Structure

1. Various theories and principles applied to reveal atomic structure
2. Origin of quantum mechanics and its need to understand structure of hydrogen atom
3. Schrodinger equation for hydrogen atom
4. Radial and angular part of hydrogenic wave functions
5. Significance of quantum numbers
6. Shapes of orbitals

2. Periodicity of Elements

1. Explain rules for filling electrons in various orbitals- Aufbau's principle, Pauli exclusion principle, Hund's rule of maximum multiplicity
2. Discuss electronic configuration of an atom and anomalous electronic configurations.
3. Describe stability of half-filled and completely filled orbitals.
4. Discuss concept of exchange energy and relative energies of atomic orbitals
5. Design Skeleton of long form of periodic table.
6. Describe Block, group, modern periodic law and periodicity.
7. Classification of elements as main group, transition and inner transition elements
8. Write name, symbol, electronic configuration, trends and properties.
9. Explain periodicity in the following properties in details:
 - a. Effective nuclear charge, shielding or screening effect; some numerical problems.
 - b. Atomic and ionic size.
 - c. Crystal and covalent radii
 - d. Ionization energies
 - e. Electronegativity- definition, trend, Pauling electronegativity scale.
 - f. Oxidation state of elements

3. Chemical Bonding

1. Attainment of stable electronic configurations.
2. Define various types of chemical bonds- Ionic, covalent, coordinate and metallic bond
3. Explain characteristics of ionic bond, types of ions, energy consideration in ionic bonding, lattice and solvation energy and their importance in the context of stability and solubility of ionic compounds
4. Summarize Born-Landé equation and Born-Haber cycle,
5. Define Fajan's rule, bond moment, dipole moment and percent ionic character

6. Describe VB approach, Hybridization with example of linear, trigonal, square planer, tetrahedral, TBP, and octahedral.
7. Discuss assumption and need of VSEPR theory.
8. Interpret concept of different types of valence shell electron pairs and their contribution in bonding.
9. Application of non-bonded lone pairs in shape of molecule
10. Basic understanding of geometry and effect of lone pairs with examples such as ClF_3 , Cl_2O , BrF_5 , XeO_3 and XeOF_4 .

CH- 202: Analytical Chemistry (2 Credits, 36 Lectures of 50 min.)

1. Introduction to Analytical Chemistry

What is analytical Chemistry, the analytical perspectives, Common analytical problems. [03]

2. Calculations used in Analytical Chemistry

Some important units of measurements-SI units, distinction between mass and weight, mole, millimole and Calculations, significant figures

Solution and their concentrations- Molar concentrations, Molar analytical Concentrations, Molar equilibrium concentration, percent Concentration, part per million, part per billion, part per thousand, Solution –dilutant volume ration, functions , density and specific gravity of solutions, problems

Chemical Stoichiometry – Empirical and Molecular Formulas, Stoichiometric Calculations, Problems. [10]

3. Qualitative Analysis of Organic Compounds

Types of organic compounds, characteristic tests and classifications, reactions of different functional groups, analysis of binary mixtures.

Analysis – Detection of nitrogen, sulfur, halogen and phosphorous by Lassaigne's test.

Purification of organic compounds- Introduction, recrystallization, distillation, sublimation [05]

4. Chromatographic Techniques –Paper and Thin Layer Chromatography

Introduction- Introduction to chromatography, IUPAC definition of chromatography.

History of Chromatography- paper chromatography, Thin Layer Chromatography, Ion exchange Chromatography, Gas permeation Chromatography, affinity chromatography, Gas chromatography, Supercritical fluid chromatography, High Performance Liquid Chromatography, Capillary electrophoresis, Classification of chromatographic methods – according to separation methods, according to development procedures.

Thin Layer Chromatography: Theory and principles, outline of the method, surface adsorption and spot shape, Comparison of TLC with other forms of chromatography, adsorbents, preparation of plates, application of samples, development.

Paper Chromatography- Origin, overview of technique, sample preparation, types of paper, solvents, equilibrium, development, sample application and detection, Identification, Quantitative methods, applications of paper chromatography

5. pH meter

Introduction, pH meter, Glass pH electrode, combination of pH electrode-Complete Cell, Standard Buffer –reference for pH measurement, Accuracy of pH measurement, Using pH meter –How does it works? Applications of pH meter. [04]

Learning Outcomes**1. Introduction to Analytical Chemistry**

- i. Analytical Chemistry –branch of chemistry
- ii. Perspectives of analytical Chemistry
- iii. analytical problems

2. Calculations used in Analytical Chemistry

- i. Calculations of mole, molar concentrations and various units of concentrations which will be helpful for preparation of solution
- ii. Relation between molecular formula and empirical formula
- iii. Stoichiometric calculation
- iv. Define term mole, millimole, molar concentration, molar equilibrium concentration and Percent Concentration.
- v. SI units, distinction between mass and weight
- vi. Units such as parts per million, parts per billion, parts per thousand, solution-dilutant volume ratio, function density and specific gravity of solutions.

3 Qualitative Analysis of Organic Compounds

Basics of type determination, characteristic tests and classifications, reactions of different functional groups.

- i. Separation of binary mixtures and analysis
- ii. Elemental analysis -Detection of nitrogen, sulfur, halogen and phosphorous by Lassaigne's test.
- iii. Purification techniques for organic compounds.

4. Chromatographic Techniques – Paper and Thin layer Chromatography

- i. Basics of chromatography and types of chromatography
- ii. Theoretical background for Paper and Thin Layer Chromatography

5. pH metry

- i. pH meter and electrodes for pH measurement
- ii. Measurement of pH
- iii. Working of pH meter
- iv. Applications of pH meter

Reference Books:

1. Lee, J.D. *Concise Inorganic Chemistry* ELBS, 1991.
2. Cotton, F.A., Wilkinson, G. & Gaus, P.L. *Basic Inorganic Chemistry*, 3rd ed., Wiley.
3. Douglas, B.E., McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry*, John Wiley & Sons.
4. Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. *Inorganic Chemistry: 1 and Reactivity*, Pearson Education India, 2006.

5. Graham Solomon, T.W., Fryhle, C.B. & Snyder, S.A. *Organic Chemistry*, John Wiley & Sons (2014).
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 10. Bahl, A. & Bahl, B.S. *Advanced Organic Chemistry*, S. Chand, 2010.
 11. A Braithwait and F. J. Smith, *Chromatographic method*, 5th edition, Kluwer Academic publishers
 12. G D Christian -Analytical Chemistry
 13. Qualitative Organic Analysis 4th Edn by A I Vogel (ELBS)
 14. Vogel's Quantitative Analysis
 15. Douglas A Skoog, Donald M West, F James Holler, Stainly R Crouch, *Fundamentals of Analytical Chemistry*, 9th edition
 16. David Harvey, *Modern Analytical Chemistry*, McGraw Hill Higher education
 17. Gurudeep R Chatwal, Sham K Anand, *Instrumental Methods of Chemical Analysis*, Himalaya Publishing House.
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 19. Kotz, J.C., Treichel, P.M. & Townsend, J.R. *General Chemistry* Cengage Learning India Pvt. Ltd., New Delhi (2009).
 20. Mahan, B.H. *University Chemistry* 3rd Ed. Narosa (1998).
 21. Petrucci, R.H. *General Chemistry* 5th Ed. Macmillan Publishing Co.: New York (1985).
 22. Atkins' *Physical Chemistry*, 10th edition (2014), Oxford University Press
 23. Thomas Engel, Philip Reid; *Physical Chemistry*, Pearson Education (2006)
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 25. McQuarrie, D. A., & Simon, J. D., *Physical Chemistry: A molecular approach*. Sausalito, CA: University Science Books (1997)
 26. Atkins, P., & de Paula, J., *Physical Chemistry for the Life Sciences*. New York: W. H. Freeman and Company (2006)
 27. McMahon, D. (2005). *Quantum Mechanics Demystified*. New York: McGraw-Hill Professional
 28. Ladd, M. *Introduction to Physical Chemistry* (3rd ed). Cambridge, UK: Cambridge University Press (1998)
-

CH- 203: Chemistry Practical –II (1.5 Credits, 46.8 Lectures of 50 min.)

Section A: Inorganic Chemistry

Wherever required standardization of volumetric reagent must be performed.

I] Synthesis of commercially important inorganic compounds (any two)

- 1) Synthesis of potash alum from aluminium metal (scrap Aluminium metal)
- 2) Synthesis of Mohr's Salt $[(\text{FeSO}_4)(\text{NH}_4)_2\text{SO}_4] \cdot 6\text{H}_2\text{O}$
- 3) Preparation of Dark red inorganic pigment: Cu_2O
- 4) Synthesis of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

Note:

- i. In synthesized compound student must confirm the particular cation and anion by performing qualitative tests.
- ii. Costing of product for 100 g pack can be calculated on the basis of cost of raw materials used and percent yield of the product.
- iii. Synthesized compounds should be collected from all students and stored properly. They should be used in other experiments such as Mohr's salt for determination of water of crystallization. Potash alum and FeSO_4 can be given in IQA experiments or for estimations at SY and TY level.

II] Volumetric Analysis (Any Two)

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Determination of basicity of boric acid or oxalic acid or citric acid hence determination of their equivalent weight.
3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO_4 .

III] Analysis of Commercial products containing inorganic substances (any two)

- 1) Estimation of Ca from calcium supplementary tablet by complexometric titration.
- 2) Estimation of acid neutralizing capacity of antacids like Gelusil tablet/ Gellusil syrup etc.
- 3) Estimation of selectively Cu(II) from brass alloy by iodometrically (Use KIO_3 as primary standard for standardization of $\text{Na}_2\text{S}_2\text{O}_3$ and **not** $\text{K}_2\text{Cr}_2\text{O}_7$).

IV] To draw polar plots of s and p orbitals.

Section B: Organic Chemistry

I] Organic Purification Techniques

1. Purification of organic compounds by i) crystallization (from water and alcohol) ii) distillation (Two Compounds), iii) Sublimation (micro technique).

II] Organic preparations: Derivatives

2. Preparations: Mechanism of various reactions involved to be discussed. Recrystallization, determination of melting point and calculation of quantitative yields to be done. (Any Two)
 - a) Bromination of Cinnamic acid using sodium bromide and Sodium bromate. (Green Chemistry Approach)

OR

- a) Bromination of acetanilide using KBr and Ceric ammonium nitrate in aqueous medium. (Green Chemistry Approach)
- 3) Semicarbazone derivatives of aldehydes and ketones
- 4) Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone

Note: Presence of extra element in the synthesized compound must be tested (Br and N in respective compound)

N. B.:

1. Use molar concentrations for volumetric /estimations/synthesis experiments.
2. Use optimum concentrations and volumes
3. Two burette method should be used for volumetric analysis (Homogeneous mixtures)
4. Use of microscale technique is recommended wherever possible

Reference Books:

1. Svehla, G. *Vogel's Qualitative Inorganic Analysis*, Pearson Education, 2012.
2. Mendham, J. *Vogel's Quantitative Chemical Analysis*, Pearson, 2009.
3. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
4. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
5. Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).

Learning Outcome

1. Inorganic Estimations using volumetric analysis
2. Synthesis of Inorganic compounds
3. Analysis of commercial products
4. Purification of organic compounds
5. Preparations and mechanism of reactions involved

Course Outcome

CH- 101: Physical Chemistry

After completing the course work learner will be acquired with knowledge of chemical energetics, Chemical equilibrium and ionic equilibria.

CH- 102: Organic Chemistry

Students will learn Fundamentals of organic chemistry, stereochemistry (Conformations, configurations and nomenclatures) and functional group approach for aliphatic hydrocarbons.

CH- 201: Inorganic Chemistry

Students will learn quantum mechanical approach to atomic structure, Periodicity of elements, various theories for chemical bonding.

CH-202: Analytical Chemistry

Students will know about basics of analytical chemistry, some techniques of analysis and able to do calculations essential for analysis.

Lab Course CH 103 and CH-203

1. The practical course is in relevance to the theory courses to improve the Understanding of the concepts.
 2. It would help in development of practical skills of the students.
 3. Use of microscale techniques wherever required
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Savitribai Phule Pune University

(Formerly University of Pune)

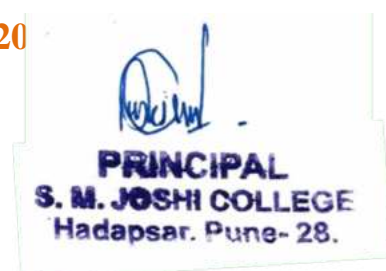
Three Year B.Sc. Degree Program in Geography

(Faculty of Science & Technology)

F.Y.B.A. (Geography)

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-20



Title of the Course: B.A. (Geography)

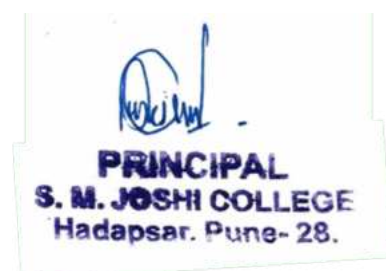
Preamble for the Syllabus:

Savitribai Phule Pune University has decided to change the syllabi of various faculties from June, 2019. Taking into consideration the rapid changes in arts & Humanities aches in different areas of Geography and related subjects board of studies in Geography with concern of teachers of Geography from different colleges affiliated to Savitribai Phule Pune University has prepared the syllabus of F.Y.B.A. Geography. To develop the syllabus the U.G.C. Model curriculum is followed.

Preamble: This paper intends to acquaint the students with various dimensions of Physical Geography, and its challenges. The students of Geography, F.Y.B. A. should understand the current issues in Physical geography. Specifically Physical geography focused on Lithosphere, Fluvial Cycle, Atmosphere, Hydrosphere.

Objectives:

- I. To introduce the students to the basic concepts in Physical geography.
- II. To introduce latest concept in Physical geography
- III. To acquaint the students with the utility and application of Physical geography in different regions and environment.
- IV. IV. To make the students aware about Earth system (Lithosphere, Atmosphere, Biosphere and Hydrosphere)

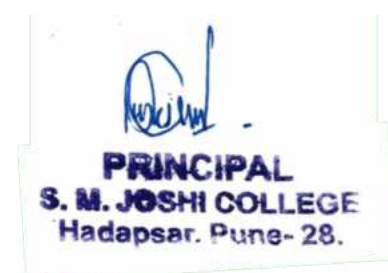


Course Structure**F. Y. B. A. GEOGRAPHY**

Sr. No.	Semester	Course No	Name of the Course	Category
1	Semester I	Gg- 110 (A)	Physical Geography	Geography DSE - 1
2	Semester – II	Gg- 110 (B)	Human Geography	Geography DSE - 2

S. Y. B. A. GEOGRAPHY

Paper Code	Semester	Paper	Subject
Gg: 210(A)	III	G2	Environmental Geography I OR Economic Geography -I
Gg: 220(A)	III	S1	Geography of Maharashtra - I OR Population Geography – I
Gg: 201(A)	III	S2	Practical Geography – I (Scale and Map Projections)
Gg: 210(B)	IV	G2	Environmental Geography II OR Economic Geography -II
Gg: 220(B)	IV	S1	Geography of Maharashtra - II OR Population Geography – II
Gg: 201(B)	IV	S2	Practical Geography – II (Cartographic Techniques, Surveying and Excursion / Village / Project Report)



T. Y. B. A. GEOGRAPHY

Paper Code	Semester	Paper	Subject
Gg: 310(A)	V	G3	Geography of Disaster Management-I OR Geography of Tourism- I
Gg: 320(A)	V	S3	Geography of India -I OR Geography of rural development -I
Gg: 301(A)	V	S4	Practical Geography – I (Techniques of Spatial Analysis)
Gg: 310(B)	VI	G3	Geography of Disaster Management-II OR Geography of Tourism -II
Gg: 320(B)	VI	S3	Geography of India -II OR Geography of rural development -II
Gg: 301(B)	VI	S4	Practical Geography – II (Techniques of Spatial Analysis, Surveying and Excursion / Village / Project Report)

Equivalence of Previous syllabus along with new syllabus:

	Old course	New Course
Paper I	Gg-110 Elements of Geomorphology	Gg-110(A) Physical Geography
Paper II		Gg-110(B) Human Geography


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 Hadapsar, Pune- 28.

Semester I Physical Geography

Course Outcome:

1. To recognize the basic concepts in Physical geography.
2. To discuss the utility and application of Physical geography in different regions and environment.
3. To acquaint with Earth system (Lithosphere, Atmosphere, Biosphere and Hydrosphere).
4. To identify the principles and applications of Hydrology and Oceanography to address water resource and environment related problems.

Details of Syllabus:

Sr. No	Topic	Sub Topics	Teaching Hours	Total Credits
1.	Introduction to Physical Geography	1) Definitions of Physical Geography 2) Nature and scope of Physical Geography 3) Branches of Physical Geography 4) Introduction about the Earth system (Lithosphere, Atmosphere, Hydrosphere and Biosphere)	12	03
2	Lithosphere	1) Interior of the earth 2) Wegner's Continental Drift Theory 3) Davis Concept of Cycle of erosion	12	
3	Atmosphere	1) Structure of the atmosphere 2) Heat Balance 3) Pressure belts and wind system 4) Forms and types of Precipitation	12	
4	Hydrosphere	1) Hydrological cycle 2) General structure of ocean floor 3) Waves and Tides 4) Field Visit (Not more than one day) for observations geographical places and landforms.	12	

Reference Books

- 1) Clayton K., (1986), Earth Crust, AdusBook, London.
- 2) Davis W. M., (1909), Geographical Essay, Ginnia Co.
- 3) Dayal P., (1996), Text Book of Geomorphology, Shukla Book Depot, Patna.
- 4) Kale V.S. and Gupta A., (2015), Introduction of Geomorphology, University Press, PVT Kolkata.
- 5) Kale V.S. and Gupta A., (2001), Elements of Geomorphology, Oxford Univ. Press.
- 6) Monkhouse, (1951), Principle of Physical Geography, McGraw Hill Pub – New York.
- 7) Pitty A. F., (1974), Introduction to Geomorphology, Methuen London.
- 8) Singh Savindra, (2000), Physical Geography, PrayagPustakBhavan, 20-A Allahabad – 211002.
- 9) Steers J. A., (1964), The Unstable Earth Some Recent Views in Geogra Publishers, New Delhi.
- 10) Swaroop Shanti, (2006), Physical Geography, King Books, NaiSarak, Delhi.
- 11) Wooldridge S. W. and Morgan R. S., (1959), The Physical Basis of Geog Geomorphology, Longman Green and Co. London.


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- 11) More, Pagar & Thorat, (2014), Elements of Climatology & Oceanography, (Marathi), Atharv Publication, Pune
- 12) S MUKHERJEE, UNDERSTANDING PHYSICAL GEOGRAPHY, ORIENT BLACKSWAN (PVT)LTD
- 13) More & Devne : 2019, **Physical Geography (English)**, Nirali Publication, Pune
- 14) मोरे, पगार व थोरात : 2019, **प्राकृतिक भूगोल** Nirali Publication, Pune



Semester II**DSE (Discipline Specific Elective) - II Geography**
Human Geography**Course Outcome:**

1. To describe the basic and latest concepts in Human Geography
2. To demonstrate applications of Human Geography in different regions of environment.
3. To define the Settlement pattern and rural and urban settlement.
4. To describe the Agriculture types and pattern.

Sr. No	Topic	Sub Topics	Teaching Hours	Credits
1.	Introduction to Human Geography	1) Definitions of Human Geography 2) Nature and scope of Human Geography 3) Branches and importance of Human Geography	12	03
2	Population	1) Factors affecting on distribution of population 2) Theory of demographic transition 3) Composition of Indian population (Gender and literacy)	12	
3	Settlements	1) Types and pattern of rural Settlements 2) Urbanisation in India 3) Urbanisation in Maharashtra	12	
4	Agriculture	1) Types of Agriculture 2) Factors affecting on Agriculture activity 3) Problems of Indian agriculture	12	

Reference Books

1. Chandna, R.C. (2010) Population Geography, Kalyani Publisher.
2. Hassan, M.I. (2005) Population Geography, Rawat Publications, Jaipur
3. Daniel, P.A. and Hopkinson, M.F. (1989) The Geography of Settlement, Oliver & Boyd, London.
4. Musmade Arjun, Sonawane Amit and Jyotiram More, Population & Settlement Geography, (2015), Diamond Publication Pune.
5. Jyotiram More and Musmade Arjun (2015) Regional Geography of India .Diamond Publication Pune.
6. Johnston R; Gregory D, Pratt G. et al. (2008) The Dictionary of Human Geography, Blackwell Publication.
7. Jordan-Bychkov et al. (2006) The Human Mosaic: A Thematic Approach to Cultural Geography. W. H. Freeman and Company, New York.
8. Kaushik, S.D. (2010) Manavi Bhugol, Rastogi Publication, Meerut.
9. Maurya, S.D. (2012) Manav Bhugol, Sharda Pustak Bhawan. Allahabad.
10. Sudeeptha Adhikari (2016) Orient Blackswan PVT, New Delhi.



12. Sumitra Ghosh (2015), Introduction of Settlement Geography. Orient Blackswan PVT Kolkaqa.
13. Ghosh B.N. : Fundamentals of Population Geography
14. Hussin M. : Human Geography 1994
15. Money D.S. : Human Geography
16. Robinson H. : Human Geography, 1976
17. Mishra & Puri : Indian Economy 2004
18. India- 2008 : Govt. of India
19. Hassan Mohammed I. : Population Geography, 2005
20. Bhende Asha & Kanitkar Tara : Principles of Population studies
21. Perillouav : Human Geography, 1986
22. Singh, R.Y. : Geography of Settlement, 1998
23. Singh, Gopal : Mapwork & Practical Geography, 1999
24. Sawant S.B. Athavale A.S. and Musmade A H, Population Geography, Mehata publishing house, Pune
25. Chandana R.C. : Geography of Population, Kalyani Pub. Ludhayana 1988
26. S MUKHERJEE, UNDERSTANDING PHYSICAL GEOGRAPHY, ORIENT BLACKSWAN (PVT) LTD More & Devne: 2020, Introduction To Human Geography - Nirali Publication, Pune
27. Perpillou A.V. : Human Geography, Longman, London- 1986



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Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.A. Degree Program in Mathematics

(Faculty of Science & Technology)

F.Y.B.A. (Mathematics)

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020

Title of the Course: B.A. (Mathematics)

Preamble:

SavitribaiPhule Pune University has decided to change the syllabi of various faculties from June,2019. Taking into consideration the rapid changes in science and technology and new approaches in different areas of mathematics and related subjects board of studies in mathematics with concern of teachers of mathematics from different colleges affiliated to SavitribaiPhule Pune University has prepared the syllabus of F. Y. B. A. Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

Aims:

- (i) Give the students a sufficient knowledge of fundamental principles, methods and a clear perception of innumerable power of mathematical ideas and tools and know how to use them by modeling, solving and interpreting.
- (ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science and technology.
- (iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- (iv) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

Objectives:

- (i) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays, state important facts resulting from their studies.
- (ii) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
- (iii) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- (iv) A student be able to apply their skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
- (v) A student should be made aware of history of mathematics and hence of its past, present and future role as part of our culture.

Course Outcome:

Sr. No	Course Outcomes
1	On completion of this course, students should be able to understand basic functions and the fundamentals of calculus required in financial mathematics
2	To understand the concepts of basic and linear algebra and applications of mathematical methods to the problem of economics.
3	To graph and differentiate the simple functions
4	To be able calculate basic quantities in financial mathematics and to apply these concepts in financial markets and real-life situations

Structure of the course:

	Semester - I		Semester -II	
Paper I	MG-1	Algebra	MG-2	Analytical Geometry
Paper II	AMG-1	Calculus - I	AMG-2	Calculus - II
Paper III	FMG-1	Financial Mathematics-1	FMG-2	Financial Mathematics-2

All three above courses are compulsory.

Equivalence of Previous syllabus along with new syllabus:

	Old course	New Course
Paper I	MG-1 : Algebra and Geometry	MG-1: Algebra and MG-2 : Analytical Geometry
Paper II	AMG-1 : Calculus and Differential Equations	AMG-1: Calculus - I and AMG-2 : Calculus – II
Paper III	FMG- 1 : Industrial Mathematics	FMG-1: Financial Mathematics-1 and FMG-2: Financial Mathematics-2

Qualifications for Teacher: M.Sc. Mathematics (with NET /SET as per existing rules).

Proposed Structure of F. Y. B. A. Mathematics Courses:

	Semester - I		Semester -II	
Paper I	MG - 1	Algebra	MG - 2	Analytical Geometry
Paper II	AMG - 1	Calculus - I	AMG - 2	Calculus - II
Paper III	FMG - 1	Financial Mathematics-1	FMG - 2	Financial Mathematics-2

Proposed Structure of S. Y. B. A. Mathematics Courses:

	Semester - III		Semester -IV	
Paper I	MG - 3	Laplace Transform and Fourier Series	MG -4	Linear Algebra
Paper II	AMG -3	Calculus of Several Variables	AMG - 4	Vector Calculus
Paper III	FMG -3	Financial Mathematics- 3 (Operations Research)	FMG -4	Financial Mathematics - 4 (Optimization Techniques)
Paper IV	MS - 1	Problem Course Based on MG - 3 and AMG - 3	MS – 3	Problem Course Based on MG - 4and AMG - 4
Paper V	MS - 2	Number Theory	MS – 4	Graph Theory

Proposed Structure of T. Y. B. A. Mathematics Courses:

	Semester - V		Semester -VI	
Paper I	MG - 5	Group Theory - I	MG - 6	Ring Theory – I
Paper II	AMG -5	Real Analysis - I	AMG - 6	Real Analysis - II
Paper III	FMG - 5	Financial Mathematics - 5	FMG -6	Financial Mathematics – 6
Paper IV	MS - 5	Metric Spaces	MS – 7	Complex Analysis
Paper V	MS - 6	Ordinary Differential Equations - I	MS – 8	Partial Differential Equations– I

Details of Syllabus:**Semester – I****MG-1:Algebra****Unit 1: Sets Relations and Functions (8 Lectures)**

- 1.1 Sets, Relations, Equivalence relations, Equivalence classes and partitions of a set
- 1.2 Functions, Basic terminology, Types of Functions, Inverse of a Function, Composition of Functions (Excluding theorems only examples).

Unit2: Divisibility Theory in the Integers(10 Lectures)

- 2.1 Mathematical Induction:Well-Ordering Principle.
- 2.2 The Division Algorithm, The Greatest Common Divisor, Euclid's Lemma, The Least Common Multiple, The Euclidean Algorithm.

Unit 3: Primes and the theory of Congruence (8 Lectures)

- 3.1 The Fundamental Number of Arithmetic: Prime Numbers, Euclid's Lemma.
- 3.2 The theory of Congruence: Basic Properties of congruence.
- 3.3 Fermat's Theorem

Unit 4: Complex Numbers (10 Lectures)

- 4.1 Sums and Products, Basic Algebraic Properties, Moduli, Complex Conjugates, Exponential form, Products and Quotients, De-Moivre's theorem.
- 4.2 Roots of Complex Numbers: The n^{th} roots of unity.
- 4.3 Regions in Complex Plane.

Text Books:

- 1. **A Foundation Course in Mathematics, Ajit Kumar, S. Kumeresan and Bhaba Kumar Sarma, Narosa Publication House.**
Unit 1: Chapter 2: Sec. 2.1 to 2.5, Chapter 3: Sec. 3.1 to 3.6, Chapter 4: Sec. 4.1 to 4.4.
- 2. **Elementary Number Theory, David M. Burton, Tata McGraw Hill, Sixth Edition.**
Unit 2: Textbook 2: Chapter 1: Sec. 1.1, Chapter 2: Sec. 2.2 to 2.4
Unit 3: Textbook 2: Chapter 3: Sec. 3.1, Chapter 4: Sec. 4.1, 4.2, Chapter 5: Sec. 5.2.
- 3. **Complex Variables and Applications, James Ward Brown and Ruel V. Churchill, Mc-Graw Hill, Seventh Edition.**
Unit 4: Textbook 3: Chapter 1: Sec 1 to 10.

Reference Books:

1. Textbook of Algebra, S. K. Shah and S. C. Garg, Vikas Publishing House Pvt. Ltd. Edition 2017.
2. Introduction to Real Analysis by R.G. Bartle and D.R. Sherbert, John Wiley and Sons Inc, Fourth Edition.

AMG-1: CALCULUS - I**Unit 1: Real Numbers****(06 Lectures)**

- 1.1 The Algebraic and Order Properties of $\mathbb{R}$:
Algebraic properties of $\mathbb{R}$, Order properties of $\mathbb{R}$, Well-Ordering Property of $\mathbb{N}$.
Arithmetic mean-Geometric mean inequality, Bernoulli's inequality.
(Revision: essential properties should be revised with illustrative examples)
- 1.2 Absolute Value and the Real Line:
Absolute value function and its properties, triangle inequality and its consequences, neighborhood of a point on real line.
- 1.3. The Completeness Property of $\mathbb{R}$:
Definitions of Upper bound, Lower bound, supremum, infimum of subsets of $\mathbb{R}$, completeness property of $\mathbb{R}$.
- 1.4 Applications of the Supremum Property:
Archimedean property and its consequences, The density theorem (without proof).

Unit 2. Sequences**(10 Lectures)**

- 2.1 Sequences and Their Limits:
Definition and examples of sequences of real numbers, Definition of limit of sequence and uniqueness of limit, Examples on limit of sequence.
- 2.2 Limits Theorems:
Definition of bounded sequence, Every convergent sequence is bounded, Algebra of limits.
- 2.3 Monotone Sequences:
Definition and examples of monotone sequences, Monotone convergence theorem and examples.
- 2.4 Subsequences and Bolzano -Weierstrass Theorem:
Definition of subsequence and examples, Divergence criteria, Monotone Subsequence theorem (without proof), Bolzano -Weierstrass theorem (first proof).

Unit 3. Limits**(08 lectures)**

- 3.1 Functions and their Graphs:
Functions, domain and range, graphs of functions, representing a function numerically, Vertical line test, Piecewise defined functions, increasing and decreasing functions, even and odd functions symmetry, common
- 3.2 Limits of Functions:

Definition of cluster point and examples, definition of limit of a function, sequential criterion for limits, divergence criteria.

3.3 Limit Theorems:

Algebra of limits (proofs using sequential criterion), Squeeze theorem.

3.4 Some extension of limit concepts:

one-sided limits, infinite limits (without proof).

Unit 4: Continuity

(12 lectures)

4.1 Continuous Functions:

Definition of continuous function at a point, sequential criterion for continuity, Divergence criterion, combination of continuous functions.

4.2 Continuous Functions on Intervals:

Properties of continuous functions on an interval, Boundedness theorem (without proof), The minimum-maximum theorem (without proof), Location of root theorem (Without proof), Bolzano's intermediate value theorem. Continuous function maps closed bounded interval to closed bounded interval, Preservation of interval theorem.

Textbook Books:

1. Introduction to Real Analysis by R.G. Bartle and D.R. Sherbert, John Wiley and Sons Inc, Fourth Edition.

Unit 1: Chapter 2: Sec 2.1 (2.1.1 to 2.1.13), Sec. 2.2(2.2.1 to 2.2.9), 2.3, 2.4(2.4.1, 2.4.3 to 2.4.6, 2.4.8, 2.4.9).

Unit 2: Chapter 3: Sec. 3.1(3.1.1 to 3.1.7, 3.1.10, 3.1.11), Sec. 3.2(3.2.1 to 3.2.11), Sec. 3.3(3.3.1, 3.3.4), Sec. 3.4 (3.4.1 to 3.4.3, 3.4.5 to 3.4.8).

Unit 3: Chapter 4: Sec. 4.1(4.1.1, 4.1.3 to 4.1.9), Sec. 4.2(4.2.1 to 4.2.8), Sec. 4.3 (4.3.1 to 4.3.9).

Unit 4: Chapter 5: Sec. 5.1, Sec. 5.2, Sec 5.3 (5.3.1 to 5.3.5, 5.3.7 to 5.3.10).

2. Thomas Calculus, Thirteenth edition, Pearson Publication.

Unit 3: Text book-2: Chapter 1: Sec. 1.1.

Reference books:

1. Introduction to Real analysis, William F.Trench, Free edition, 2010.

2. Calculus of a single variable Ron Larson, Bruce Edwards, tenth edition.

3. Elementary Analysis, The Theory of Calculus, Kenneth A. Ross, Springer Publication, second edition.

4. Calculus and its Applications, Marvin L. Bittinger, David J. Ellenbogen and Scott A. Surgent, Addison Wesley, tenth edition.

FMG-1:Financial Mathematics-1**Unit 1: Review (08 lectures)**

- 1.1 Exponents
- 1.2 Polynomials
- 1.3 Equations: Linear and quadratic
- 1.4 Simultaneous Equations
- 1.5 Functions
- 1.6 Graphs, Slopes and Intercepts

Unit 2: The Derivative and the rules of differentiation (10 lectures)

- 2.1 Limits
- 2.2 Continuity
- 2.3 The Derivative
- 2.4 Differentiability and Continuity
- 2.5 Derivative Notation
- 2.6 Rules of Differentiation
- 2.7 Higher Order Derivatives
- 2.8 Implicit Differentiation

Unit 3: Uses of derivative in Mathematics and Economics (10 lectures)

- 3.1 Increasing and Decreasing functions
- 3.2 Concavity and Convexity
- 3.3 Relative Extrema
- 3.4 Inflection Points
- 3.5 Optimization of Functions
- 3.6 Marginal Concepts
- 3.7 Optimizing Economic Functions
- 3.8 Relationship among Total, Marginal and Average Concepts.

Unit 4: Exponential and logarithmic functions (12 lectures)

- 4.1 Exponential Functions
- 4.2 Logarithmic Functions
- 4.3 Properties of Exponents and Logarithms
- 4.4 Natural Exponential and Logarithmic Functions

Text Book:

**Introduction to Mathematical Economics, 3rd edition, Edward T. Dowling,
Schaum's outline series, McGraw Hill International Edition, 2012.**

Unit 1: Chapter 1: Sec 1.1 to 1.6.

Unit 2 : Chapter 3: Sec. 3.1, 3.2, 3.4 to 3.8.

Unit 3: Chapter 4 : Sec 4.1 to 4.5, Sec. 4.7 to 4.9.

Unit 4: Chapter 7 : Sec 7.1 to 7.4.

Reference Books:

1. Alpha C. Chiang, Fundamental Methods of Mathematical Economics, McGraw-Hill, Inc. 3rd edition, 1984.
2. V.N. Kapoor, Introductory Mathematics for Business and Economics, Sultan Chand & Sons, 12th edition.
3. A. Sarama, Basic Application of Mathematics in Economics, AB Publisher, Guwahati, 2nd edition, 2016.

Semester - II

MG-2 :Analytical Geometry

Unit 1: Analytical Geometry of Two Dimension (10 Lectures)

- 1.1. Change of axes: translation and rotation.
- 1.2. Conic Sections: General equation of second degree in two variables
- 1.3. Reduction to standard form, centre of conic, nature of conic.

Unit 2: Planes (10 Lectures)

- 2.1. Direction cosines and direction ratios, Equation of plane, Normal form, Transform to the normal form, Plane passing through three non-collinear points, Intercept form, Angle between two planes.
- 2.2. Distance of a point from a plane, Distance between parallel planes, Systems of planes, two sides of planes, Bisector planes.

Unit 3: Lines in three dimension (8 lectures)

- 3.1. Equations of a line in Symmetric and unsymmetrical forms, Line passing through two points, Angle between a line and a plane.
- 3.2. Perpendicular distance of a point from a plane, Condition for two lines to be coplanar (without proof).

Unit 4: Sphere (8 Lectures)

- 4.1. Equation of a sphere in different forms, plane section of a sphere.
- 4.2. Equation of a circle, sphere through a given circle
- 4.3. Intersection of a sphere and a line, Equation of tangent plane to sphere.

Text Books:

1. **Analytic Geometry in Two and Three Dimensions : Von Steube**
Unit 1: Sec, 8.4

2. **Analytical Solid Geometry: Shantinayaran; S. Chand and Company Ltd, New Delhi, 1998.**

Unit 2: Sec. 1.6, 1.7, Sec. 2.1 to 2.7

Unit 3: Sec. 3.1 to 3.4, 3.7

Unit 4: Sec. 6.1 to 6.6.

Reference Book:

1. P.K.Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd. 1999.

AMG-2 : Calculus-II

Unit 1: Differentiation (10 lectures)

1.1. The Derivatives:

Definition of the derivative of a function at a point, every differentiable function is continuous, Rules of differentiation, Caratheodary's theorem (without proof), The chain rule, Derivative of inverse function (without proof, only examples).

1.2 The Mean Value Theorems:

Interior extremum theorem, Mean Value theorems and their Consequences, Intervals of increasing and decreasing of a function, first derivative test for extrema.

Unit 2: L' Hospital Rule and Successive Differentiation (10 lectures)

2.1 L'Hospital Rule: Indeterminate forms, L'Hospital Rules (without proof)

2.2 Taylor's theorem: Taylor's theorem and Maclaurin's theorem with Lagrange's form of remainder (Without proof).

2.3. Successive Differentiation: The n th derivative and Leibnitz theorem for successive differentiation.

Unit 3: Ordinary Differential Equations (08 lectures)

3.1 Linear first order equations.

3.2 Separable equations.

3.3 Existence and Uniqueness of solutions of nonlinear equations.

Unit 4: Exact Differential Equations (08 lectures)

4.1 Transformation of nonlinear equations to separable equations.

4.2 Exact differential equations.

4.3 Integrating factors.

Textbooks:

1. **Introduction to Real Analysis by R.G. Bartle and D.R. Sherbert, John Wiley and Sons, Inc., Fourth Edition.**

Unit 1: Chapter 6: Sec. 6.1 (6.1.1 to 6.1.8), Sec 6.2 (6.2.1 to 6.2.8).

Unit 2: Chapter 6: Sec 6.3 (6.3.1 to 6.3.7), Sec 6.4 (6.4.1 to 6.4.3).

2. **Differential Calculus by Shanti Narayan, Tenth Revised Edition.**

Units 2: Chapter 5: Sec. 5.1 to 5.6.

3. Elementary Differential equations, William F. Trench, E-book (Free download)

Unit 3: Chapter 2: Sec 2.1 to 2.3.

Unit 4: Chapter 2: Sec 2.4 to 2.6.

Reference books:

1. Introduction to Real analysis, William F.Trench, Free edition, 2010.
2. Calculus of a single variable Ron Larson , Bruce Edwards, tenth edition.
3. Elementary Analysis, The Theory of Calculus, Kenneth A. Ross, Springer Publication, second edition.
4. Calculus and its Applications, Marvin L. Bittinger, David J. Ellenbogen and Scott A. Surgent, Addison Wesley, tenth edition.
5. Ordinary and partial Differential equations,M.D. Raisingania, S. Chand andCompany,2009.

FMG-2: Financial Mathematics-2**Unit 1 : Exponential and Logarithmic functions in Economics (08 lectures)**

- 1.1. Interest Compounding
- 1.2. Discounting
- 1.3. Converting Exponential to Natural Exponential functions
- 1.4. Estimating growth rates from data points.

Unit 2 :The Fundamentals of Linear Algebra (12 lectures)

- 2.1. The role of linear algebra
- 2.2. Definitions and Terms
- 2.3. Addition and Subtraction of Matrices
- 2.4. Scalar Multiplication
- 2.5. Multiplication of Matrices
- 2.6. Commutative, Associative and Distributive laws in Matrix Algebra
- 2.7. Identity and null matrices
- 2.8. Matrix Expression of a System of Linear Equations
- 2.9. Determinants and Nonsingularity
- 2.10. Minors and Cofactors
- 2.11. Cofactor and Adjoint Matrices
- 2.12. Inverse Matrix
- 2.13. Solving Linear EquationsWith Inverse

Unit 3 :Integral Calculus: The Indefinite Integral (08 lectures)

- 3.1. Integration
- 3.2. Rules of Integration
- 3.3. Initial Conditions and Boundary Conditions
- 3.4. Integration by Substitutions

- 3.5. Integration by Parts
- 3.6. Economic Applications.

Unit 4 : Integral Calculus: The Definite Integral**(08 lectures)**

- 4.1. Area Under a Curve
- 4.2. The definite Integral
- 4.3. Properties of Definite Integral
- 4.4. Area Between Curves
- 4.5. Consumers and Producer's Surplus.

Text Book:

**Introduction to Mathematical Economics, 3rd edition, Edward T. Dowling,
Schaum's outline series, McGraw Hill International Edition, 2012.**

Unit 1: Chapter 8: Sec. 8.1, 8.3, 8.4, 8.5

Unit 2: Chapter 10 : Sec. 10.1 to 10.4, Sec. 10.6 to 10.9, Chapter 11: Sec 11.1, 11.3, 11.6, 11.7, 11.8.

Unit 3: Chapter 14: Sec. 14.1 to 14.6.

Unit 4: Chapter 15: Sec. 15.1, 15.2, 15.4, 15.5, 15.8

Reference Books:

1. Alpha C. Chiang, Fundamental Methods of Mathematical Economics, McGraw-Hill, Inc. 3rd edition, 1984.
2. V.N. Kapoor, Introductory Mathematics for Business and Economics, Sultan Chand & Sons, 12th edition.
3. A. Sarama, Basic Application of Mathematics in Economics, AB Publisher, Guwahati, 2nd edition, 2016.



Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Computer Science

(Faculty of Science & Technology)

F.Y.B.Sc. (Computer Science)

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020

Title of the Course: B. Sc. (Computer Science)

Preamble:

The B. Sc. (Computer Science) course is systematically designed three year degree program under the faculty of Science and Technology. The objective of the course is to prepare students to undertake careers involving problem solving using computer science and technologies, or to pursue advanced studies and research in computer science. The syllabus which comprises of Computer Science subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) covers the foundational aspects of computing sciences and also develops the requisite professional skills and problem solving abilities using computing sciences.

Introduction:

At the first year of under-graduation, the basic foundations of two important skills required for software development are laid. A course in problem solving and programming along with a course in database fundamentals forms the preliminary skill set for solving computational problems. The practical courses are designed to supplement the theoretical training in the year. Along with Computer Science, the two theoretical and one practical course each in Statistics, Mathematics and Electronics help in building a strong foundation. Career Advancement courses are introduced in both semesters to cover additional areas of Computer Science.

At the second year of under-graduation, computational problem solving skills are further strengthened by a course in Data structures. Software engineering concepts that are required for project design are also introduced. Essential concepts of computer networking are also introduced in this year. The practical course included in both semesters complements the theory courses.

At the third year of under-graduation, all the subjects are designed to fulfill core Computer Science requirements as well as meet the needs of the software industry. Theory courses are adequately supplemented by hands-on practical courses. Skill Enhancement courses enable the students to acquire additional value-added skills.

Objectives:

- To develop problem solving abilities using a computer.
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To train students in professional skills related to Software Industry.
- To prepare necessary knowledge base for research and development in Computer Science.
- To help students build-up a successful career in Computer Science and to produce entrepreneurs who can innovate and develop software products.

Titles of Papers, Credit Allocation and Scheme of Evaluation**Semester I (Total credits=22)**

Course type	Paper Code	Paper title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
CC-I	CS-111	Problem Solving using Computer and 'C' Programming	2		15	35	50
	CS-112	Database Management Systems	2		15	35	50
	CS-113	Practical course based on CS101 and CS102		1.5	15	35	50
CC-II*		Mathematics – I, II and III					
CC-III*		Electronics – I,II and III					
CC-IV*		Statistics – I, II and III					

Semester II (Total credits=22)

Course type	Paper Code	Paper title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
CC-V	CS-121	Advanced 'C' Programming	2		15	35	50
	CS-122	Relational Database Management Systems	2		15	35	50
	CS-123	Practical course based on CS201 and CS202		1.5	15	35	50
CC-VI*		Mathematics – I,II and III					
CC-VII*		Electronics – I, II and III					
CC-VIII*		Statistics – I,II and III					

S. Y. B. Sc.(Computer Science)**Semester III (Total credits=22)**

Course type	Paper Code	Paper title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
CC-IX	CS-231	Data Structures and Algorithms – I	2		15	35	50
	CS-232	Software Engineering	2		15	35	50
	CS-233	Practical course based on CS301		2	15	35	50
CC-X*		Mathematics – I, II and III					
CC-XI*		Electronics – I,II and III					
AECC-I*		Environment Science – I	2				
AECC-II*		Language Communication – I	2				

Semester IV (Total credits=22)

Course type	Paper Code	Paper title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
CC-XII	CS-241	Data Structures and Algorithms – II	2		15	35	50
	CS-242	Computer Networks - I	2		15	35	50
	CS-243	Practical course based on CS401		2	15	35	50
CC-XIII*		Mathematics – I,II and III					
CC-XIV*		Electronics – I, II and III					
AECC-III*		Environment Science – I	2				
AECC-IV*		Language Communication – I	2				

T. Y. B. Sc.(Computer Science)**Semester V (Total credits=22)**

Course type	Paper Code	Paper title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
DSEC - I	CS-351	Operating Systems - I	2		15	35	50
	CS-352	Computer Networks - II	2		15	35	50
	CS-357	Practical course based on CS501		2	15	35	50
DSEC - II	CS-353	Web Technologies - I	2				
	CS-354	Foundations of Data Science	2				
	CS-358	Practical course based on CS503		2			
DSEC - III	CS-355	Object Oriented Programming - I (Core Java)	2				
	CS-356	Theoretical Computer Science and Compiler Construction - I	2				
	CS-359	Practical Course based on CS505		2			
SECC - I	CS-3510	Python Programming / R Programming	1	1	15	35	50
SECC - II	CS-3511	Open Elective	1	1	15	35	50

Semester VI (Total credits=22)

Course type	Paper Code	Paper title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
DSEC - IV	CS-361	Operating Systems - II	2		15	35	50
	CS-362	Software Testing	2		15	35	50
	CS-367	Practical course based on CS601		2	15	35	50
DSEC - V	CS-363	Web Technologies - II	2				
	CS-364	Data Analytics	2				
	CS-368	Practical course based on CS603 and CS604		2			
DSEC - VI	CS-365	Object Oriented Programming - II (Advanced Java)	2				
	CS-366	Theoretical Computer Science and Compiler Construction - II	2				
	CS-369	Practical Course based on CS605		2			
SECC- III	CS-3610	Mobile Application Development OR Software Testing Tools	1	1	15	35	50
SECC - IV	CS-3611	Project OR Open Elective	1	1	15	35	50

Detailed Syllabus:

Semester- I Paper - I Course Type: Core Credit Course Code: CS101 Course Title : Problem Solving Using Computer and 'C' Programming - I		
Teaching Scheme 2 Hours / Week	No. of Credits 2	Examination Scheme IE : 15 Marks UE: 35 Marks
Course Objectives 1. To introduce the foundations of computing, programming and problem- solving using computers. 2. To develop the ability to analyze a problem and devise an algorithm to solve it. 3. To formulate algorithms, pseudocodes and flowcharts for arithmetic and logical problems 4. To understand structured programming approach. 5. To develop the basic concepts and terminology of programming in general. 6. To implement algorithms in the 'C' language. 7. To test, debug and execute programs.		
Course Outcomes:- On completion of this course, students will be able to : 1. Explore algorithmic approaches to problem solving. 2. Develop modular programs using control structures and arrays in 'C'.		
Course Contents		
Chapter 1	Problem Solving Aspects	5 Hours
1.1. Introduction to problem solving using computers. 1.2. Problem solving steps. 1.3 Algorithms-definition, characteristics , examples ,advantages and limitations. 1.4 Flowcharts - definition, notations , examples , advantages and limitations, Comparison with algorithms. 1.5 Pseudo codes - notations, examples, advantages and limitations. 1.6 Programming Languages as tools, programming paradigms, types of languages 1.7 Converting pseudo-code to programs. 1.8 Compilation process (compilers , interpreters), linking and loading, syntax and semantic errors, testing a program 1.9 Good Programming Practices (naming conventions , documentation, indentation).		
Chapter 2	'C' Fundamentals	7 Hours
2.1 History of 'C' language. 2.2 Application areas. 2.2 Structure of a 'C' program. 2.3 'C' Program development life cycle.		

2.4 Function as building blocks. 2.5 'C' tokens 2.6 Character set, Keywords , Identifiers 2.7 Variables, Constants (character, integer, float, string, escape sequences, enumeration constant). 2.8 Data Types (Built-in and user defined data types). 2.9 Operators, Expressions, types of operators, Operator precedence and Order of evaluation. 2.10 Character input and output. 2.11 String input and output. 2.12 Formatted input and output.		
Chapter 3	Control Structures	6 Hours
3.1 Decision making structures:- if ,if-else, switch and conditional operator. 3.2 Loop control structures:- while ,do while, for. 3.3 Use of break and continue. 3.4 Nested structures. 3.5 Unconditional branching (goto statement).		
Chapter 4	Functions	6 Hours
4.1 Concept of function, Advantages of Modular design. 4.2 Standard library functions. 4.3 User defined functions:- declaration , definition, function call, parameter passing (by value), return statement. 4.4 Recursive functions. 4.5 Scope of variables and Storage classes.		
Chapter 5	Arrays	6 Hours
5.1 Concept of array. 5.2 Types of Arrays – One , Two and Multidimensional array. 5.3 Array Operations - declaration, initialization, accessing array elements. 5.4 Memory representation of two-dimensional array (row major and column major) 5.5 Passing arrays to function. 5.6 Array applications - Finding maximum and minimum, Counting occurrences, Linear search, Sorting an array (Simple exchange sort, bubble sort), Merging two sorted arrays, Matrix operations (trace of matrix, addition, transpose, multiplication, symmetric, upper/ lower triangular matrix)		
Reference Books:		
1. How to Solve it by Computer, R.G. Dromey, Pearson Education. 2. Problem Solving and Programming Concept, Maureen Sprankle, 7 th Edition ~ Publication.		

3. C: the Complete Reference, Schildt Herbert, 4th edition, McGraw Hill
4. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India
5. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI
6. Programming in C ,A Practical Approach, Ajay Mittal , Pearson
7. Programming with C, B. Gottfried, 3rd edition, Schaum's outline Series, Tata McGraw Hill.
8. Programming in ANSI C, E. Balagurusamy, 7th Edition, McGraw Hill.

Semester- I Paper - II Course Type: Core Credit Course Code: CS102 Course Title : Database Management Systems		
Teaching Scheme 02 Hours / Week	No. of Credits 2	Examination Scheme IE : 15 Marks UE: 35 Marks
Prerequisites Basic Knowledge of file system, storing data in file system and Operations on sets		
Course Objectives - To understand the fundamental concepts of database. - To understand user requirements and frame it in data model. - To understand creations, manipulation and querying of data in databases.		
Course Outcomes On completion of the course, student will be able to– - Solve real world problems using appropriate set, function, and relational models. - Design E-R Model for given requirements and convert the same into database tables. - Use SQL.		
Course Contents		
Chapter 1	Introduction to DBMS	3 Hours
1.1. Introduction 1.2. File system Vs DBMS 1.3. Levels of abstraction & data independence 1.4. Structure of DBMS (Roles of DBMS Users) 1.5. Users of DBMS Advantages of DBMS		
Chapter 2	Conceptual Design	11 Hours
2.1. Overview of DB design process 2.2. Introduction to data models (E-R model, Relational model, Network model, Hierarchical model) 2.3. Conceptual design using ER data model (entities, attributes, entity sets, relations, relationship sets) 2.4. Constraints (Key constraints, Integrity constraints, referential integrity, unique constraint, Null/Not Null constraint, Domain, Check constraint, Mapping constraints) 2.5. Extended features – Specialization, Aggregation, Generalization 2.6. Pictorial representation of ER(symbols) 2.7. Structure of Relational Databases (concepts of a table) 2.8. DBMS Versus RDBMS 2.9. Case Studies on ER model		

Chapter 3	SQL	9 Hours
3.1. Introduction to query languages 3.2. Basic structure 3.3. DDL Commands 3.4. DML Commands 3.5. Forms of a basic SQL query (Expression and strings in SQL) 3.6. Set operations 3.7. Aggregate Operators and functions 3.8. Date and String functions 3.9. Null values 3.10. Nested Subqueries 3.11 SQL mechanisms for joining relations (inner joins, outer joins and their types) 3.12 Views 3.13. Examples on SQL (case studies)		
Chapter 4	Relational Database Design	7 Hours
3.1. Introduction to Relational-Database Design (undesirable properties of a RDB design) 3.2. Functional Dependency(Basic concepts, F+, Closure of an Attribute set, Armstrong's axioms) 3.3. Concept of Decomposition 3.4. Desirable Properties of Decomposition (Lossless join, Lossy join, Dependency Preservation) 3.5. Concept of normalization, Normal Forms (1NF,2NF and 3NF), Examples 3.6 Keys Concept with Examples : Candidate Keys and Super Keys, Algorithm to find the super keys / primary key for a relation		
Reference Books:		
1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S.Sudarshan,ISBN:9780071289597,Tata McGraw-Hill Education 2. Database Management Systems ,RaghuRamakrishnan,ISBN:9780071254342,Mcgraw-hill higher Education 3. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke,McGraw-Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631 4. Database Systems, Shamkant B. Navathe, RamezElmasri,ISBN:9780132144988,PEARSON HIGHER EDUCATION 5. Beginning Databases with PostgreSQL: From Novice to Professional, Richard Stones, Neil Matthew, ISBN:9781590594780, Apress 6. PostgreSQL, Korry Douglas, ISBN:9780672327568, Sams 7. Practical PostgreSQL (B/CD),JohnWorsley, Joshua Drake,ISBN:9788173663925Shroff/O'reilly 8. Practical Postgresql , By Joshua D. Drake, John C Worsley (O'Reillypublications) 9. "An introduction to Database systems", Bipin C Desai, Galgotia Publications		

Semester- I
Paper - III

Course Type: Core Credit

Course Code: CS103

**Title : Practical course on Problem Solving using Computer and 'C' programming
and
Database Management Systems**

Teaching Scheme 3 Hrs / week	No. of Credits 1.5	Examination Scheme IE : 15 Marks UE: 35 Marks

Course Objectives

- To understand the program development life cycle.
- Solve simple computational problems using modular design and basic features of the 'C' language.
- Understand basic database management operations.
- Design E-R Model for given requirements and convert the same into database tables.

Course Outcomes:-

On completion of this course, students will be able to :

- Devise pseudocodes and flowchart for computational problems.
- Write, debug and execute simple programs in 'C'.
- Create database tables in postgresQL.
- Write and execute simple, nested queries.

Guidelines :

Lab Book: The lab book is to be used as a hands-on resource, reference and record of assignment submission and completion by the student. The lab book contains the set of assignments which the student must complete as a part of this course.

Submission:

Problem Solving Assignments:

The problem solving assignments are to be submitted by the student in the form of a journal containing individual assignment sheets. Each assignment includes the Assignment Title, Problem statement, Date of submission, Assessment date, Assessment grade and instructors sign.

Programming Assignments:

Programs should be done individually by the student in the respective login. The codes should be uploaded on either the local server, Moodle, Github or any open source LMS. Print-outs of the programs and output may be taken but not mandatory for assessment.

DBMS Assignments:

For each problem/case study, the student must design the database model in the f

diagram. Table design should be based on the same and must include proper constraints and integrity checks. The students have to create, populate the tables and then perform the activities specified in each of the assignments. A pool of databases will get created as student progresses through the assignments and these databases can be repeatedly used in subsequent assignments. A separate softcopy of the queries must be maintained for each assignment.

Assessment:

Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of student. Each lab assignment assessment will be assigned grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, innovation, efficient codes and good programming practices.

Operating Environment:

For 'C' Programming :

Operating system: Linux

Editor: Any linux based editor like vi, gedit etc.

Compiler : cc or gcc

For DBMS:

Operating System: Linux Operating system

DBMS: PostgreSQL

Language: SQL

Suggested List of Assignments:**A) Problem Solving and C programming:****Assignment 1.**

Problem Solving using Pseudo code and Flowchart, Simple programs, Understanding errors and error handling.

Assignment 2.

Decision Making Control Structures.

Assignment 3.

Loop Control Structures

Assignment 4.

Functions (User Defined functions, Library functions and Recursion).

Assignment 5.

Arrays (1-D and 2-D).

B) Database Management Systems**Assignment 1.**

To create simple tables with only the primary key constraint (as a table level constraint & as a field level constraint) (include all data types)

Assignment 2.

To create more than one table, with referential integrity constraint, PK constraint.

Assignment 3.

To create one or more tables with following constraints, in addition to the first two constraints (PK & FK)

- a. Check constraint
- b. Unique constraint
- c. Not null constraint

Assignment 4.

To drop a table, alter schema of a table, insert / update / delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)

Assignment 5.

To query the tables using simple form of select statement Select <field-list> from table [where <condition> order by <field list>] Select <field-list, aggregate functions > from table [where <condition> group by <> having <> order by <>]

Assignment 6.

To query table, using set operations (union, intersect)

Assignment 7.

To query tables using nested queries (use of 'Except', exists, not exists, all clauses

Assignment 8.

To create views.

Books: Laboratory handbook prepared by the University.

Semester- II
Paper - I

Course Type: Core Credit

Course Code: CS201

Course Title : Advanced 'C' Programming

Teaching Scheme 2 Hours / Week	No. of Credits 2	Examination Scheme IE : 15 Marks UE: 35 Marks

Prerequisites

- Problem Solving tools like algorithms, flowcharts and pseudocodes.
- Basic knowledge of 'C' language.

Course Objectives :-

- To study advanced concepts of programming using the 'C' language.
- To understand code organization with complex data types and structures.
- To work with files.

Course Outcomes:- Student will be able to :-

- Develop modular programs using control structures, pointers, arrays, strings and structures
- Design and develop solutions to real world problems using C.

Course Contents

Chapter 1	Pointers	8 Hours
1.1. Introduction to Pointers. 1.2. Declaration, definition, initialization, dereferencing. 1.3. Pointer arithmetic. 1.4. Relationship between Arrays & Pointers- Pointer to array, Array of pointers. 1.5. Multiple indirection (pointer to pointer). 1.6. Functions and pointers- Passing pointer to function, Returning pointer from function, Function pointer. 1.7. Dynamic memory management- Allocation(malloc(),calloc()), Resizing(realloc()), Releasing(free()), 1.8. Memory leak, dangling pointers. 1.9. Types of pointers.		
Chapter 2	Strings	6 Hours
2.1 String Literals, string variables, declaration, definition, initialization. 2.2 Syntax and use of predefined string functions 2.3 Array of strings. 2.4. Strings and Pointers 2.5. Command line arguments.		

Chapter 3	Structures And Unions.	8 Hours
3.1. Concept of structure, definition and initialization, use of typedef. 3.2. Accessing structure members. 3.3. Nested Structures 3.4. Arrays of Structures 3.5. Structures and functions- Passing each member of structure as a separate argument, Passing structure by value / address. 3.6. Pointers and structures. 3.7. Concept of Union, declaration, definition, accessing union members. 3.8. Difference between structures and union.		
Chapter 4	File Handling	6 Hours
4.1. Introduction to streams. 4.2. Types of files. 4.3. Operations on text files. 4.4. Standard library input/output functions. 4.5. Random access to files.		
Chapter 5	Preprocessor	2 Hours
6.1. Role of Preprocessor 6.2. Format of preprocessor directive 6.3. File inclusion directives (#include) 6.4. Macro substitution directive, argumented and nested macro 6.5. Macros versus functions		
Reference Books:		
1. C: the Complete Reference, Schildt Herbert, 4 th edition, McGraw Hill 2. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India 3. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI 4. Programming in C ,A Practical Approach, Ajay Mittal , Pearson 5. Programming with C, B. Gottfried, 3 rd edition, Schaum's outline Series, Tata McGraw Hill. 6. Programming in ANSI C, E. Balagurusamy, 7 th Edition, McGraw Hill.		

Semester- II
Paper - II

Course Type: Core Credit

Course Code: CS202

Course Title : Relational Database Management Systems

Teaching Scheme 2 Hours / Week	No. of Credits 2	Examination Scheme IE : 15 Marks UE: 35 Marks

Prerequisites

- Basic Knowledge of DBMS
- Knowledge of SQL Queries
- Basics of relational design
- Basics of ER model

Course Objectives

- To teach fundamental concepts of RDBMS (PL/PgSQL)
- To teach database management operations
- Be familiar with the basic issues of transaction processing and concurrency control
- To teach data security and its importance

Course Outcomes

On completion of the course, student will be able to–

- Design E-R Model for given requirements and convert the same into database tables.
- Use database techniques such as SQL & PL/SQL.
- Explain transaction Management in relational database System.
- Use advanced database Programming concepts

Course Contents

Chapter 1	Relational Database Design Using PLSQL	8 Hours
1.1 Introduction to PLSQL 1.2 PL/PgSQL: Datatypes, Language structure 1.3 Controlling the program flow, conditional statements, loops 1.4 Stored Procedures 1.5 Stored Functions 1.6 Handling Errors and Exceptions 1.7 Cursors 1.8 Triggers		

Chapter 2	Transaction Concepts and concurrency control	10 hours
2.1 Describe a transaction, properties of transaction, state of the transaction. 2.2 Executing transactions concurrently associated problem in concurrent execution. 2.3 Schedules, types of schedules, concept of Serializability, Precedence graph for Serializability. 2.4 Ensuring Serializability by locks, different lock modes, 2PL and its variations. 2.5 Basic timestamp method for concurrency, Thomas Write Rule. 2.6 Locks with multiple granularity, dynamic database concurrency (Phantom Problem). 2.7 Timestamps versus locking. 2.8 Deadlock and deadlock handling - Deadlock Avoidance(wait-die, wound-wait), Deadlock Detection and Recovery (Wait for graph).		
Chapter 3	Database Integrity and Security Concepts	6 Hours
3.1 Domain constraints 3.2 Referential Integrity 3.3 Introduction to database security concepts 3.4 Methods for database security 3.4.1 Discretionary access control method 3.4.2 Mandatory access control 3.4.3. Role base access control for multilevel security. 3.5 Use of views in security enforcement. 3.6 Overview of encryption technique for security. 3.7 Statistical database security.		
Chapter 4	Crash Recovery	4 Hours
4.1 Failure classification 4.2 Recovery concepts 4.3 Log base recovery techniques (Deferred and Immediate update) 4.4 Checkpoints, Relationship between database manager and buffer cache. Aries recovery algorithm. 4.5 Recovery with concurrent transactions (Rollback, checkpoints, commit) 4.6 Database backup and recovery from catastrophic failure		
Chapter 5	Other Databases	2 Hours
5.1 Introduction to Parallel and distributed Databases 5.2 Introduction to Object Based Databases 5.3 XML Databases 5.4 NoSQL Database 5.5 Multimedia Databases 5.6 Big Data Databases		

Reference Books:

1. Database System Concepts, By Silberschatz A., Korth H., Sudarshan S., 6th Edition, McGraw Hill Education
2. Database Management Systems, Raghu Ramakrishnan, Mcgraw-Hill Education
3. Database Systems, Shamkant B. Navathe, Ramez Elmasri, PEARSON HIGHER EDUCATION
4. Fundamentals of Database Systems, By: Elmasri and Navathe, 4th Edition Practical PostgreSQL O'REILLY
5. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, McGraw-Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631
6. NoSQL Distilled, Pramod J. Sadalage and Martin Fowler, Addison Wesley
7. An Introduction to Database Systems", C J Date, Addison-Wesley
8. Database Systems : Concepts, Design and Application", S.K.Singh, Pearson, Education
9. NoSQL Distilled A Brief Guide to the Emerging World of Polyglot Persistence : by Pramod J. Sadalage, Martin Fowler, Addison-Wesley, Pearson Education, Inc.
10. MongoDB: The Definitive Guide , Kristina Chodorow, Michael Dirolf, O'Reilly Publications

Semester- II Paper - III Course Type: Core Credit Course Code: CS203 Title : Practical Course on Advanced 'C' Programming and Relational Database Management Systems		
Teaching Scheme 3 Hours / week	No. of Credits 1.5	Examination Scheme IE : 15 Marks UE: 35 Marks
Course Objectives - To solve real world computational problems. - To perform operations on relational database management systems.		
Course Outcomes:- On completion of this course, students will be able to : - Write, debug and execute programs using advanced features in 'C'. - To use SQL & PL/SQL. - To perform advanced database operations.		
Guidelines : Lab Book: The lab book is to be used as a hands-on resource, reference and record of assignment submission and completion by the student. The lab book contains the set of assignments which the student must complete as a part of this course. Submission: Programming Assignments: Programs should be done individually by the student in respective login. The codes should be uploaded on either the local server, Moodle, Github or any open source LMS. Print-outs of the programs and output may be taken but not mandatory for assessment. RDBMS Assignments: For each problem/case study, the student must design the database model in the form of an E-R diagram. Table design should be based on the same and must include proper constraints and integrity checks. The students have to create, populate the tables and then perform the activities specified in each of the assignments. A separate softcopy of the table creation statements and queries must be maintained for each assignment. Assessment Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of student. Each lab assignment assessment will be assigned grade/marks based on parameters with appropriate weightage. Suggested parameters		

assessment as well as each lab assignment assessment include- timely completion, performance, innovation, efficient codes and good programming practices.

Operating Environment:

For 'C' Programming :

Operating system: Linux

Editor: Any linux based editor like vi, gedit etc.

Compiler : cc or gcc

For DBMS:

Operating System: Linux Operating system

DBMS: PostgreSQL 11 and higher

Language: PL/SQL

Suggested List of Assignments:**A) Advanced C Programming:****Assignment 1.**

Simple Pointers.

- a) Pointer initialization and use of pointers.
- b) Pointer Arithmetic.

Assignment 2.

Dynamic Memory Allocation.

Assignment 3.

String handling using standard library functions.

Assignment 4.

Structure and Unions.

Assignment 5.

File Handling.

Assignment 6.

C Preprocessors.

B) Relational Database Management Systems:**Assignment 1: Stored Procedure**

- 1) A Simple Stored Procedure
- 2) A Stored Procedure with IN, OUT and IN/OUT parameter

Assignment 2: Stored Function

- 1) A Simple Stored Function
- 2) A Stored Function that returns
- 3) A Stored Function recursive

Assignment 3 : Cursors

- 1) A Simple Cursor
- 2) A Parameterize Cursor

Assignment 4 : Exception Handling

- 1) Simple Exception- Raise Debug Level Messages
- 2) Simple Exception- Raise Notice Level Messages
- 3) Simple Exception- Raise Exception Level Messages

Assignment 5 : Triggers

- 1) Before Triggers (insert, update, delete)
- 2) After Triggers (insert, update, delete)

Books: Laboratory handbook prepared by the University.

SAVITRIBAI PHULE PUNE UNIVERSITY
F.Y.B.Sc. Practical Examination- Skeleton Paper
Zoology Practical Paper (Credits: 1.5)
Choice Based Credit System-2019 Pattern

Course Code:ZO-113

Time:3.00 hrs.

Semester:I

Max. Marks:35

- Q.1 Identification: (10)
- a) Identify, classify and describe (Protozoa to Porifera).
 - b) Identify, classify and describe (Cnidaria to Platyhelminthes).
 - c) Identify and comment (any one from practical No.5).
 - d) Identify, sketch and label/ Identify and describe (Any one slide from practical No. 6).
- Q.2 Identify the given specimen with the help of taxonomic identification key. (05)
- Q.3 Estimate Dissolved oxygen/ Alkalinity/ Carbon dioxide from given water sample. (08)
- Q.4 Identify the faunal organisms from given freshwater sample, sketch, label and comment on it. (07)

OR

Estimate the water holding capacity of given soil sample. Comment and find out the type of soil sample.

OR

Determine the density, frequency and abundance of species by quadrat method from the given data.

- Q.5 Certified Journal, Tour/ field report and Viva- voce. (05)

Examiner

Examiner


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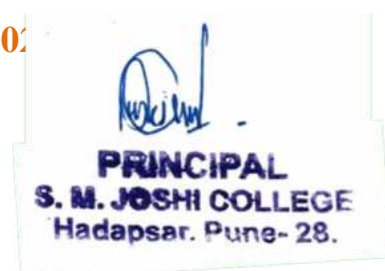
Three Year B.Sc. Degree Program in Physics

(Faculty of Science & Technology)

F.Y.B.Sc. (Physics)

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020



Title of the Course: B.Sc. (Physics)

Preamble:

The curriculum for the B. Sc. (Physics) programme is designed to cater to the requirement of Choice Based Credit System following the University Grants Commission (UGC) guidelines. In the proposed structure, due consideration is given to Core and Elective Courses (Discipline specific - Physics), along with Ability Enhancement (Compulsory and Skill based) Courses. Furthermore, continuous assessment is an integral part of the CBCS, which will facilitate systematic and thorough learning towards better understanding of the subject. The systematic and planned curricula from first year to the third year (comprised of six semesters) shall motivate the student for pursuing higher studies in Physics and inculcate enough skills for becoming an entrepreneur.

Objectives:

- To foster scientific attitude, provide in-depth knowledge of scientific and technological concepts of Physics.
- To enrich knowledge through problem solving, minor/major projects, seminars, tutorials, review of research articles/papers, participation in scientific events, study visits, etc.
- To familiarize with recent scientific and technological developments.
- To create foundation for research and development in Physics.
- To help students to learn various experimental and computational tools thereby developing analytical abilities to address real world problems.
- To train students in skills related to research, education, industry, and management.
- To help students to build-up a progressive and successful career in Physics.



Structure of the Course:

Subject Name	Year	Semester	Course Type	Course Code	Course Name	Credit
Physics	1	I	Compulsory Course	PHY-111	Mechanics and Properties of Matter	2
				PHY-112	Physics Principles and Applications	2
				PHY-113	Physics Laboratory-IA	1.5
		II	Compulsory Course	PHY-121	Heat and Thermodynamics	2
				PHY-122	Electricity and Magnetism	2
				PHY-123	Physics Laboratory-IB	1.5
	2	III	Compulsory Course	PHY-231	Mathematical Methods in Physics I	2
				PHY-232	Electronics I /Instrumentation	2
				PHY-233	Physics Laboratory-2A	2
			Ability Enhancement Compulsory Course	PHY-2310	Environment -I	2
				PHY-2311	Language-I	2
		IV	Compulsory Course	PHY-241	Oscillations, Waves and Sound	2
				PHY-242	Optics	2
				PHY-243	Physics Laboratory-2B	2
			Ability Enhancement Compulsory Course	PHY-2410	Environment –II	2
				PHY-2411	Language-II	2
	3	V	Discipline Specific Elective Course	PHY- 351	Mathematical Methods in Physics II	2
				PHY- 352	Electrodynamics	2
				PHY- 353	Classical Mechanics	2
				PHY- 354	Atomic and Molecular Physics	2
				PHY- 355	Computational Physics	2
				PHY- 356	Elective I (Select any One)	2
				PHY- 357	Physics Laboratory-3A	2
				PHY- 358	Physics Laboratory-	
				PHY- 359	Physics Laboratory-	
			Skill Enhancement Course	PHY-3510	Maintenance and P Laboratory equipm	
				PHY- 3511	Household Electrifi Maintenance and re	


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VI	Discipline Specific Elective Course	PHY- 361	Solid State Physics	2
		PHY- 362	Quantum Mechanics	2
		PHY- 363	Thermodynamics and Statistical Physics	2
		PHY- 364	Nuclear Physics	2
		PHY- 365	Electronics II /Advanced Electronics	2
		PHY- 366	Elective II (Select any One)	2
		PHY- 367	Physics Laboratory-4A	2
		PHY- 368	Physics Laboratory-4B	2
		PHY- 369	Project	2
	Skill Enhancement Course	PHY-3610	Maintenance and Repairing of Laboratory Equipment – II	2
		PHY- 3611	Household Electrification, Maintenance and Repairing- II	2


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SEMISTER-I**Course code and title: PHY-111 Mechanics and Properties of Matter****Lectures: 36****(Credits-02)****1. Motion:****(9 Lectures)**

Introduction to motion, Types of motion, Displacement, Velocity, Acceleration, Inertia, Newton's laws of motion with their explanations, Various types of forces in nature, Frames of reference (Inertial and Non inertial), Laws of motion and its real life applications, Problems.

2. Work and Energy:**(7 Lectures)**

Kinetic energy, Work Energy Theorem, Work done with constant force, Work done with varying force (spring force), Conservative and Non conservative forces, Potential energy, Law of energy conservation, Gravitational potential energy, Problems.

3. Fluid Mechanics:**(8 Lectures)**

Concept of viscous force and viscosity, Coefficient of viscosity, Steady and Turbulent flow, Reynolds number, Equation of continuity, Bernoulli's Principle, Applications of Bernoulli's Principle (Ventury Meter, PitotTube), Applications of viscous fluids, Problems.

4. Properties of Matter:**(12 Lectures)**

Surface tension, Angle of contact, Factors affecting surface tension, Jaeger's method for determination of surface tension, Applications of surface tension.

Stress and Strain, Hook's law and Coefficient of elasticity, Young's modulus, Bulk modulus, Modulus of rigidity, Work done during longitudinal strain, Volume strain, Shearing strain, Poisson's ratio, Relation between three elastic moduli, (Y , η , K), Applications of elasticity, Problems.

Reference Books

1. Physics: Resnick, Halliday & Walker 9/e, Wiley.
2. University Physics : Sears and Zeemansky, XIth/XIIth Edition, Pearson Education.
3. Mechanics: D. S. Mathur, S. Chand and Company, New Delhi.
4. Elements of Properties of Matter : D. S. Mathur, S. Chand, New Delhi.
5. Concepts of Physics: H. C. Verma, Bharati Bhavan Publisher.
6. Problems in Physics: P. K. Srivastava, Wiley Eastern Ltd.
7. Applied Fluid Mechanics: Mott Robert, Pearson Benjamin Cummir V Education/Prentice Hall International, New Delhi.
8. Fundamentals of Mechanics: J C Upadhyaya, Himalaya Publishing Hous
9. Mechanics: D. S. Mathur, Revised by P. S. Hemne, S. Chand and Compa
- 10.



Course code and title: PHY-112 Physics Principles and Applications**Lectures: 36****(Credits-02)****Learning Outcomes:**

On successful completion of this course students will be able to do the following:

1. To understand the general structure of atom, spectrum of hydrogen atom.
2. To understand the atomic excitation and LASER principles.
3. To understand the bonding mechanism and its different types.
4. To demonstrate an understanding of electromagnetic waves and its spectrum.
5. Understand the types and sources of electromagnetic waves and applications.
6. To demonstrate quantitative problem solving skills in all the topics covered.

1. Physics of Atoms**(08-Lectures)**

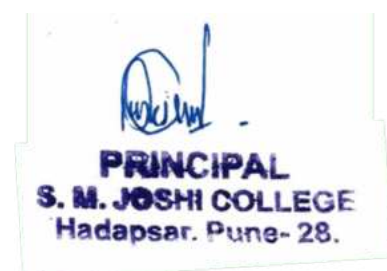
- 1.1 Introduction to Atom
- 1.2 Atomic Models:
 - 1.2.1 Thomson's Atomic Model
 - 1.2.2 Rutherford's Atomic Model
 - 1.2.3 Bohr's Atomic Model
- 1.3 Atomic Spectra:
 - 1.3.1 Emission line Spectrum
 - 1.3.2 Absorption line spectrum
 - 1.3.3 Uses of Atomic Spectra
- 1.4 Classical planetary model of Hydrogen Atom
- 1.5 The Bohr Theory of the Hydrogen Atom
- 1.6 The Hydrogen Spectrum
- 1.7 Frank-Hertz experiment
- Problems

2. LASERS and Its Applications**(07-Lectures)**

- 2.1 Introduction to LASERS
- 2.2 Basic Principle of Lasers: Three Processes
- 2.3 Characteristics of Lasers: brief explanation
- 2.4 Boltzmann Distribution Law
- 2.5 Population Inversion and Pumping
- 2.6 Types of Lasers:
 - 2.5.1 He-Ne Laser
 - 2.5.2 Ruby Laser
- 2.7 Applications of Lasers
- Problems

3. Physics of Molecules**(08-Lectures)**

- 3.1 Introduction to Bonding Mechanisms
- 3.2 Forces between Atoms
- 3.3 Types of Bonding:
 - 3.3.1 Ionic Bonds
 - 3.3.2 Covalent Bonds
 - 3.3.3 van der Waal's Bonds
 - 3.3.4 Hydrogen Bond
 - 3.3.5 Metallic Bond
- 3.4 Rotation energy levels of a diatomic molecule
- 3.5 Vibration energy levels of a diatomic molecule
- Problems



4. Sources of Electromagnetic Waves**(06-Lectures)**

- 4.1 Introduction to Electromagnetic Waves: Historical Perspective
- 4.2 General properties of Electromagnetic radiations
- 4.3 Electromagnetic spectrums and its sources
- 4.4 Production of electromagnetic waves: Hertz experiment
- 4.5 Plank's hypothesis of Photons
- 4.6 Applications of various waves in electromagnetic spectrum

5. Applications of Electromagnetic Waves**(07-Lectures)**

- 5.1 Microwave oven
 - 5.2 RADAR
 - 5.3 Pyroelectric thermometer
 - 5.4 X-ray radiography
 - 5.5 CT Scan
 - 5.6 Solar cell and its types
- Problems

Books/References

1. Concepts of Modern Physics: A Beiser (6th ed., McGraw Hill, 2003
2. Modern Physics: Raymond A. Serway, Clement J. Moses, Curt A. Moyer
3. Sears and Zemansky's University Physics: H.D. Young R. A. Freedman, Sandin (11th Ed. Pearson Education)
4. LASERS: M. N. Avdhanulu, S. Chand Publications.



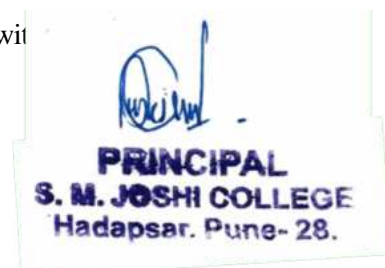
Course code and title: PHY-113 Physics Laboratory 1A**Practical: 10****(Credits-1.5)****Section I- Mechanics and Properties of Matter**

Sr. No	Title of the experiment
1	Study and use of various measuring Instruments. 1. Vernier caliper 2. Micrometer Screw Gauge 3. Travelling Microscope
2	Study of Modulus of Rigidity of wire using Torsional Oscillations
3	Determination of coefficient of Viscosity by Poiseuille's method
4	Determination of “Y” and “ η ” by flat spiral spring
5	Determination of “Y” by bending method.
6	Study of surface tension by Jaeger's method
7	Study of Poisson's ratio of rubber using rubber tube /rubber chord
8	Study of surface tension of liquid using Fergusson Method

Section II-Physics Principles and Applications

Sr. No	Title of the experiment
1	Study of Spectrometer and determination of angle of prism
2	Study of Spectrometer calibration and determination of refractive indices of different colors
3	Study of divergence of LASER beam
4	Study of total internal reflection using LASER
5	Determination of Plank's constant
6	Determination of wavelength of LASER light by plane diffraction grating
7	Study of I-V characteristics of solar cell

Note: Any four experiments from each section be conducted during the semester, with experiments.



SEMISTER-II**Course code and title: PHY-121 Heat and Thermodynamics****Lectures: 36****(Credits-02)****1. Fundamentals of Thermodynamics****(10 Lectures)**

Concept of thermodynamic state, Equation of state, Van der Waal's equation of state, Thermal equilibrium, Zeroth law of thermodynamics, Thermodynamic processes: Adiabatic, Isothermal, Isobaric and Isochoric changes, Indicator diagram, Work done during isothermal change, Adiabatic relations, Work done during adiabatic change, Internal energy, Internal energy as state function, First law of thermodynamics, Reversible and Irreversible changes, Problems.

2. Applied Thermodynamics:**(9 Lectures)**

Conversion of heat into work and its converse, Second law of thermodynamics, Concept of entropy, Temperature - entropy diagram, T-dS equations, Clausius - Clapeyron latent heat equations, Problems.

3. Heat Transfer Mechanisms**(9 Lectures)**

Carnot's cycle and Carnot's heat engine and its efficiency, Heat Engines: Otto cycle & its efficiency, Diesel cycle & its efficiency, Refrigerators: General principle and coefficient of performance of refrigerator, Simple structure of Vapour compression refrigerator, Air Conditioning: Principle and its applications, Problems.

4. Thermometry:**(8 Lectures)**

Concept of heat & temperature, Principle of thermometry, Temperature scales & inter-conversions, Principle, Construction and Working: (Liquid thermometers, Liquid filled thermometers, Gas filled thermometers, Bimetallic thermometers, Platinum resistance thermometer, Thermocouple), Problems.

Reference Books:

1. Concept of Physics: H. C. Verma, Bharati Bhavan Publisher.
2. Heat and Thermodynamics: Brijlal, N. Subrahmanyam, S. Chand and Company Ltd.
3. Heat and Thermodynamics: Mark W. Zemansky, Richard H. Dittman, 7th Edition, Mc-Graw Hill International Edition.
4. Thermodynamics and Statistical Physics: J. K. Sharma, K. K. Sarkar, Hi House.
5. Thermal Physics (Heat and Thermodynamics): A. B. Gupta, H. P. Roy b Ltd. Calcutta.
6. Instrumentation: Devices & Systems, Rangan, Mani, and Sarma.



Course code and title: PHY-122 Electricity and Magnetism**Lectures: 36****(Credits-02)****Learning Outcomes:**

On successful completion of this course students will be able to do the following:

- 1) To understand the concept of the electric force, electric field and electric potential for stationary charges.
- 2) Able to calculate electrostatic field and potential of charge distributions using Coulomb's law and Gauss's law.
- 3) To understand the dielectric phenomenon and effect of electric field on dielectric.
- 4) To Study magnetic field for steady currents using Biot-Savart and Ampere's Circuital laws.
- 5) To study magnetic materials and its properties.
- 6) Demonstrate quantitative problem solving skills in all the topics covered.

1. Electrostatics**(08-Lectures)**

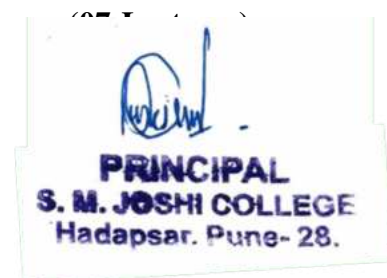
- 1.1 Revision of Coulomb's law:
 - 1.1.1 Statement
 - 1.1.2 Variation of forces with distances
 - 1.2 Superposition principle:
 - 1.2.1 Statement
 - 1.2.2 Explanation with illustration
 - 1.3 Energy of system of charges
 - 1.4 Concept of electric field
 - 1.4.1 Due to point charge
 - 1.4.2 Due to group charges
 - 1.5 Concept of electric flux
 - 1.6 Gauss's law in electrostatics
- Problems

2. Dielectrics**(08-Lectures)**

- 2.1 Introduction to dielectric materials
 - 2.2 Electric Dipole
 - 2.2.1 Electric dipole
 - 2.2.2 Dipole moment
 - 2.3 Electric potential and intensity at any point due to dipole
 - 2.4 Torque on a dipole placed in an electric field
 - 2.5 Polar and non-polar molecules
 - 2.6 Electric polarization of dielectric material
 - 2.7 Gauss' law in dielectric
 - 2.8 Electric vectors and its relation
- Problems

3. Magnetization

- 3.1 Introduction to Magnetization
- 3.2 Magnetic materials
- 3.3 Types of Magnetic Materials
 - 3.3.1 Diamagnetic materials
 - 3.3.2 Paramagnetic materials
 - 3.3.3 Ferromagnetic materials
 - 3.3.4 Antiferromagnetic materials



3.4 Bohr magnetron
Problems

4. Magnetostatics**(07-Lectures)**

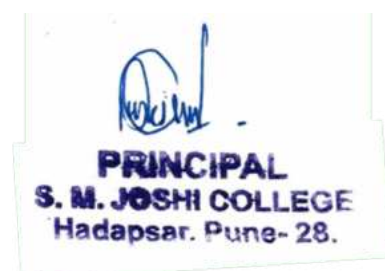
- 4.1 Introduction to magnetization,
 - 4.2 Magnetic Induction and Intensity of magnetization
 - 4.3 Biot-Savart's law:
 - 4.3.1 Statement
 - 4.3.2 Long straight conductor
 - 4.3.3 Circular Coil
 - 4.4 Ampere's circuital law:
 - 4.4.1 Statement
 - 4.4.2 Field of Solenoid
 - 4.4.3 Field of Toroid
 - 4.5 Gauss law for magnetism
- Problems

5. Magnetic Properties of Materials**(06-Lectures)**

- 5.1 Definition
 - 5.1.1 Magnetization (M),
 - 5.1.2 Magnetic Intensity (H),
 - 5.1.3 Magnetic Induction (B),
 - 5.1.4 Magnetic Susceptibility
 - 5.1.5 Magnetic Permeability
 - 5.2 Relation between B, M and H
 - 5.3 Hysteresis and Hysteresis Curve
 - 5.4 Ferrite materials and its Applications
- Problems

References:

1. Fundamentals of Physics: Halliday Resnik and Walkar, 8th Edition.
2. Electromagnetics: B. B. Laud.
3. Foundations of Electromagnetic theory: Reitz, Milford, Christey.
4. Electricity and Electronics: D.C. Tayal, Himalaya Publishing House, Mumbai.
5. Introduction to Electrodynamics: D.G. Griffith.
6. Electricity and Magnetism: Brij Lal, Subramanyan, Ratan Prakashan (Revised edition, 1997).
7. Electricity and Magnetism: Khare, Shrivastav (Revised edition, 1997).



Course code and title: PHY-123 Physics Laboratory 1B**Practical: 08****(Credits-1.5)****Section I- Heat and Thermodynamics**

Sr No	Title of the experiment
1	Interpretation of Isothermal and Adiabatic curve on P-V diagram and theoretical study of Carnot's cycle by drawing graphs of Isothermal and Adiabatic curves
2	Study of temperature coefficient of Thermistor.
3	Study of Thermocouple and determination of inversion temperature
4	Study of thermal conductivity by Lee's method
5	Study of specific heat of Graphite
6	Study of Solar constant
7	Determination of calorific values of different fuels

Section II- Electricity and Magnetism

Sr No	Title of the experiment
1	Study of charging and discharging of capacitor
2	Study of LR circuit
3	Study of LCR circuit
4	Study of Kirchhoff's Laws
5	Study of Diode characteristics
6	Study of Voltmeter, Ammeter and Multimeter (AC, DC, ranges and least count)
7	Determination of frequency of AC mains
8	Comparison of capacitor using DeSauty's method

Note: Any four experiments from each section be conducted during the semester.


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Three Year B.Sc. Degree Program in Zoology

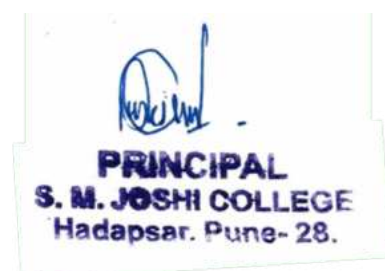
(Faculty of Science & Technology)

F.Y.B.Sc. Zoology

Choice Based Credit System Syllabus

to be implemented from

Academic Year 2019-2020



Preamble:

Zoology is one of the major subjects of Basic Sciences and deals with all aspects of animal biology. It includes an interesting range of highly diverse topics. A zoology student needs to gain understanding of many areas of the subject to keep pace with advancements in Life Sciences.

This under-graduate degree program has been designed by the Board of Studies in Zoology of Savitribai Phule Pune University with a substantial component of what is needed from zoologists as a skilled career and what zoologists need to pursue for post-graduation and further academic studies. It follows the guidelines laid down by the University Grants Commission, New Delhi. This newly designed curriculum is a perfect blend of the classical aspects in Zoology and the advanced and more specialized areas.

This degree offers Discipline Specific Core Courses [CC] in Animal Systematics, Animal Ecology, Animal Cell biology, Applied Zoology, Pest Management, Histology, Biological Chemistry, Genetics, Developmental Biology, Parasitology, Medical & Forensic Zoology, Animal Physiology, Molecular Biology, Entomology, Techniques in Biology and Evolutionary Biology.

In addition to the Core Courses, Ability Enhancement Compulsory Courses [AECC] have been added in the second year i.e. Semester III and Semester IV of the undergraduate course. In the third year i.e. Semester V and Semester VI, Discipline specific Elective Courses [DSEC] and Skill Enhancement Courses [SEC] have been offered. The students, therefore, have an opportunity to take courses in Environment Awareness, Language communication: English/Marathi, Aquarium Management, Poultry Management and Environmental Impact Assessment. In Semester VI the students also have a course dedicated to Project work.

The syllabus has been framed in such a way that the student gains each year, a broader perspective of the subject as he progresses towards completion of the degree program. Field trips, Educational visits and the Project work have been included for the student to experience the applications of the theory learnt in the classroom.

After completion of the program, it is expected that students will understand and appreciate: animal diversity, few applications of Zoology, the structure, functions and life processes at cellular, tissue, organ and system level, significance of evolution, and basic concepts of human health. The students would also gain an insight into laboratory and field work through the practical course, field work and the project.

While presenting this new syllabus to the teachers and students of F.Y.B.Sc. Zoology, I am extremely happy to state that efforts have been made to seek inputs of all the stake holders to make it more relevant.

The new course that will be effective from the academic year 2019- 2020 and will follow the Choice Based Credit System in a Semester mode. It has been primed to meet the distinctive requirements of B.Sc. Zoology students. The contents have been designed to accommodate the widening prospects of the discipline of Life Sciences. The program has been introduced for the subject group while 08 credits to earn from any of the 08 groups of curricular, cocurricular and extracurricular activities. This pattern has been designed towards the overall development of the students'. The calculation of credits and CGPA will



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be as per the guidelines of the University. The B.Sc. Zoology program provides an appropriate blend of classical and applied aspects of the subject. This newly designed curriculum will allow students to acquire the skill in handling scientific instruments planning and performing in the laboratory and exercising critical judgement, independent thinking and problem solving skills. The Syllabus has been revised with the following aims

- To foster curiosity in the students for Zoology
- To create awareness amongst students for the basic and applied areas of Zoology
- To orient students about the importance of abiotic and biotic factors of environment and their conservation.
- To provide an insight to the aspects of animal diversity.
- To inculcate good laboratory practices in students and to train them about proper handling of lab instruments.



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1. Course Structure:

Course Structure with Credit Distribution of the Undergraduate Science Program in Zoology

Course	Course Code and Name of the Course		Credits
F.Y.B.Sc.	SEMESTER I	SEMESTER II	
CC	ZO-111 Animal Diversity I	ZO-121 Animal Diversity II	2+2
CC	ZO-112 Animal Ecology	ZO-122 Cell Biology	2+2
CC	ZO-113 Zoology Practical Paper	ZO-123 Zoology Practical Paper	1.5 +1.5
S.Y.B.Sc.	SEMESTER III	SEMESTER IV	
CC	ZO-231 Animal Diversity III	ZO-241 Animal Diversity IV	2+2
CC	ZO-232 Applied Zoology I	ZO-242 Applied Zoology II	2+2
CC	ZO-233 Zoology Practical Paper	ZO-243 Zoology Practical Paper	2+2
AECC	EVS 231-Environment Awareness	EVA 241-Environment Awareness	2+2
AECC	LA 231-English/Marathi	LA 241- English /Marathi	2+2
T.Y.B.Sc.	SEMESTER V	SEMESTER VI	
DSEC	ZO-351 Pest Management	ZO-361 Medical & Forensic Zoology	2+2
DSEC	ZO-352 Histology	ZO-362 Animal Physiology	2+2
DSEC	ZO-353 Biological Chemistry	ZO-363 Molecular Biology	2+2
DSEC	ZO-354 Genetics	ZO-364 Entomology	2+2
DSEC	ZO-355 Developmental Biology	ZO-365 Techniques in Biology	2+2
DSEC	ZO-356 Parasitology	ZO-366 Evolutionary Biology	2+2
DSEC	ZO-357 Zoology Practical Paper 1	ZO-367 Zoology Practical Paper 1	2+2
DSEC	ZO-358 Zoology Practical Paper 2	ZO-368 Zoology Practical Paper 2	2+2
DSEC	ZO-359 Zoology Practical Paper 3	ZO-369 Zoology Practical Paper 3	2+2
SEC	ZO-3510 Aquarium Management	ZO-3610 Environmental Impact Assessment	2+2
SEC	ZO- 3511 Poultry Management	ZO-3611 Project	2+2


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Detailed Syllabus of F.Y.B.Sc.

Paper	Semester I Course Code & Course	Credits	No of Lectures	Marks (Internal + University)	Semester II Course Code & Course	Credits	No of Lectures	Marks (Internal + University)
I	ZO-111 Animal Diversity I	02	30	15+ 35= 50	ZO-121 Animal Diversity II	02	30	15+ 35 = 50
II	ZO-112 Animal Ecology	02	30	15+ 35 = 50	ZO-122 Cell Biology	02	30	15+ 35 = 50
III	ZO-113 Zoology Practical Paper	01	15 practical	15+ 35 = 50	ZO-123 Zoology Practical Paper	01	15 Practical	15+ 35 = 50

Course No.	Course Title	Total Number of lectures/practical per Term	Standard of passing		
			Internal marks	University marks	Total marks
ZO-111 (First term)	Animal Diversity-I	Three lectures/Week (Total 30 lectures per term)	15	35	50
ZO-121 (Second term)	Animal Diversity-II	Three lectures/Week (Total 30 lectures per term)	15	35	50
ZO-112 (First term)	Animal Ecology	Three lectures/Week (Total 30 lectures per term)	15	35	50
ZO-122 (Second Term)	Cell Biology	Three lectures/Week (Total 30 lectures per term)	15	35	50
ZO-113 (First term)	Zoology Practical Paper	Practical session of 3 hours. 15 Practicals	15	35	50
ZO-123 (Second Term)	Zoology Practical Paper	Practical session of 3 hours. 15 Practicals	15		


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Animal Diversity I & II**Objectives:**

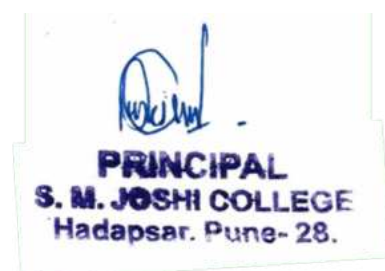
1. To understand the Animal diversity around us.
2. To understand the underlying principles of classification of animals.
3. To understand the terminology needed in classification.
4. To understand the differences and similarities in the various aspects of classification.
5. To classify invertebrates and to be able to understand the possible group of the invertebrate observed in nature. to understand our role as a caretaker and promoter of life.

Learning outcomes for the course:

1. The student will be able to understand classify and identify the diversity of animals.
2. The student understands the importance of classification of animals and classifies them effectively using the six levels of classification.
3. The student knows his role in nature as a protector, preserver and promoter of life which he has achieved by learning, observing and understanding life.

Course Title: Animal Diversity –I**Course Code-ZO-111****Semester I****(2 credits-30 lectures)**

No.	Title & Contents	Number of lectures
1.	Principles of Classification: Taxonomy & Systematics 1.1 Taxonomy: Basic terminology and Introduction • Alpha, Beta and Gamma levels of taxonomy, Micro-taxonomy • Macro taxonomy: Phenetics (numerical taxonomy, Cladistics (Phylogenetic systematics), Evolutionary taxonomy (evolutionary systematics) • Classical taxonomy and experimental or neo taxonomy (biochemical taxonomy and Cytotaxonomy) • Significance of Taxonomy 1.2 Systematics: definition introduction	(05)



1.3 Linnaean system of classification (Six level classification: Phylum, class, order, family, genus, species)

1.4 Concept of Species: Biological & Evolutionary

1.5 Introduction to Binomial Nomenclature.

1.6 Introduction to Five kingdom system.

2. **General Features of kingdom Animalia** (02)

2.1 General characters of Kingdom Animalia, Grades of organization

2.2 Symmetry.

3. **Kingdom Protista (Phylum: Protozoa)** (07)

3.1 Introduction to Phylum Protozoa

3.2 Salient features of Phylum Protozoa

3.3 Classification of Phylum Protozoa up to classes with two examples of each class (names only).

Class Rhizopoda (e.g :*Entamoeba histolytica*, *Arcella*),

Class Mastigophora (e.g: *Euglena viridis*, *Trypanosoma gambiense*),

Class Ciliata (e.g *Paramecium caudatum*, *Opalina ranarum*),

Class Sporozoa (e.g *Plasmodium vivax*, *Toxoplasma gondii*)

3.4 Locomotion in Protozoa: Amoeboid, Ciliary and Flagellar with suitable examples

3.5 Type Study: ***Paramecium caudatum***: Classification, Habit and Habitat, External morphology, Feeding and digestion, Excretion, Reproduction (binary fission and conjugation)

3.6. Economic importance of Protozoa (three harmful and one useful protozoan)

3.6.1-**Harmful Protozoa:**

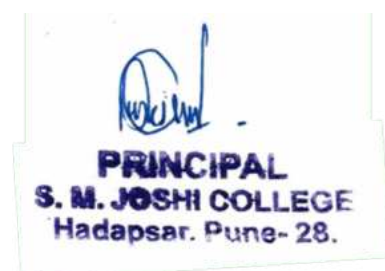
Plasmodium vivax (malarial parasite),

Entamoeba histolytica (Amoebic dysentery),

Trypanosoma gambiense (Gambian sleeping sickness).

3.6.2- **Useful Protozoa:**

Trichonympha



4. **Origin of Metazoa** (01)

4.1 Introduction Origin and importance of Metazoa

5. **Phylum Porifera** (06)

5.1. Introduction to Phylum Porifera

5.2 Classification of Phylum Porifera up to classes with two examples of each class (names only, no description of specimens).

Class Calcarea (e.g.: *Leucosolenia*, *Sycon* (*Scypha*))

Class Hexactinellida (e.g: *Euplectella* (venus flower basket), *Hyalonema* (glass sponge))

Class Demospongiae (e.g: *Chalina* (Mermaid's gloves, *Spongilla* (fresh water sponge))

5.3 Canal system in sponges: Ascon, Leucon and Rhagon type.

5.4 Skeleton in sponges: Spicules, its types:

Microscleres & Megascleres,

Monoaxon – monactinal, diactinal, Amphidiscs, Triaxon, Polyaxon, Spongin fibres.

5.5 Regeneration in sponges.

5.6 Economic importance of Phylum Porifera.

6. **Phylum: Cnidaria** (05)

6.1 Introduction to Phylum Cnidaria

6.2 Salient features of Phylum Cnidaria

6.3 Classification of Phylum Cnidaria up to class level with given examples each class (names of examples only)

Class Hydrozoa e.g.: *Hydra*, *Physalia* (Portuguese man of war)

Class Scyphozoa e.g: *Aurelia* (Jelly fish), *Leucernaria* (trumpet shaped Jellyfish)

Class Anthozoa: e.g; *Metridium* (Common sea anemone)

6.4 Polymorphism in Hydrozoa: Polyps & Medusa (polyp types: gastrozooids, dactylozooids, gonozooids) and functions

6.5 Economic importance of Cnidarians with reference to Corals and Coral reefs.



7. Phylum Platyhelminthes (04)

7.1 Introduction to Phylum Platyhelminthes

7.2 Salient features of Phylum Platyhelminthes

7.3 Classification of Phylum Platyhelminthes up to classes with two examples each class (names of examples only).

Class: Turbellaria (e.g: *Dugesia*, *Bipallium*)

Class: Trematoda (e.g: *Fasciola hepatica*, *Schistosoma haematobium*)

Class Cestoda: (*Taenia solium* (pork tape worm), *Echinococcus granulosus* (dog tapeworm))

7.4 Parasitic adaptations in Platyhelminthes: structural and physiological.

7.5 Economic importance of Platyhelminthes

Course Title: Animal Ecology

Course Code: ZO 112

Semester I

(2 Credits-30 Lectures)

Learning outcomes for the course:

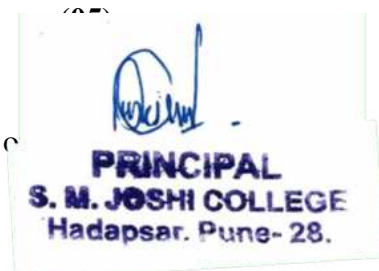
- The learners will be able to identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.
- To understand anticipate, analyse and evaluate natural resource issues and act on a lifestyle that conserves nature.
- The Learner understands and appreciates the diversity of ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community.
- The learner will be able to link the intricacies of food chains, food webs and link it with human life for its betterment and for non-exploitation of the biotic and abiotic components.
- The working in nature to save environment will help development of leadership skills to promote betterment of environment.



PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar, Pune- 28.

ZO 112: Animal Ecology**(2 Credits-30 Lectures)**

No.	Topic & Content	Number of lectures
1.	Introduction to Ecology 1.1 Concepts of Ecology, Environment, Population, Community, Ecosystem, Biosphere, Autecology and synecology.	(02)
2.	Ecosystem 2.1 Types of ecosystems: Aquatic (Freshwater, estuarine, Marine and terrestrial (Forest, Grassland and Desert) 2.2 Structure and Composition of Ecosystem (Abiotic components and biotic components. 2.3 Food chain: Detritus and grazing food chains, Food web, Energy flow through the ecosystem, Ecological pyramids: Number, Biomass, and Energy. 2.4 concept of Eutrophication in lakes and rivers.	(08)
3	Population 3.1Characteristic of population: Density, Natality, Mortality, Fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion. 3.2Exponential and logistic growth, 3.3 Population regulation – density-dependent and independent factors. Population interactions, Gause's Principle with laboratory and field interactions, 3.4 Quadrature, line and belt transect methods.	(08)
4.	Community 4.1Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Eco tone and edge effect; Ecological succession with one example.	(07)
5.	Animal interactions 5.1Introduction to Animal interactions 5.2 Types of Animal interactions with at least to suitable examples of each 5.2.1-Competition: Interspecific and intraspecific	(05)



5.2.2- Beneficial Associations:

Commensalism (remora fish on shark, Cattle egrets on livestock),

Mutualism (Termite and *Trichonympha*, bees and flowers, cleaning symbiosis in fish by prawns).

5.3 Antagonistic associations: Parasitism (*Ascaris* and man, lice and humans), Prey predation (Lion and deer).

Course Title: Zoology Practical Paper

Course Code: ZO113

Semester I

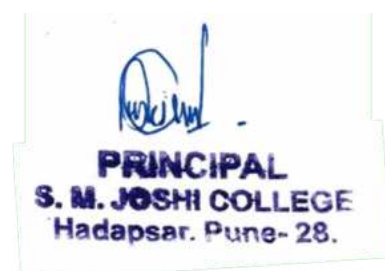
(1.5 Credits-45 Hours)

Animal Diversity –I

1. Museum Study of phylum Protozoa: *Euglena*, *Paramecium*, *Amoeba*, *Plasmodium* sp.
2. Museum study of Phylum Porifera: *Sycon*, *Euplectella*, *Chalina*, *Spongilla*.
3. Museum study of phylum Cnidaria: *Hydra*, *Physalia*, *Aurelia*, *Metridium*.
4. Museum Study of phylum Platyhelminthes: *Planeria*, *Faciola hepatica*, *Taenia solium*
5. Study of *Paramecium*: Culture, External morphology, Conjugation and Binary fission.
6. Study of permanent slides: Spicules and Gemmules in Sponges, T.S. of *Sycon*, T.S. of *Hydra*, *Taeniasolium*: Scolex, Gravid proglottid.
7. Identification of any three museum specimen with help of taxonomic identification key.
8. Visit to Zoological survey of India/ Museum/National Park.

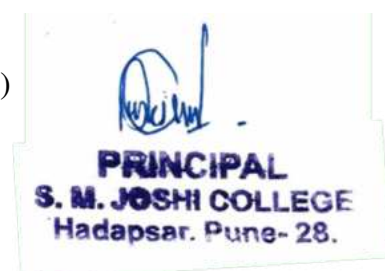
Animal Ecology:

1. Estimation of Dissolved oxygen from given water sample.
2. Estimation of Water Alkalinity from given water sample.
3. Study of animal community structure by quadrat method (Field or Simulation).
4. Determination of density, frequency and abundance of species by quadrat method.
5. Study of microscopic fauna of freshwater ecosystem (from pond).
6. Estimation of water holding capacity of given soil sample.
7. Estimation of dissolved and free carbon dioxide from water sample.
8. Study of Eutrophication in lake/river.



Course Title: Animal Diversity –II**Course Code: ZO-121:****Semester II****(2 credits-30 lectures)**

No.	Title & Contents	Number of lectures
1.	Phylum Aschelminthes	(04)
	1.1 Introduction to phylum Aschelminthes	
	1.2 Salient features of Phylum Aschelminthes	
	1.3 Classification of Phylum Aschelminthes (Class Nematoda only with two examples – <i>Ascaris lumbricoides</i> (common round worm), <i>Wuchereria bancrofti</i> (Elephantiasis)).	
	1.4 Economic importance of class Nematoda.	
2.	Phylum Annelida	(06)
	2.1 Introduction to Phylum Annelida	
	2.2 Salient features of Phylum Annelida.	
	2.3 Classification of Phylum Annelida up to classes with examples of following classes (names of examples only). Class Polychaeta (e.g: <i>Nereis pelagica</i> (<i>neries</i> / sand worm, <i>Aphrodita aculeata</i> (=Aphrodite/ seamouse) Class Oligochaeta (e.g.: <i>Pheritima posthuma</i> (earthworm), Class Hirudinea (e.g: <i>Hirudinaria granulosa</i> common cattle leech)	
	2.4 Economic importance of Annelida with reference to earthworms as friends of farmers and in their role in vermicomposting.	
3.	Phylum Arthropoda	(06)
	3.1 Introduction to Phylum Arthropoda	
	3.2 Salient features of Phylum Arthropoda	
	3.3 Classification of Phylum Arthropoda with specific classes and mentioned examples (names only) Class:Crustacea: <i>Palaemon palaemon</i> (Prawn) <i>Brachyura</i> spp. crabs) Class: Chilopoda: <i>Scolopendra</i> sp. (centipede) Class: Diplopoda: <i>Julus</i> sp. (millipede)	



Class Insecta: *Periplaneta americana* (American Cockroach),
Anopheles stephensi (mosquito).

Class: Arachnida- Spiders, *Buthus sp* (scorpion)

3.4 mouth parts in insects: Mandibulate (cockroach), Piercing and sucking (female *Anopheles* mosquito), chewing and lapping type (honey bee)

3.5 Economic importance of Arthropoda

Useful Insects: Honey bee, Lac insect, Silkworm.

Harmful insects: Female *Anopheles* mosquito, Red cotton bug, Rice weevil

4. **Phylum Mollusca** (06)

4.1 Introduction to Phylum Mollusca

4.2 Salient features of Phylum Mollusca

4.3 Classification of Phylum Mollusca with specific classes and mentioned examples (names only)

Class Gastropoda e.g *Pila globosa* (apple snail)

Class Pelecypoda e.g *Lamellidens marginalis* (Bivalve)

Class Polyplacophora e.g *Chiton*

Class: Cephalopoda e.g: *Octopus vulgaris* (common octopus), *Sepia officinalis* (common Cuttle fish)

4.4 Economic importance of Mollusca.

5. **Study of Phylum Echinodermata** (08)

5.1 Introduction to Phylum Echinodermata

5.2 Salient features of Phylum Echinodermata.

5.3 Classification of Phylum Echinodermata with specific classes and mentioned examples (names only)

Class Asteroidea (*Asterias rubens* sea stars or starfish)

Class: Holothuroidea. *Holothuria sp.* sea cucumbers)

Class: Echinoidea (*Echinus esculentis* common sea urchins)

Class: Crinoidea (sea lilies or feather stars)



5.4 Type study: *Asterias rubens* (Sea Star): Classification, Habit
Habitat, External Morphology, Digestive system, Water vascular
System and autotomy and regeneration

5.5 Pedicellaria in Echinodermata: straight, crossed, valvate,
tridactylous, globigerous.

5.6 Economic importance of Echinodermata.

Course Title: Cell biology

Course Code: ZO122:

Semester II

(2 credits-30 lectures)

Learning outcomes for Cell Biology

- The learner will understand the importance of cell as a structural and functional unit of life.
- The learner understands and compares between the prokaryotic and eukaryotic system and extrapolates the life to the aspect of development.
- The dynamism of bio membranes indicates the dynamism of life. Its working mechanism and precision are responsible for our performance in life.
- The cellular mechanisms and its functioning depends on endo-membranes and structures. They are best studied with microscopy.

ZO122: Cell biology

(2 credits-30 lectures)

No. Title & Contents

Number of lectures

1. Introduction:

(04)

1.1 Introduction cell biology,

1.2 Cell as basic unit of life.

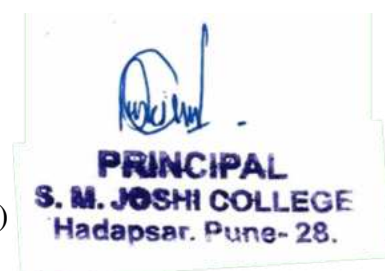
1.3 Importance of Cell Biology and its applications in industry.

Overview of Cells

1.3 Introduction to Prokaryotic and Eukaryotic cells.

1.4 Structure and function of Prokaryotic (*E. coli*)

1.5 Structure and function of Eukaryotic cells (Animal and Plant Cell)



2 Techniques in Cell Biology: (04)

3.1 Introduction

3.2 Microscopy: Basic Principle, Simple, Compound and applications of Electron Microscope.

3.3 Stains and dyes:

Types of Stain: Acidic, basic and neutral.

Dye (Preparation and chemistry of dyes not expected)

3.4 Micrometry.

3 Plasma Membrane: (06)

4.1 Introduction

4.2 Structure of plasma membrane: Fluid mosaic model.

4.3 Transport across membranes: Active and Passive transport, Facilitated transport, exocytosis, endocytosis, phagocytosis – vesicles and their importance in transport.

4.4 Other functions of Cell membrane in brief Protection, cell recognition, shape, storage, cell signalling.

4.5 Cell Junctions: Tight junctions, gap junctions, Desmosomes.

4 Nucleus: Structure and function (04)

5.1 Introduction to Nucleus

5.2 Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleoplasm, Nucleolus

5.3 Chromatin: Eu-chromatin and Hetro-chromatin, nature and differences.

5.4 Functions of nucleus

5. Endomembrane System (04)

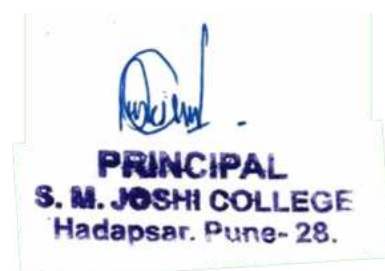
6.1 Introduction

6.2 Structure, location and Functions: Endoplasmic Reticulum, Golgi apparatus, Lysosomes and vacuoles.

7. Mitochondria and Peroxisomes

7.1 Introduction

7.2 Mitochondria: ultrastructure and function of mitochondrion.



7.3 Peroxisomes

Cell Division**(05)**

7.1 Introduction

7.2 Cell cycle (G1, S, G2, M phases),

7.3 Mitosis.

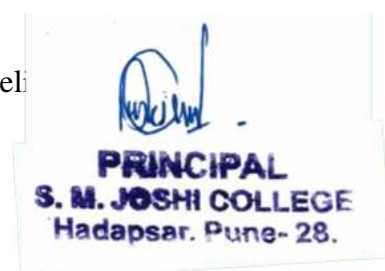
7.4 Meiosis.

Course Title: Zoology Practical Paper**Course Code: ZO123****Semester II****(1.5 Credits-45 Hours)****Animal Diversity –II**

1. Museum study of Phylum Aschelminthes: *Ascaris lumbricoides*,
2. Museum study of phylum Annelida: *Neries*, Earthworm, Leech.
3. Museum study of phylum Arthropoda: Prawn, Cockroach, Centipede, Millipede, Crab
4. Museum study of phylum Mollusca: *Pila*, *Chiton*, Bivalve, Octopus.
5. Museum study of phylum Echinodermata: Sea Star, Sea urchin, Brittle Star, sea cucumber.
6. Study of permanent slides: Mouthparts of Insects -Mandibulate, Piercing and sucking, Chewing and Lapping.
7. Types of Shells in Mollusca. *Pila*, Bivalve, Chiton, Sepia.
8. Economic importance of honey bees, Lac insects silk worms, red cotton bug, Anopheles mosquito
9. Earthworm: vermicomposting bin preparation and maintenance.
10. Visit to a vermicomposting unit/ field for insect pest collection and its identification

Cell Biology

1. Study of Microscope: Simple and Compound
2. Micrometry: Measurement of microscopic objects
3. Study of cell: Preparation of temporary mount of human buccal epithel
4. Preparation of blood smears to observe the blood cells
5. Temporary preparation of mitotic cell from onion roots
6. Study of Cell organelles (any three) by using microphotographs



Recommended Reference Books

Animal Diversity – I and II

1. Anderson, D.T (Ed) 1988: Invertebrate Zoology, Oxford University Press.
2. Barnes, R.D. (1982). Invertebrate Zoology, V Edition. Holt Saunders International Edition.
3. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
4. Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson
5. Boradale, L.A. and Potts, E.A. (1961). Invertebrates: A Manual for the use of Students. Asia Publishing Home.
6. Brusca, R.C and Brusca, G. J (2003): Invertebrate (2nd ed.) Sinauer Associates Inc., Publishers Sunderland.
7. Hadzi, J (1963): The Evolution of Metazoa, Macmillan Newyork.
8. Hyman, L. H (1940): Invertebrates Vol I, Protozoa through ctenophore.
9. Hyman. L. H (1955): The Invertebrates Vol: IV, Echinodermata, the coelomate bilateria, Mcgraw Hill, Newyork.
10. Modern Text-Book of zoology, Vertebrates. By Kotpal, RL., Rastogi and Co., Meerut.
11. Nigam H.C., Zoology of Chordates, Vishal Publication, Jalandhar-144008.
12. Phylum Protozoa to Echinodermata (series) by Kotpal, RL. Rastogi and Co., Meerut
13. Parker T.J and W.A Haswell (1972): A text book of Zoology, Vol –I (7th edition by Marshall and Williams) Mcmillan Press ltd.
14. Jordan, E.L. and P.s.Verma Invertebrate Zoology, S. Chand and Co., Ltd. Ram Nagar, New Delhi.
15. Russel Hunter: - A Biology of higher invertebrates, MacMillon Co. Ltd. London



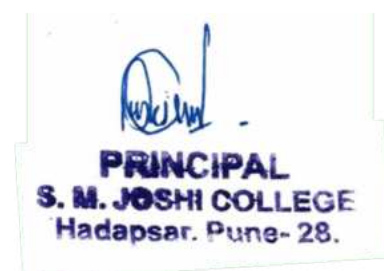
Animal Ecology

1. Colinviaux, P. A. (1993). Introduction to Ecology. II Edition. Wiley, John and Sons, Inc.
2. Krebs, C. J. (2001). Ecology: The Experimental Analysis of Distribution and Abundance, 6th Edition, ©2009, Pearson
3. Odum, E.P., (2008). Fundamentals of Ecology. Indian Edition. Brooks/Cole
4. Robert Leo Smith Ecology and field biology Harper and Row publisher
5. Ricklefs, R.E., (2000). Ecology. V Edition. Chiron Press
6. Sharma P.D. (2002) Ecology and Environment, Himalaya Publication

Cell Biology

1. Karp, G. (2010). *Cell and Molecular Biology: Concepts and Experiments*. VI Edition John Wiley and Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). *Cell and Molecular Biology*. VII Edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. (2009). *The Cell: A Molecular Approach*. V Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). *The World of the Cell*. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
5. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008). *Molecular Biology of the Cell*, V Edition, Garland publishing Inc., New York and London
6. Inside the Cell (2005); US Department of Health Sciences, National Institute of Health, Natinal institute of General Medicine Sciences.
7. Lodish, H., D. Baltimore, A. Berk, L. Zipursky, M. Matsudaira and J. Darnell. (2010).
8. Molecular Cell Biology, Eds. 3, Scientific American & W. H. Freeman. New York.
9. Powar C B.: Cell Biology, Himalaya Publication, Meerut

Note: Latest editions of the recommended books may be referred.





Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Electronic Science

(Faculty of Science & Technology)

F.Y.B.Sc. (Electronic Science)

Choice Based Credit System (CBCS) Syllabus

To be implemented from Academic Year 2019-2020

Title of the Course: B. Sc (Electronic Science)**Preamble:**

Electronics technology has revolutionized various fields including communication, consumer appliances, medical, defense and so on. The advances in technology are making systems smaller, smarter and powerful. Electronics is an important branch of Science devoted to design implementation and analysis of circuits and systems. Knowledge of Electronics is based on fundamental laws of Physics and though new chips/SOC's are fabricated every day, basic principles remain the same.

The goal of the three-year course is to instill in students a confidence that they can get a grip of the subject and apply it for designing, testing and analyzing systems. The course will also make use of problem-solving approach wherein the students will be trained to apply the acquired knowledge to design and analyze circuits for specific applications. The students will be familiarized with programming languages, various development tools, modeling and simulation tools through lab sessions.

The syllabus has been designed such that basic fundamental concepts, knowledge and specific practical skills of the students are developed. The students will be first introduced to various components, devices and their applications, Network theorems and applications of electronics in day to day life. Digital Electronics fundamentals, Operational amplifier circuits, and its applications will be covered in the second semester. In the Second year the students will be taught the basic principles of communication, Analog and digital circuit design and Microcontrollers. In the third year the students will be given an insight to concepts of Embedded System Design, VLSI Technology, Communication systems and various discipline specific courses with a Project in the final semester.

Titles of Papers and Scheme of Study Evaluation**F. Y. B. Sc. Electronic Science**

Sem	Paper Code	Paper	Paper title	Credits	Lectures/Week			Evaluation		
					Th	Tut	Pr.	CA	UE	Total
I	EL- 111	I	Basics of Applied Electronics	2	3			15	35	50
	EL- 112	II	Electronic Devices and Circuits	2	3			15	35	50
	EL-113	III	Electronics Lab IA	1.5			3.15	15	35	50
II	EL-121	I	Fundamentals of Digital Electronics	2	3			15	35	50
	EL-122	II	Analog and Digital device Applications	2	3			15	35	50
	EL-123	III	Electronics Lab IB	1.5			3.15	--	--	--

S. Y. B. Sc. Electronic Science

Sem	Paper Code	Paper	Paper title	Credits	Lectures/Week			Evaluation		
					Th	Tut	Pr.	CA	UE	Total
III	EL-231	I	Analog Communication	2	4			15	35	50
	EL-232	II	Digital System Design	2	4			15	35	50
	EL-233	III	Electronics Lab IIA	2			4	15	35	50
IV	EL-241	I	Analog Circuit Design	2	4			15	35	50
	EL-242	II	Microcontroller	2	4			15	35	50
	EL-243	III	Electronics Lab IIB	2			4	15	35	50

T. Y. B. Sc. Electronic Science

Sem		Paper Code	Paper	Paper title	Credits
V	Discipline Specific Elective Course	EL-351	I	Theory Paper 1	2
		EL-352	II	Theory Paper 2	2
		EL-353	III	Theory Paper 3	2
		EL-354	IV	Theory Paper 4	2
		EL-355	V	Theory Paper 5	2
		EL-356	VI	Theory Paper 6	2
		EL-357	VII	Electronics Lab IIIA	2
		EL-358	VIII	Electronics Lab IIIB	2
		EL-359	IX	Electronics Lab IIIC	2
	Skill Enhancement Course	EL-3510	X	Theory Paper 7	2
		EL-3511	XI	Theory Paper 8	2
VI	Discipline Specific Elective Course	EL-361	I	Theory Paper 1	2
		EL-362	II	Theory Paper 2	2
		EL-363	III	Theory Paper 3	2
		EL-364	IV	Theory Paper 4	2
		EL-365	V	Theory Paper 5	2
		EL-366	VI	Theory Paper 6	2
		EL-367	VII	Lab IVA: Project	2
		EL-368	VIII	Lab IVB: Project	2
		EL-369	IX	Lab IVC: Project	2
	Skill Enhancement Course	EL-3610	X	Theory Paper 7	2
		EL-3611	XI	Theory Paper 8	2

Semester I**Paper I: EL- 111: Basics of Applied Electronics (2 Credits, 36 lectures)****Semester 1****Theory Lectures: 36****Objective**

1. *To understand importance of Electronics in day today life*
2. *To understand basics of electronic circuits*
3. *To make the students learn through problem solving*
4. *To understand few electronic systems*

Learning outcomes:**After completion of this course student will be able:**

1. *To identify different parameters/functions/specifications of components used in electronic circuits*
2. *To solve problems based on network theorems.*
3. *To perform simulations using simulator for analyzing network performance*

Unit 1: Fundamentals of Electronics (14 L)

Introduction to Electronics, applications of Electronics

Electronic Components: Resistors, Capacitors, Inductors, Relays, Batteries, Switches, cables and connectors, fuses (Only basic concept, working, Specifications and application is expected)

Series and parallel combination of resistors, capacitors and inductors

Voltage and Current Sources: Input and output impedance of AC and DC voltage and/or current sources

Variable and constant voltage and current sources

Unit 2: Network Theorems (10L)

Kirchoff's Voltage Law and Kirchoff's Current Law, Thevenin, Norton , superposition and maximum power transfer theorems

DC and AC analysis of network

Numerical problems based on these network theorems

Unit 3: Introduction to electronic systems (12 L)

Building blocks, working principle and features of Smart Phone System, Security systems: Surveillance Camera System CCTV, Public Address System and thermostat

TEXT BOOKS AND REFERENCE BOOKS:

1. Electronic Principles by Malvino
2. Consumer Electronics by J. S. Chitode Technical Publications, Jan-2007
3. Mobile Cellular Telecommunications Analog and Digital System-By Lee.

Paper II: EL- 112: Electronic Devices and Circuits (2 Credits, 36 lectures)

Objectives:

Semester 1

Theory lectures:36

1. To know about basics of Semiconductor Devices and its parameters
2. To know about the details of diode, transistors, FET and MOSFETS
3. To build and understand application circuits of electronic devices.
4. To encourage the students for making use of simulation software for testing the circuits before experimentation.

Learning outcomes:

After completion of this course student will be able:

1. To analyze performance parameters based on study of characteristics of electronic devices like diode, transistors etc
2. To choose proper electronic devices as per the need of application
3. To perform simulations for designing and analyzing diode/transistor circuits
4. To build and test the circuits like street light controller using electronic devices

Unit 1: PN Junction Diodes (14L)

Junction Diode, Construction, working and V-I characteristics, Depletion region, Barrier Potential, Forward and Reverse bias condition – Junction capacitance.

Diode current equation–Effect of temperature on reverse saturation current

Types of diodes: rectifier diodes, Zener diode

Applications: Voltage regulator using Zener diode, Rectifiers: Half wave, full wave and bridge rectifiers ripple factor, Use of diode in mobile charger and power supply (includes transformer, diodes, C- filter, regulator IC(78XX or 78XX series))

Unit 2: BJT, FET and MOSFET Basics and Applications(12L)

BJT: Symbol, terminals, types, basic operation, configurations and characteristics (Showing different regions)

Applications: Transistor as switch, Transistor as amplifier Transistor as impedance matching network

FET: Terminals, Symbol, Basic operation and FET as Voltage Variable Resistance

MOSFET: Terminals, Symbol, Basic operation, characteristics and MOSFET as switch

Unit 3: Photo Electric Devices:(10L)

Light-Emitting Diodes (LEDs): Symbol and its use in circuit, IR transmitter and receiver applications ,Photo diode circuit , Photo transistors, LDR and its use in street light controller and Opto-Isolators (MCT2E) and its use in isolation

TEXT BOOKS:

1. Electronic Devices and Circuit Theory --- Robert L. Boylestad & Louis Nashelsky.
2. Electronic Devices and Circuits I – T.L.Floyd- PHI Fifth Edition

REFERENCE BOOKS:

1. Integrated Electronics –Millmam & Halkias.
2. Electronic Devices & Circuits – Bogart.
3. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company Ltd

Semester I**EL- 113: ELECTRONICS LAB IA (1.5 Credits)**

Number of Practicals:10**Objectives:**

1. *To teach students how to draw different symbols and circuit diagrams*
2. *To develop skill of circuit connections*
3. *To familiarize the student with different components and devices used in the laboratory and the device manuals*
4. *To familiarize students with laboratory instruments like Ammeter, voltmeter, DMM, Signal Generator, Function Generator, CRO and tools like cutter, stripper etc.*
5. *To train them to design and analyze the circuits for specific purpose*
6. *To teach the students how to analyze the results and calculate performance parameters*
7. *To motivate them to work on different mini projects*

Learning outcomes:**After completion of this course student will be able**

1. *To identify different components and devices as well as their types*
2. *To understand basic parameters associated with each device*
3. *To know operation of different instruments used in the laboratory*
4. *To connect circuit and do required performance analysis*
5. *To compare simulated and actual results of given particular experiment*

Section A: List of Experiments(Any 05)

1. Assignment type experiment: finding values of Electronic components like resistors from color code, capacitors, inductors and their types, know the components like cables, fuses, wires and tools like stripper, cutter, soldering gun etc
2. Know your laboratory instruments: Signal Generators and CRO,DMM
3. To verify Kirchhoff's Voltage and current laws
4. To verify Thevenin's Theorem
5. .To verify Norton's Theorem
6. .To verify Maximum Power Transfer Theorem

7. To verify Superposition theorem
8. To study application circuit of LED
9. How it works: GSM, GPS and Bluetooth(Assignment experiment)
10. Simulation experiment using pSpice (any of the above experiment)

Section B: List of Experiments(Any 05)

1. To study forward and reverse characteristics of Diode characteristics
 2. To study diode rectifier circuits
 3. To design Zener voltage regulator
 4. To design Transistor as a switch(LEDON/OFF)
 - 5.To Study of three terminal voltage regulators
 7. To study MOSFET as a Switch
 8. Simulation experiment using pSpice (any of the above experiment)
-

Semester II

Paper I: EL-121: Fundamentals of Digital Electronics (2 Credits, 36 lectures) Semester II

Theory lectures: 36

Objectives:

1. To know about different number systems and codes
2. To understand logic gates and truth tables
3. To understand combinational logical circuits
4. To understand sequential logical circuits
5. To encourage the students for making use of simulation software for testing and building the circuits before experimentation.

Learning outcomes:

After completion of this course student will be able

1. To solve problems based on interconversion of number systems
2. To reduce the expression using Boolean theorems
3. To reduce expressions using K maps in SOP and POS forms
4. To understand how to use flip flops to build modulus counter
5. To familiarize with applications of counters like ring counter or event counter

Unit 1 : Basics of Digital Electronics(16L)

Number Systems: Decimal, Binary, Hexadecimal, BCD, Gray code and their inter-conversions, ASCII, Complements (1's, 2's), Rules of binary Addition, Subtraction.

Logic gates: positive and negative logic, AND, OR, NOT, EX-OR, NAND, NOR, EX-NOR and truth tables, NAND and NOR universal gates

Boolean Algebra and Theorems: Boolean Theorems, De-Morgan's laws. Digital logic gates, Multi level NAND & NOR gates. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 3 variables), don't care condition.

Basic concept of Arithmetic and logical unit (ALU)

Unit-2 Combinational Logic Circuits (10 L)

Adders-Half & full adder, Subtractor-Half and full subtractors, Parallel Comparator, Digital lock using magnitude comparator Multiplexers (2:1, 4:1, 8:1), Encoder (8-line-to-3-line) and Decoder (3-line-to-8-line). Parity generator and checker.



Unit 3: Sequential Logic Circuits (10 L)

Flip Flops and truth tables: S-R FF , J-K FF, T and D type FFs, Master-Slave FFs, Flip flop as memory device

Shift Registers and their types, serial to parallel and parallel to serial converters using shift registers
Counters : Asynchronous-Mod16, Mod-10, Mod-8, up down counter, Synchronous-Ring counter, Event counter

TEXT BOOKS:

1. M.Morris Mano, "Digital Design " 3rd Edition, PHI, New Delhi.
2. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi. 1999.(UNITS I to IV)
3. G.K.Kharate :Digital electronics-Oxford University Press
4. S.Salivahana &S. Arivazhagan-Digital circuits and design
5. Fundamentals of Digital Circuits by Anand Kumar

Reference Books :

1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics" . McGrawHill.1985.
2. Malvino and Leach. " Digital Principles and Applications". TMGHill Edition.

Paper II: EL- 122: Analog and Digital Device applications (2 Credits, 36 lectures)**Semester II****Total lectures: 36****Objectives:**

1. *To know basics of operational amplifier*
2. *To compare performance parameters of opamp ICs available in market*
3. *To understand basic application circuits of opamp.*
4. *To basics of timer IC 555 and its applications*
5. *To understand data converters and their performance parameters*

Learning outcomes:**After completion of this course student will be able**

1. *To compare different opamps as per specifications or performance parameters*
2. *To understand opamp circuits and its usefulness in different applications*
3. *To know operating principle of IC 555 in different configurations*
4. *To understand different types of DAC and their performance parameters*
5. *To study different types of ADC and their performance parameters*

Unit 1 : Operational Amplifiers(10 L)

Definition, Basic op-amp Ideal op-amp, Block diagram of op-amp, ideal and practical characteristics of inverting, non inverting configuration, virtual ground

Introduction of OPAMP ICs(comparative study)

Unit 2: Applications of Opamp and IC 555 (14 L)

Wave shaping circuits using integrator and differentiator, ON-OFF controller using comparator or Schmitt trigger, Function generator, Audio amplifier, V to I converter, PWM generation IC-555 –functional block diagram , formula of output frequency, duty cycle, pin diagram, astable, monostable and bistable operation

Application circuits: Moisture detector circuit, PWM generation, FSK generator, 50% duty cycle circuit using diode

Unit 3: Data Converters (12 L)

D/A converter: R-2R Ladder network, Binary Weighted DAC

A/D converter:-Counter type ADC, Successive Approximation ADC

Basic operation and block diagram: Digital thermometer

TEXT BOOKS:

1. G.K.Kharate-Digital electronics-oxford university press
2. M.Morris Mano, “ Digital Design “ 3rdEdition, PHI, New Delhi.
3. Op Amp and Linear Integrated Circuits By Ramakant Gaykwad
4. Linear Integrated Circuits By Roy Choudary

REFERENCE BOOKS :

1. Jacob Millan, MicroElectronics, McGrawHill.
2. Mithal G K, Electronic Devices and Circuits, ThanaPublishers.
3. Allan Mottershead ,Electronic Devices and Circuits – An Introduction-PrenticeHall

Semester II**EL- 123: ELECTRONICS LAB IB (1.5 Credits)****Number of Practicals:10****Objectives:**

1. *To build opamp configurations and study its performance*
2. *To build application circuits of opamp and study its performance*
3. *To build application circuits of IC555*
4. *To understand types of ADC and DAC and its performance parameters like accuracy, resolution etc*
5. *To teach the students how to analyze the results and calculate performance parameters*
6. *To understand features of laboratory instruments like Ammeter, voltmeter, DMM, Signal Generator, Function Generator, CRO*

Learning outcomes:**After completion of this course student will be able**

1. *To connect opamp circuits and analyze the output*
2. *To build application circuits of opamp*
3. *To design the output frequency of IC 555 as astable/monostable multivibrator*
4. *To compare simulated and actual results of given circuit*

Section A: List of Experiments (Any 05)

1. Op-Amp as inverting and non-inverting
2. Op-Amp as integrator and differentiator
3. Op-Amp as adder & subtractor
4. Op-Amp as voltage to current converter
5. Op-Amp as sine wave generator (Wien bridge oscillator)
6. Op-Amp as function generator
7. Astable multivibrator determination of frequency (using IC-555)
8. Schmitt trigger using IC-555 timer
9. Smoke detector circuit
10. Simulation experiment using pSpice (any of the above experiment)

Section B: List of Experiments(Any 05)

1. Study of logic families (assignment type practical)
 2. Verification of IC-logic gates
 3. Realization of basic gates using discrete components (resistor, diodes & transistor)
 4. Realization of basic gates using Universal gates (NAND & NOR gates)
 5. Verify Half adder and full adder using gates
 6. Verify Half subtractor and full subtractor using gates.
 7. Verify the truth table of RS , JK, T-F/F using NAND gates
 8. 4-bit binary parallel adder and subtractor using IC7483
 9. BCD to Seven Segment Decoder using IC-7447/7448
 10. Simulation experiment using pSpice (any of the above experiment)
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Savitribai Phule Pune University

(Formerly University of Pune)

Faculty of Science & Technology

F.Y.B.Sc. (Computer Science) Statistics

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020

Title of the Course: B. Sc. (Computer Science) STATISTICS

Preamble of the Syllabus:

Statistics is a branch of science that can be applied practically in every walk of life. Statistics deals with any decision making activity in which there is certain degree of uncertainty and Statistics helps in taking decisions in an objective and rational way. The student of Statistics can study it purely theoretically which is usually done in research activity or it can be studied as a systematic collection of tools and techniques to be applied in solving a problem in real life.

In last 15 to 20 years, computers are playing a very crucial role in the society. The use of computers has horizontally spread and also penetrated vertically in the society. It has become a part and parcel of common man. Thus there is a huge demand for computer education.

The University of Pune has done a pioneering work in this area and a three year degree course B. Sc. (Computer Science) of University of Pune is very popular among the student community and I. T. Industry. This course covers various subjects which are required directly or indirectly for becoming a computer professional. Statistics is one such important subject which is required and is extensively used in a vast spectrum of computer based applications. Data Mining and Warehousing, Big Data Analytics, Theoretical Computer Science, Reliability of a computer Program or Software, Machine Learning, Artificial Intelligence, Pattern Recognition, Digital Image Processing, Embedded Systems are just a few applications to name where Statistics can be extensively used.

Introduction: The syllabus of Statistics for First Year of this course covers basic concepts and terminology in Statistics and covers basic tools and methods required for data analysis. The teachers teaching this syllabus and students should give emphasis on understanding the concepts and ability to apply statistical tools and techniques and not on the theoretical discussion. It is expected that at the end of the course, a student should be well equipped to learn and apply acquired techniques in computer based applications.

Structure of the Subject

Structure of the subject and the pattern of examination and question papers are as specified below.

Structure of F. Y. B. Sc. (Computer Science) Statistics

Semester	Paper code	Paper	Paper title	credits	Marks		
					CIA	ESE	Total
1	CSST 111	I	Descriptive Statistics I	2	15	35	50
	CSST 112	II	Mathematical Statistics	2	15	35	50
	CSST113	III	Statistics Practical Paper I	1.5	15	35	50
2	CSST121	I	Methods of Applied Statistics	2	15	35	50
	CSST122	II	Continuous Probability Distributions and Testing of Hypothesis	2	15	35	50
	CSST123	III	Statistics Practical Paper II	1.5	15	35	50

Semester I**Paper-I****CSST 111 :Descriptive Statistics**

No. of Credits :2No. of lectures: 40

TOPICS/CONTENTS:**UNIT1: Data Condensation and Presentation of Data (9L)**

- 1.1 Definition, importance, scope and limitations of statistics.
- 1.2 Data Condensation: Types of data (Primary and secondary), Attributes and variables, discrete and Continuous variables.
- 1.3 Graphical Representation: Histogram, Ogive Curves, Steam and leaf chart. [Note: Theory paper will contain only procedures. Problems to be included in practical]
- 1.4 Numerical problems related to real life situations.

UNIT2: Descriptive Statistics(14L)

- 2.1 Measures of central tendency: Concept of central tendency, requisites of good measures of central tendency.
- 2.2 Arithmetic mean: Definition, computation for ungrouped and grouped data, properties of arithmetic mean (without proof) combined mean, weighted mean, merits and demerits.
- 2.3 Median and Mode: Definition, formula for computation for ungrouped and grouped data, graphical method, merits and demerits. Empirical relation between mean, median and mode (without proof)
- 2.4 Partition Values: Quartiles, Box Plot.
- 2.5 Concept of dispersion, requisites of good measures of dispersion, absolute and relative measures of dispersion.
- 2.6 Measures of dispersion : Range and Quartile Deviation definition for ungrouped and grouped data and their coefficients, merits and demerits,
Variance and Standard deviation: definition for ungrouped and grouped data, coefficient of variation, combined variance & standard deviation, merits and demerits.
- 2.7 Numerical problems related to real life situations.

UNIT3: Moments, Skewness and Kurtosis**(10L)**

- 3.1 Concept of Raw and central moments: Formulae for ungrouped and grouped data (only first four moments), relation between central and raw moments upto fourth order. (without proof)
- 3.2 Measures of Skewness: Types of skewness, Pearson's and Bowley's coefficient of skewness, Measure of skewness based on moments.
- 3.3 Measure of Kurtosis: Types of kurtosis, Measure of kurtosis based on moments.
- 3.4 Numerical problems related to real life situations

UNIT4: Theory of Attributes**(7L)**

- 4.1 Attributes: Concept of a Likert scale, classification, notion of manifold classification, dichotomy, class- frequency, order of a class, positive class frequency, negative class frequency, ultimate class frequency, relationship among different class frequencies (up to two attributes), 4.2 Consistency of data upto 2 attributes.
- 4.3 Concepts of independence and association of two attributes.
- 4.4 Yule's coefficient of association (Q), $-1 \leq Q \leq 1$, interpretation.

References:

1. Statistical Methods, George W. Snedecor, William G. Cochran, John Wiley & sons
2. Programmed Statistics, B.L. Agarwal, New Age International Publishers.
3. Modern Elementary Statistics, Freund J.E. 2005, Pearson Publication
4. Fundamentals of Applied Statistics (3rd Edition), Gupta and Kapoor, S. Chand and Sons, New Delhi, 1987.
5. An Introductory Statistics, Kennedy and Gentle
6. Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). The World Press Pvt. Ltd., Calcutta

Semester I**Paper-II****CSST 112 :Mathematical Statistics**

No. of Credits : 2

No. of lectures: 40

TOPICS/CONTENTS:**UNIT 1:Theory of Probability****(10L)**

- 1.1 Counting Principles, Permutation, and Combination.
- 1.2 Deterministic and non-determination models.
- 1.3 Random Experiment, Sample Spaces (Discrete and continuous)
- 1.4 Events: Types of events, Operations on events.
- 1.5 Probability - classical definition, probability models, axioms of probability, probability of an event.
- 1.6 Theorems of probability (without proof)
 - i) $0 \leq P(A) \leq 1$ ii) $P(A) + P(A') = 1$ iii) $P(\Phi) = 0$ iv) $P(A) \leq P(B)$ when $A \subset B$
 - iv) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- 1.7 Numerical problems related to real life situations.

UNIT 2: Conditional Probability and Independence**(8L)**

- 2.1 Concepts and definitions of conditional probability, multiplication theorem
 $P(A \cap B) = P(A) \cdot P(B|A)$
- 2.2 Bayes' theorem (without proof). True positive, false positive and sensitivity of test as application of Bayes' theorem.
- 2.3 Concept of Posterior probability, problems on posterior probability.
- 2.4 Concept and definition of independence of two events.
- 2.5 Numerical problems related to real life situations.

UNIT 3: Random Variable**(10L)**

- 3.1 Definition of random variable (r.v.), discrete and continuous random variable.
- 3.2 Definition of probability mass function (p.m.f.) of discrete r.v. and Probability density function of continuous r.v..
- 3.3 Cumulative distribution function (c.d.f.) of discrete and continuous r.v. and properties. (Characteristic properties only)

3.4 Definition of expectation and variance of discrete and continuous r.v., theorem on expectation and variance (statement only).

3.4 Determination of median and mode using p.m.f. only.

3.5 Numerical problems related to real life situations.

UNIT 4 : Standard Discrete Distributions

(12L)

4.1 Discrete Uniform Distribution: definition, mean, variance.

4.2 Binomial Distribution: definition, mean, variance, additive property, Bernoulli distribution as a particular case with $n = 1$.

4.3 Geometric Distribution (p.m.f $p(x) = pq^x$, $x = 0, 1, 2, \dots$): definition, mean, variance.

4.4 Poisson Distribution: definition, mean, variance, mode, additive property, limiting case of $B(n, p)$

4.5 Illustration of real life situations.

4.6 Numerical problems related to real life situations.

* Only statement of mean and variance, derivation is not expected.

References:

1. A First course in Probability, Sheldon Ross. Pearson Education Inc.
2. Statistical Methods (An Introductory Text), Medhi J. 1992, New Age International.
3. Modern Elementary Statistics, Freund J.E. 2005, Pearson Publication.
4. Probability, Statistics, Design of Experiments and Queuing Theory with Applications of Computer Science Trivedi K.S. 2001, Prentice Hall of India, New Delhi.
5. Fundamentals of Mathematical Statistics (3rd Edition), Gupta S. C. and Kapoor V. K. 1987 S. Chand and Sons, New Delhi.
6. Mathematical Statistics (3rd Edition), Mukhopadhyay P. 2015, Books And Allied (P), Ltd.
7. Introduction to Discrete Probability and Probability Distributions, Kulkarni M.B., Ghatpande S.B. 2007, SIPF Academy
8. Programmed Statistics, B.L. Agarwal, New Age International Publishers.

Semester I**Paper-III****CSST113: Statistics Practical**

No. of Credits : 1.5

TOPICS/CONTENTS

Pre-requisites: Knowledge of the topics in theory papers I and II

Objectives: At the end of the course students are expected to be able

- i) To tabulate and make frequency distribution of the given data.
- ii) To use various graphical and diagrammatic techniques and interpret.
- iii) To compute various measures of central tendency, dispersion, Skewness and kurtosis.
- iv) To fit the Binomial and Poisson distributions.
- v) To compute the measures of attributes.
- vi) The process of collection of data, its condensation and representation for real life data.
- vii) To study free statistical softwares and use them for data analysis in project.

Sr. No.	Title of the practical
1	Tabulation and construction of frequency distribution. (Use of at least two data sets more than 50 observations- each for constructing frequency distribution)
2	Diagrammatic and graphical representation using EXCEL and data interpretation. (problems on the basis of SET and NET examination in Paper I to be taken)
3	Summary statistics for ungrouped data and comparison for consistency using EXCEL.
4	Summary statistics for grouped frequency distribution. (Problems based on central tendency, dispersion, measures of skewness: Karl Pearson's and Quartile measure to be covered)
5	Measure of Skewness and kurtosis based on moments.
6	Fitting of Binomial distribution and computation of expected frequencies. (Use the observed and expected frequencies for the next semester χ^2 test)
7	Fitting of Poisson distribution and computation of expected frequencies. (Use the observed and expected frequencies for the next semester χ^2 for test.) (Give one data set for fitting both Poisson and Binomial distributions.)
8	Measure of attributes. (Two attributes only)
9	Study of free statistical softwares and writing a report on it. (individual activity)
10	Project(Part-I) -Data collection, its condensation and representation.

Notes:

- 1) For project, a group of maximum 8 students be made.
- 2) All the students in a group are given equal marks for project.
- 3) Different data sets from primary or secondary sources may be collected.

Semester II**Paper-I****CSST 121 :Methods of Applied Statistics**

No. of Credits: 2 No. of lectures: 40

TOPICS/CONTENTS:**UNIT 1:Correlation (For ungrouped data) (10L)**

- 1.1 Concept of bivariate data, scatter diagram, its interpretation, concept of correlation, Positive correlation, negative correlation, zero correlation.
- 1.2 Karl Pearson's coefficient of correlation, properties of correlation coefficient, Interpretation of correlation coefficient, coefficient of determination with interpretation.
- 1.3 Spearman's rank correlation coefficient (formula with and without ties).
- 1.4 Numerical problems

UNIT 2: Regression (for ungrouped data) (12L)

- 2.1 Concept of linear and nonlinear regression.
- 2.2 Illustrations, appropriate situations for regression and correlation
- 2.3 Linear regression :Fitting of both lines of regression using least square method.
- 2.4 Concept of regression coefficients.
- 2.5 Properties of regression coefficients : $b_{xy} \cdot b_{yx} = r^2$, $b_{xy} \cdot b_{yx} \leq 1$, $b_{xy} = r (\sigma_x / \sigma_y)$ and $b_{yx} = r (\sigma_y / \sigma_x)$.
- 2.6 Nonlinear regression models: Second degree curve, exponential curves of the type $Y=ab^x$ and $Y=ax^b$.
- 2.7 Numerical problems related to real life situations

UNIT3: Multiple Regression and Multiple, partial Correlation (For Trivariate Data)(10L)

- 3.1 Concept of multiple regressions, Yule's Notations.
- 3.2 Fitting of multiple regression planes.[Derivation of equation to the plane of regression of X_1 on X_2 and X_3 is expected. Remaining two equations to be written analogously.]
- 3.3 Concept of partial regression coefficients, interpretations.
- 3.4 Concept of multiple correlation: Definition of multiple correlation coefficient and its formula..

3.5 Concept of partial correlation. Definition of partial correlation coefficient and its formula.

UNIT4: Time series**(8L)**

4.1 Meaning and utility

4.2 Components of time series

4.3 Additive and multiplicative models

4.4 Methods of estimating trend : moving average method, least squares method and exponential smoothing method(with graph and interpretation).

4.5 Numerical problems related to real life situations

References:

- 1 Introduction to Linear Regression Analysis, Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining, Wiley
- 2 Time Series Methods, Brockwell and Davis, Springer, 2006.
- 3 Time Series Analysis, 4th Edition, Box and Jenkin, Wiley, 2008.
- 4 Fundamentals of Applied Statistics (3rd Edition), Gupta and Kapoor, S. Chand and Sons, New Delhi, 1987.
- 5 Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). The World Press Pvt. Ltd., Calcutta

Semester II**Paper-II****CSST122: Continuous Probability Distributions and Testing of Hypotheses**

No. of Credits : 2

No. of lectures: 40

TOPICS/CONTENTS:**UNIT 1: Standard Continuous Probability Distributions (10L)**

1.1 Uniform Distribution: statement of p.d.f., mean, variance, nature of probability curve.

Theorem (without proof): The distribution function of any continuous r.v. if it is invertible follows $U(0, 1)$ distribution

1.2 Exponential Distribution: statement of p.d.f. of the form, $f(x) = (1/\theta) e^{(-x/\theta)}$, mean, variance, nature of probability curve, lack of memory property. (with proof)

1.3 Pareto Distribution: Form of pdf $f(x): \alpha / x^{(\alpha+1)}$; $x \geq 1, \alpha > 0$. Mean, variance, symmetry, applications

1.3 Normal Distribution: statement of p.d.f., identification of parameters, nature of probability density curve, standard normal distribution, symmetry, distribution of $aX+b$, $aX+bY+c$ where X and Y are independent normal variables, computations of probabilities using normal probability table, normal approximation to binomial and Poisson distribution, central limit theorem (statement only), normal probability plot. Box Muller transformation

1.4 Numerical problems related to real life situations.

UNIT 2: Concepts and definitions related to testing of hypothesis (4L)

2.1 Concepts of population and sample.

2.2 Definitions: random sample from a probability distribution, parameter, statistic, standard error of estimator.

2.3 Concept of null hypothesis and alternative hypothesis (Research hypothesis), critical region, level of significance, type I and type II error, one sided and two sided tests, Test of hypothesis, p-value.

UNIT 3:Parametric Tests**(20L)****1.1 Large Sample Tests**3.1.1 $H_0: \mu = \mu_0$ Vs $H_1: \mu \neq \mu_0, \mu < \mu_0, \mu > \mu_0$ (One sided and two sided tests)3.1.2 $H_0: \mu_1 = \mu_2$ Vs $H_1: \mu_1 \neq \mu_2, \mu_1 < \mu_2, \mu_1 > \mu_2$ (One sided and two sided tests)3.1.3 $H_0: P = P_0$ Vs $H_1: P \neq P_0, P < P_0, P > P_0$ (One sided and two sided tests)3.1.4 $H_0: P_1 = P_2$ Vs $H_1: P_1 \neq P_2, P_1 < P_2, P_1 > P_2$ (One sided and two sided tests)

3.1.5 Numerical problems related to real life situations.

3.2 Test based on F- distribution

3.2.1 F-test for testing significance of equality of two population variances.

3.3 Tests based on t – distribution3.3.1 $H_0: \mu_1 = \mu_2$ Vs $H_1: \mu_1 \neq \mu_2, \mu_1 < \mu_2, \mu_1 > \mu_2$ (One sided and two sided tests)

3.3.2 Paired t-test.

3.4 Tests based on Chi square distribution

3.4.1 Chi-square test for goodness of fit

3.4.2 Test for independence of attributes (mxn and 2x2)

3.5 Numerical problems related to real life situations.

UNIT 4 :Simulation (6L)4.1 Introduction, concept of simulation , random numbers, pseudo random numbers ,
Advantages , Disadvantages of Simulation. Applications4.2 Methods of simulation, Linear congruential generator and simulation from Uniform,
Exponential and Normal Distribution.**References**

1. A First course in Probability, Sheldon Ross. Pearson Education Inc.
2. Statistical Methods (An Introductory Text), Medhi J. 1992 , New Age International.
3. Modern Elementary Statistics , Freund J.E. 2005, Pearson Publication.
4. Probability, Statistics, Design of Experiments and Queuing Theory with Applications of Computer Science, Trivedi K.S. 2001, Prentice Hall of India, New Delhi.
5. Gupta S. C. and Kapoor V. K. 1987 Fundamentals of Mathematical Statistics (3rd Edition) S. Chand and Sons, New Delhi.
6. Mukhopadhyay P. 2015, Mathematical Statistics (3rd Edition), Books And Allied (P), Ltd.
7. Simulation Modelling and Analysis Law A. M. and Kelton W.D. 2007, Tata McGraw Hill.
8. Programmed Statistics, B.L. Agarwal, New Age International Publishers.
9. Common Statistical Tests Kulkarni M.B., Ghatpande, S.B., Gore S.D. 1999 Satya jeet Prakashan,

Semester II**Paper-III****CSST 123: Statistics Practical**

No. of Credits : 1.5

Pre-requisites: Knowledge of the topics in theory papers I and II

Objectives: At the end of the course students are expected to be able

- i) To understand the relationship between two variables using scatter plot.
- ii) To compute coefficient of correlation, coefficient of regression.
- iii) To fit various regression models and to find best fit.
- iv) To fit the Normal distribution.
- v) To understand the trend in time series and how to remove it.
- vi) To apply inferential methods for real data sets.
- vii) To generate model sample from given distributions.
- viii) To understand the importance and functions of different statistical organizations in the development of nation.

Sr. No.	Title of the Practical
1	Linear correlation and regression (use of scatter plot for explaining the linear relationship between two variables)
2	Fitting of non-linear regression. (use of scatter plot for explaining the non-linear relationship between two variables)
3	Fitting of normal distribution and computation of expected frequencies.
4	Fitting of linear regression model (Simple and Multiple) and non-linear regression models and finding the best fit by using EXCEL.
5	Model sampling from continuous uniform, exponential and normal distributions using Excel.
6	Large sample tests.
7	F test, t test, χ^2 test using EXCEL (one problem each with equal and unequal variance) (χ^2 test – for goodness of fit-use fitted problems of Binomial, Poisson and Normal distribution in previous practical problems)
8	Time Series- Estimation of trend by using the method of moving averages
9	Write a report on application of some statistical technique in the field of computers.(individual activity)
10	Project (Part-II) - Analysis of data collected in semester-I

Notes:

- i) For project, a group of maximum 8 students be made.
- ii) All the students in a group are given equal marks for project.
- iii) Students will be asked to use Statistical methods which they have learnt and use of free statistical software for data analysis.



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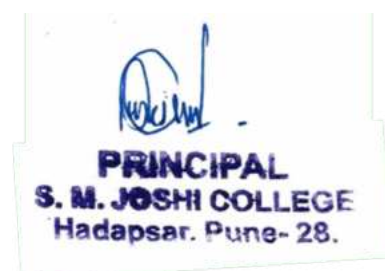
(Formerly University of Pune)

Faculty of Science & Technology

F.Y.B.Sc. Computer Science (Electronics)

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020



Title of the Course: F.Y. B. Sc. Electronics of B. Sc. (Computer Science)**Preamble of the Syllabus:**

The systematic and planned curricula for first year and second year Electronics shall motivate and encourage the students for pursuing higher studies in Electronics and Computer and for becoming an entrepreneur.

Introduction:

At first year of under-graduation: The basic topics related to the fundamentals of electronics are covered. Since electronics is an inherent part of technological advancements, the practical course is intended to achieve the basic skills required for computer science students.

At second year under-graduation: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. Courses based on content of first year shall be introduced. Concepts of Communication, embedded system, Internet of things will be introduced at this stage.

Objectives:

- To provide knowledge of technological and practical aspects of electronics.
- To familiarize with current and recent technological developments.
- To enrich knowledge through activities such as industrial visits, seminars, projects etc.
- To train students in skills related to computer industry and market.
- To create foundation for research and development in Electronics/ Computer Science.
- To develop analytical abilities towards real world problems
- To help students to build-up a progressive and successful career.



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Titles of Papers and Scheme of Study**F. Y. B. Sc. Electronic Science of B. Sc. (Computer Science)**

SEM	Paper / subject code	Paper	Paper Title	Credits	Lectures/ practical per week	Evaluation		
						C.A.	U.E.	Total
I	ELC-111	I	Semiconductor Devices and Basic Electronic Systems	2 (36 L)	3	15	35*	50
	ELC-112	II	Principles of Digital Electronics	2 (36 L)	3	15	35*	50
	ELC-113	III	Electronics Lab IA	1.5 (48 L)	4	15	35**	50
II	ELC-121	I	Instrumentation System	2 (36 L)	3	15	35*	50
	ELC-122	II	Basics of Computer Organisation	2 (36 L)	3	15	35*	50
	ELC-123	III	Electronics Lab IB	1.5 (48L)	4	15	35**	50



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Detail Syllabus:**SEMESTER I****Paper I****ELC-111: Semiconductor Devices and Basic Electronic Systems****(2 Credits, 36 lectures)****Objectives :**

1. To study various types of semiconductor devices
2. To study elementary electronic circuits and systems

Term I**Unit 1. Semiconductor Diodes****(6 L)**

Semiconductor, P and N type semiconductors, Formation of PN junction diode, it's working, Forward and Reverse bias characteristics, Zener diode: working principle, breakdown mechanism and characteristics, Working principle of Light emitting diode, photo diode, optocoupler, Solar cell working principle and characteristics

Unit 2. Bipolar Junction Transistor (BJT)**(7 L)**

Bipolar Junction Transistor (BJT) symbol, types, construction, working principle, Transistor amplifier configurations - CB, CC (only concept), CE configuration: input and output characteristics, Definition of α , β and γ , Concept of Biasing (numerical problems not expected), Potential Divider bias, Transistor as amplifier (Concept of Gain and Bandwidth expected), Transistor as a switch.

Unit 3. MOSFET**(5 L)**

MOSFET types, Working principle, Characteristics, Application of MOSFET as a Switch.

Unit 4. POWER SUPPLY**(6 L)**

Block Diagram of Regulated Power Supply, Rectifiers (half wave, full wave, Bridge), rectifier with capacitor-filter, Use of Zener Diode as a Voltage Regulator, IC 78XX and 79XX as regulator, Block Diagram and explanation of SMPS, Block diagram and explanation of UPS

Unit 5. OSCILLATORS**(6 L)**

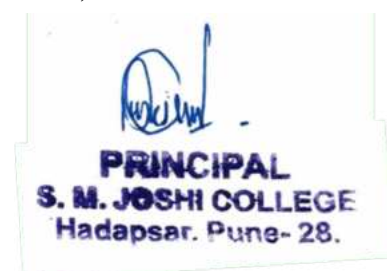
Barkhausen Criteria, Low frequency Wein-bridge oscillator, High frequency crystal oscillator, IC 555 as astable multivibrator used as square wave generator / clock

Unit 6. DATA CONVERTERS**(6 L)**

Need of Digital to Analog converters, parameters, weighted resistive network, R-2R ladder network, need of Analog to Digital converters, parameters, Flash ADC, successive approximation ADC.

Text/reference books :

1. Electronic Devices and Circuits I – T. L. Floyd- PHI Fifth Edition
2. Principles of Analog Electronics - A.P.Malvino
3. Sedha R.S., A Text Book Of Applied Electronics, S.Chand& CompanyLtd



SEMESTER I**PAPER II****ELC 112: Principles of Digital Electronics
(2 Credits, 36 lectures)****Objectives:**

1. To get familiar with concepts of digital electronics
2. To learn number systems and their representation
3. To understand basic logic gates, Boolean algebra and K-maps
4. To study arithmetic circuits, combinational circuits and sequential circuits

Unit 1: Number Systems and Digital codes (10 L)

Introduction to Decimal, Binary and Hexadecimal number systems and their inter-conversions, binary addition and binary subtraction using 2's complement, Binary Coded Decimal number, Gray Codes, Gray to Binary and Binary to Gray conversion, Alphanumeric representation in ASCII codes.

Unit 2: Logic gates and Boolean Algebra (14)

Logic gates (NOT, AND, OR, NAND, NOR, XOR gate) with their symbol, Boolean equation and truth table, Universal gates

Introduction of CMOS and TTL logic families, Parameters like voltage levels, propagation delay, noise margin, fan in, fan out, power dissipation (TTL NAND, inverter, CMOS gates etc. not expected)

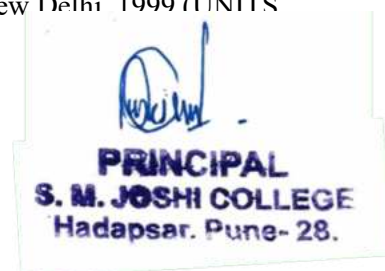
Rules and laws of Boolean algebra, De Morgan's theorem, simplification of Logic equations using Boolean algebra rules, Min terms, Max terms, Boolean expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form Introduction to Karnaugh Map, problems based on SOP (upto 4 variables), digital designing using K Map for: Gray to Binary and Binary to Gray conversion,

Unit 3: Combinational Circuits (12 L)

Half adder and full adder, 4-Bit Universal adder/ Subtractor, applications of Ex-OR gates as parity checker and generator, study of Multiplexer (4:1) and Demultiplexer (1:4), Encoders - Decimal/BCD to binary, 3X4 matrix keyboard encoder, priority encoder, Decoder- BCD to seven segment decoder, IC 74138 and IC 7447, Digital comparator,

Reference Books:

1. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education
2. Digital Electronics: Jain R.P., Tata McGraw Hill
3. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill
4. M.Morris Mano, "Digital Design" 3rd Edition, PHI, New Delhi.
5. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi 1999 (UNITS I to IV)
6. G.K.Kharate-Digital electronics-Oxford university press
7. S.Salivahana & S.Arivazhagan-Digital circuits and design

**SEMESTER I**

Paper III
ELC-113: ELECTRONICS LAB IA (1.5 Credits)

The practical course consists of **10 experiments** out of which two will be preparatory experiments. These will be evaluated in an oral examination for 15% marks at internal and external semester examination. **Each Practical batch will have maximum 15 students.**

Preparatory Experiments (Minimum 2/3)

1. Identification of Components (Passive and Active) /Tools

- Minimum 10 different types of components must be given
- Identification based on visual inspection / data sheets be carried out

2. Use of Digital Multimeters

- Measurement of AC/DC voltage and Current – on different ranges
- Measurement of R & C
- Testing of Diodes & Transistors
- Measurement of β .
- Use of Multimeter in measurement of Resistance of LDR and Thermistor

3. Study of Signal Generator & CRO

- Understand how to use Signal Generator, CRO
- Study of front panel controls of both
- Measurement of amplitude and frequency of Sine/Square waveform
- Measurement of Phase with the help of RC circuit
- Demonstration of Lissajous figures
- Demonstrate the use of Component testing facility

Semester I List of Practical's (Minimum 08, 4 from each group)

Group A

1. Study of breakdown characteristics and voltage regulation action of Zener diode, Use of 3 Pin Regulator IC 78XX & 79XX as a regulator.
2. Study of half wave, full wave and bridge rectifier circuit with and without capacitor filters.
3. Study of Opto-coupler using LED and Photodiode (Package may be used here), it's application as burglar alarm.
4. Study of Bipolar Junction Transistor as a Switch.
5. Study of Single stage RC coupled CE transistor Amplifier (Gain/ Bandwidth).
6. Study of output and transfer characteristics of MOSFET.
7. Study of SMPS.
8. Study of IC 555 as an Astable Multivibrator.
9. Study of 4-Bit R-2R Ladder Network type of DAC.
10. Study of 3-bit Flash ADC.



Group B

11. Study of Logic Gates (Verification of Truth tables)
12. Study of Binary to Gray & Gray to Binary Converter (K- Map based design).
13. Study of Half Adder and Full Adder using Logic Gates.
14. Use of Ex-OR as a 4-bit Parity Checker and Generator.
15. Study of Decimal to BCD/ (Binary) Converter.
16. Study of Multiplexer and Demultiplexer (4:1 & 1:4).
17. Study of 3X4 matrix Keyboard Encoder / Priority Encoder.
18. Study of BCD to Seven Segment Display using IC 7447.



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SEMESTER II**PAPER I****ELC 121: Instrumentation Systems
(2 Credits, 36 lectures)****Objectives :**

1. To study Instrumentation System
2. To study various blocks of Instrumentation System
3. To study Smart Instrumentation System

Unit 1: Introduction to Instrumentation System (6 L)

Block diagram of Instrumentation system, Definition of sensor, transducer and Actuators, Classification of sensors: Active and passive sensors. Specifications of sensors: Accuracy, range, linearity, sensitivity, resolution, reproducibility.

Unit 2: Sensors and Actuators (12 L)

Temperature sensor (Thermistor, LM-35), optical sensor (LDR), Passive Infrared sensor (PIR), Tilt Sensor, ultrasonic sensor, Motion sensor, Image Sensor, Actuators: DC Motor, stepper motor

Unit 3: Smart Instrumentation System and Smart Sensors (6 L)

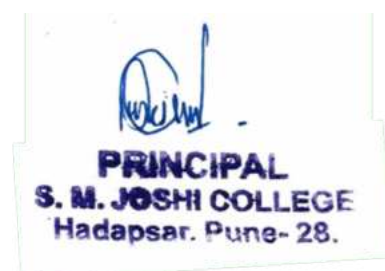
Block diagram of Smart Instrumentation system, Concept of smart sensor, Film sensors, Nano sensor

Unit 4: OPAMP as signal Conditioner (12 L)

Concept, block diagram of Op amp, basic parameters (ideal and practical): input and output impedance, bandwidth, differential and common mode gain, CMRR, slew rate, IC741/ LM324, Concept of virtual ground, Op amp as inverting and non inverting amplifier, Unity gain follower, Opamp as adder, subtractor, Op amp as current to voltage and voltage to current convertor, Voltage to frequency converter, Op amp as comparator, Problems based on above Op Amp applications.

Reference Books:

1. Sensors and Transducers : D. Patranabis, PHI publication, 2nd Edition
2. Sensors and Transducers : Prof A.D.Shaligram
3. Op Amp and Linear Integrated Circuits: Ramakant Gaykwad



SEMESTER II**PAPER II****ELC 122 : Basics of Computer Organisation
(2 Credits, 36 lectures)**

Objectives:

1. To get familiar digital sequential circuits
2. To study Basic computer Organization
3. To study Memory architecture

Unit 1: Flip-flops (5 L)

RS Flip Flop using NAND gate, clocked RS Flip Flop, D Latch, J K Flip Flop, T Flip Flop

Unit 2: Shift registers and Counters (9 L)

Shift registers - SISO, SIPO, PISO, PIPO shift registers, Ring Counter using D Flip flop. Counters -Synchronous and Asynchronous type, 3-bit Up, Down and Up-Down counter, Concept of modulus Counters
(Timing Diagram of all above are expected)

Unit 3: Basics of Computer System (12 L)

Basic Computer Organization, Concept of Address Bus, Data Bus, Control Bus. CPU Block Diagram and Explanation of each block, Register based CPU organization, Concept of Stack & its organization, I/O organization: need of interface, block diagram of general I/O interface

Unit 4: Memory Organization (10 L)

Memory Architecture, Memory hierarchy, Types of Memories, Data Read/ Write process, Vertical and Horizontal Memory Expansion, Role of Cache memory, Virtual Memory.

Reference Books:

1. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education
2. Digital Electronics: Jain R.P., Tata McGraw Hill
3. Digital Logic and Computer Design : M. Morris Mano, Pearson Education
4. Computer Organization and Architecture, William Stallings, Pearson, 10th Edi.



SEMESTER II**Paper III****ELC-123: Electronics Lab IB**

The practical course consists of **10 experiments** out of which one will be activity equivalent to 2 practical sessions.

Activity will carry 15% marks at internal and external semester examination. Activity can be any one of the following :

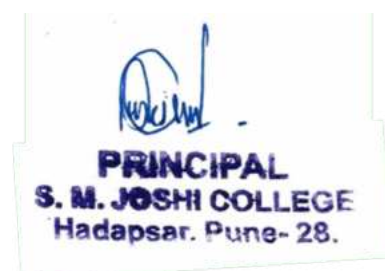
- 1.Hobby projects
- 2.Industrial visit / live work experience
- 3.PCB Making
- 4.Market Survey of Electronic Systems
- 5.Circuit Simulations and CAD tools

GROUP A (Minimum 4/8)

1. To study temperature sensor LM 35
2. Use of LDR to control light intensity
3. Study of PIR and tilt sensor.
4. Study of stepper motor.
5. Use of OPAMP as comparator and its use in DC motor driving.
6. Build and test Inverting and non inverting amplifier using OPAMP.
7. Build and test adder and subtractor circuits using OPAMP.
8. Build and test voltage to frequency converter

GROUP B (Minimum 4/8)

1. Study of RS, JK and D flip flops using NAND gates
2. Study of Four bit ALU
3. Study of asynchronous Up/Down Counter
4. Study of decade counter IC circuit configurations
5. Study of 4-bit SISO Shift register and it's use as Ring Counter
6. Study of read and write action of RAM (using IC 2112/4 or equivalent).
7. Study of Diode Matrix ROM
8. Study of Computer hardware system



Revised syllabi (2019Pattern) for three years B. Com. Degree course (CBCS)

Semester :- I

Subject :- Techniques of Account Writing

Syllabus for B. Com. Semester –I

Subject Name :- - **TECHNIQUES OF ACCOUNTS WRITING**

Course code :- TAW

Credit 3

Depth of the program – fundamental Knowledge

Objective of the Program

1. To create awareness about general commercial transactions.
2. To explore the students about banking, mutual funds, share market and insurance related transactions.
3. To prepare students for various competitive examinations.

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	Introduction:	• Meaning and concept of Accounting and Accounts Writing. • Meaning, Nature, Scope and Importance of Commercial Transactions. • Principles of Accounting. (Concepts and Conventions). • Introduction to Accounting Software.(SAP, ERP)	To acquaint the students with basic fundamental knowledge of commercial transactions.

2	Banking & Banking Transactions	• Introduction to Banks, Primary functions of Banks • Meaning of Nationalized, Private Sector & Co-operative Banks. • Difference between Nationalized, Private Sector & Co-operative Banks. • Types of Accounts (Saving A/c, Current A/c, Recurring Deposit A/c, Fixed Deposits A/c). • KYC Norms. • Concept of Mobile Banking, Net Banking, (UPI), Debit and Credit Cards. • RTGS, NEFT, TDR, STDR.	To develop the skill of handling banking transactions.
3.	Loans and Advances	• Meaning of loans and Advances • Difference between Loans and Advances • Overdraft facility, Cash Credit, Hypothecation, Advance against FDR. - Car Loan, Personal Loan, Housing Loan, Gold Loan.	To understand the loans and advances.
4.	Insurance	• Meaning of Life Insurance • Meaning of General Insurance • Schemes of Life Insurance: Endowment Plan, Term Insurance, Unit Linked Plans, Surrender Value, Maturity. Schemes of General Insurance: Shop, House, Car/Vehicles, Fire Insurance.	To develop the decision making skills.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project/Practical	Expected Outcome
1	12	Teaching in class	Power point Presentations	Accounting Procedure	• To understand the procedure to prepare the books of a

2	12	Group discussion and role play	Power point Presentations	Account Opening with Bank	- To study the banking functions. - To study the necessary documents required for opening an Account in the Bank.
3	12	Guest lecture/ visit	Power point Presentations	Loans and Advances from Banks	To study and understand the documentation related to loans and Advances
4	12	Classroom lecture/Guest lecture	Power point Presentations	Life insurance or General Insurance	- To understand the concept of life or general insurance. - To collect information of at least one life insurance plan.

Method of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested Add on Course
Unit – I	Internal Continuous assessment : 30 marks	University Theory Examination: 50 marks	-
Unit – II		University practical Exam: : 20 Marks	
Unit – III		Total 70 marks	
Unit – IV			

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Principles and Practice of Accounting	P.C.Tulsian and Bharat Tulsian	Bharat Law House Private Ltd	New Delhi
2.	Banking Law and Practice	Sukhvinder Mishra	Sultan Chand and Sons Publication	New Delhi
3.	Banking Law and Practice,	Varshney	Sultan Chand and Sons Publication	New Delhi
4.	Investment Management	Preeti Singh	Sultan Chand and Sons Publication	New Delhi.
5.				
6.				
7.				
8.				

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Syllabus for B. Com. Semester –II
Subject Name :- - **TECHNIQUES OF ACCOUNTS WRITING**

Course code :- TAW
Credit 3

Depth of the program – fundamental Knowledge

Objective of the Program

1. To impart knowledge related to various taxes & other relevant statutes in day-to-day working of business.
2. To prepare the students for becoming an independent businessman or a consultant.
3. To Make the students self employable.

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	Taxation	• Meaning of Tax, Direct and Indirect Tax • Need of Tax. • Difference between Direct and Indirect tax. • Introduction to Income tax Act and Finance Act.	To create general awareness about taxation and understand the basic terminology related to taxation
2	Direct Tax	• Meaning and concept of Direct Tax: Income Tax. • Heads of Income. • IT returns procedure. • Deductions under chapter VI-A(80C, 80D, 80E,80G)	To develop the skill to understand the IT returns procedure.

3.	Indirect tax	• Meaning of Goods and Service Tax • Basic Knowledge of GST, Concept of Goods, Service, Dual taxation System, Input Credit tax and output tax. • GST Returns- Procedure of filing GST returns. • Basic problems of CGST and SGST.	To develop the skill to file GST returns and understand the basic calculation of GST.
4	Share Market Transactions & Mutual Fund:	• Concept of share market, Primary and Secondary Market. • Meaning of Demat A/c. • Procedure of Purchase and selling of shares. • Meaning of Mutual fund • Concept of Open Ended Funds, Close Ended Funds, Equity Linked Savings Scheme (ELSS), Systematic Investment Plan (SIP), Liquid funds • Net Assets Value (NAV)	To acquaint students with the share trading concepts.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project/Practical	Expected Outcome
1	12	Teaching in class	Power point Presentations	Taxation	• To understand the concept of taxation. • To study the difference between direct and indirect tax.
2	12	Guest Lecture/ Classroom discussion	Power point Presentations	Income Tax	• To study the concept of Income tax • To Collect & study ITR -1, & self-Assessment challan.
3	12	Guest lecture/ visit	Power point Presentations	Goods and Service Tax	• To study the concept of GST. • T • T • G

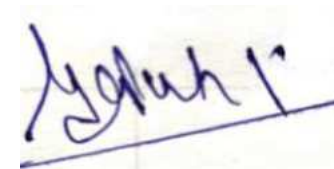
					To understand how to file R-1 and 3B returns.
4	12	Classroom lecture/Guest lecture/visit	Power point Presentations	Mutual Funds	- To Study the concepts of Mutual Funds - To study any five schemes of Mutual Funds.

Method of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested Add on Course
Unit – I	Internal Continuous assessment : 30 marks	University Theory Examination: 50 marks	-
Unit – II		University practical Exam: : 20 Marks	
Unit – III		Total 70 marks	
Unit – IV			

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Principles and Practice of Accounting	P.C.Tulsian and Bharat Tulsian	Bharat Law House Private Ltd	New Delhi
2.	Taxmann, Students guide to Income Tax Including GST	Dr. Vinod Singhania and Dr. Monica Singhania	Taxmann Publication Private Ltd	New Delhi
3.	Financial Services	Punit Pandya	Mc Graw Hill Education.	New Delhi
4.	Investment Management	Preeti Singh	Sultan Chand and Sons Publication	New Delhi



Prof. Dr. Gangadhar V. Kayandepatil
Chairman
Steering Committee
Savitribai Phule Pune University, Pune



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Revised syllabi (2019Pattern) for three years B. Com. Degree course (CBCS)

Semester :- **I**

Subject :- **Business Mathematics - I**

1. Preamble :

Mathematics is an important part of managing business. Business mathematics is used by commercial enterprises to record and manage business operations. Commercial organizations use mathematics in Accounting, Inventory management, marketing, sales forecasting and Financial analysis. The syllabus covers the foundational aspects of Mathematics and also develops the requisite professional skills in business by using Mathematics.

Objectives of the course :

- To Prepare for Competitive examination.
- To develop arithmetical and numerical abilities.
- To develop the abilities to apply the mathematical concepts to real life problems in commerce, economics and management.
- To develop logic and quantitative thinking.

Syllabus for B. Com. Semester –I
Subject Name :- **Business Mathematics - I**
Course code :- **B.M.-I**
Credit 3

Depth of the program – fundamental Knowledge

Objective of the Program

1. To prepare for production cost calculation.
2. To increase price determination ability.
3. To prepare for profit measurement.
4. Use to improve for Financial analysis.

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1.	Percentage, Ratio and Proportion:	simple problems on percentage, ratio and proportion.	To develop ideas about compare the quantities with the help of Ratio, Proportion and percentage.
2.	a) Profit and Loss: b) Shares and Dividend:	Cost price, Selling price, Market price, Trade and Cash discount. Types of Shares, Face value and Market value of Shares, Debentures and examples.	This chapter deals with various aspects relating to transactions of sales and purchases. To prepare necessary knowledge about share and share market.
3.	Interest:	Simple interest, Compound interest- Compounded Monthly, Quarterly, Half yearly, Annually. Simple Annuity and problems. EMI- Flat rate of interest and reducing balance method.	Learn the practical application of simple and compound interest in real life.
4.	Matrix algebra:	Types of Matrices, algebra of matrices, Determinant of matrix, co-factors and minors of matrix, Inverse of matrix (2 nd , 3 rd order).	To prepare basic ideas of matrices and its applications.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Practical's	Expected Outcome
1.	3	Lectures, Power Point Presentations, Problem Solving sessions, Discussions.	Lecture Videos on You Tube.	1 practical on Topic No. 1	On Completion of this course, students will be able to: 1) Explore Theoretical approach in Practical situations. 2) Use effectively all this concepts in Business.
2.	6+4=10			1 practical on Topic No. 2 a) and 1 practical on Topic No. 2 b)	
3.	5			1 practice on Topic No. 3	
4.	6			1 practice on Topic No. 4	

Method of Evaluation

Subject	Internal Evaluation Unit tests – 30 Marks	External Evaluation 70 marks	Suggested Add on Course
Unit – I	Unit test – on Topic No. 1-5 Marks	50 marks Theory Examination + 20 marks Practical Examination = 70 marks.	-----
Unit – II	Unit test on topic No. 2 a)-5 Marks Unit test on topic No. 2 b)-5 Marks		
Unit – III	Unit test – on Topic No. 3 -10 Marks		
Unit – IV	Unit test – on Topic No. 4- 5 Marks		

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Practical Business Mathematics by S.A. Bari (New Literature publishing company).	S.A. Bari	New Literature publishing company	_____
2.	Business Mathematics by V.K. Kapoor (Sultan Chand and Sons).	V.K. Kapoor	Sultan Chand and Sons.	_____
3.	Text book of Business Mathematics.	_____	Nirali Publication	_____

Suggested references

Web reference

Sr. no	Lectures	Films	Animation	PPTs	Articles	Others
1.	3	-	-	1	Search Articles on Google.	Reference Books.
2.	10	-	-	1		
3.	5	-	-	1		
4.	6	-	-	1		

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Revised syllabi (2019Pattern) for three years B. Com. Degree course (CBCS)

Semester :- **II**

Subject :- **Business Mathematics - II**

2. Preamble :

Mathematics is an important part of managing business. Business mathematics is used by commercial enterprises to record and manage business operations. Commercial organizations use mathematics in Accounting, Inventory management, marketing, sales forecasting and Financial analysis. The syllabus covers the foundational aspects of Mathematics and also develops the requisite professional skills in business by using Mathematics.

Objectives of the course

- To Prepare for Competitive examination.
- To develop arithmetical and numerical abilities.
- To develop the abilities to apply the mathematical concepts to real life problems in commerce, economics and management.
- To develop logic and quantitative thinking.

Syllabus for B. Com. Semester –II
Subject Name :- **Business Mathematics - II**
Course code :- **B.M.-II**

Credit 3

Depth of the program – fundamental Knowledge

Objective of the Program

5. To prepare for production cost calculation.
6. To increase price determination ability.
7. To prepare for profit measurement.
8. Use to improve for Financial analysis.

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1.	System of linear equations:	System of linear equations in matrix form, Solution of system of linear equations by Cramer's rule and matrix inverse method.	To build the necessary skill for solving linear equation by matrix method.
2.	Set Theory:	Definition of Set, Presentation of Set, Types of Set- Null set, Finite set, Infinite set, Universal set, Subset, Power set. Operation on sets, Law's of algebra of sets.	To know about basic of set theory.
5.	a) Function, Limit and Continuity: b) Derivative :	Concept of standard functions, Even and Odd functions, Limit of simple function and simple problems. Continuity of function at point and simple problems. Derivatives of simple algebraic functions, Simple problems. Application of derivatives in Economics and Commerce.	To prepare necessary knowledge for calculus and to study about its applications in commerce.
6.	a) Counting Techniques: b) LPP (Up to Two variables):	Counting Principles, Permutation and Combination. Formulation of L.P.P. and solution by Graphical method.	To develop skill for counting's using permutations and combinations. To help students for f LPP.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Practical's	Expected Outcome
1.	4	Lectures, Power Point Presentations, Problem Solving sessions, Discussions.	Lecture Videos on You Tube.	1 practical on Topic No. 1	On Completion of this course, students will be able to: 1) Explore Theoretical approach in Practical situations. 2) Use effectively all this concepts in Business.
2.	5			1 practical on Topic No. 2	
3.	5+5=10			1 practical on Topic No. 3 a) and b). combined.	
4.	3+2=5			1 practical on Topic No. 4 a) and 1 practical on Topic No. 4 b)	

Method of Evaluation

Subject	Internal Evaluation Unit tests – 30 Marks	External Evaluation 70 marks	Suggested Add on Course
Unit – I	Unit test –on Topic No. 1-5 Marks	50 marks Theory Examination + 20 marks Practical Examination = 70 marks.	
Unit – II	Unit test –on Topic No. 2-10 Marks		
Unit – III	Unit test –on Topic No. 3-10 Marks Combined on a) and b)		
Unit – IV	Unit test –on Topic No. 4-5 Marks Combined on a) and b)		

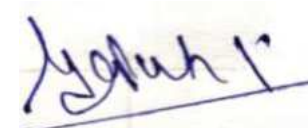
References

Sr. No.	Title of the Book	Author/s	Publication	Place
4.	Practical Business Mathematics by S.A. Bari (New Literature publishing company).	S.A. Bari	New Literature publishing company	_____
5.	Business Mathematics by V.K. Kapoor (Sultan Chand and Sons).	V.K. Kapoor	Sultan Chand and Sons.	_____
6.	Text book of Business Mathematics.	_____	Nirali Publication	_____

Suggested references

Web reference

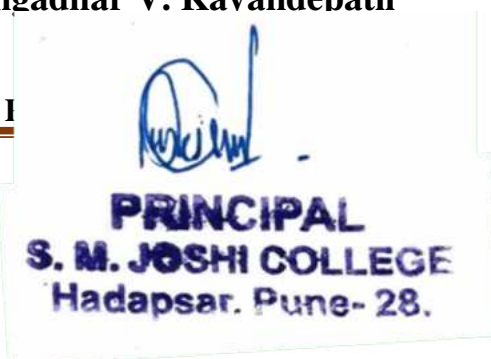
Sr. no	Lectures	Films	Animation	PPTs	Articles	Others
1.	4	-	-	1	Search Articles on Google.	Reference Books.
2.	5	-	-	1		
3.	10	-	-	1		
4.	5	-	-	1		



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Revised syllabi (2019Pattern) for three years B. Com. Degree course (CBCS)

Semester :- I

Subject :- Salesmanship and Advertising.

Syllabus for B. Com. Semester –I
Subject Name :- Salesmanship and Advertising -I
Course code :- SA
Credit 3

Depth of the program – fundamental Knowledge

Objective of the Program

1. To understand the concept of Salesmanship & Advertising.
2. To understand the role of Salesman in the changing scenario in global marketing
3. To know various types of salesman and skills of successful salesman.
4. To understand various types of customers and their buying motives.

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	CONCEPT OF SALESMANSHIP, ESSENTIAL SKILLS & TYPES OF SALESMAN.	Salesmanship, Advertising and publicity Concept, Need and Importance, Skills required to be a good salesman, Attitude & Values of salesman, Types of salesman.	To understand the concept of salesmanship and skills required to be a successful salesman.

2	COSUMER PSYCHOLOGY	Consumer Behavior-Concept, Types of Customers, Buying Motives of Customers.	To understand consumer psychology, types of customers and buying motives of customers.
3.	PROCESS OF SELLING AND SALES PROMOTION	Steps in process of Selling, A.I.D.A. Model of Selling , Concept of Sales Promotion, Emerging techniques in consumers Sales Promotion.	a) To know steps in process of selling. b) To know various techniques of sales promotion.
4.	NEW TRENDS IN ORGANISED RETAILING	Concept of Organized Retailing, Online Shopping, Brand Shops and Malls.	To understand new trends in organized retailing.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project/Practical	Expected Outcome
1.	12	Visit/Interview of a successful salesman	Audio visual media will be used as per need	Skills of a Good Salesman	To Study skills of successful salesman
2.	12	Guest lecture	Audio visual media will be used as per need	Buying Motives	To know buying motives of customers
3.	12	Visit	Audio visual media will be used as per need	Sales Promotion	To know the latest techniques for consumer sales promotion

4.	12	Case Study	Audio visual media will be used as per need	Online Marketing	To understand need and importance of online marketing

Method of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested Add on Course
Unit – I	Internal Continuous assessment : 30 marks	University Theory Examination: 50 marks	-
Unit – II		University practical Exam: : 20 Marks	-
Unit – III			-
Unit – IV		Total 70 marks	-

References

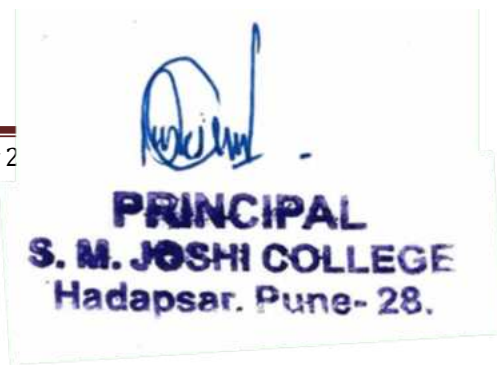
Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Salesmanship and publicity	Dr. Rustom Davar Sohrab R. Davar, Nuslir R. Davar	Vikas Publicating House Pvt. Ltd.	-
2.	Marketing management	S.A.Sherlekar	16 th Edition, Himalaya Publishing House.	-
3.	Marketing and Salesmanship	S.A.Sherlekar	Himalaya Publishing House.	
4.	Salesmanship and Sales Management	P.K. Sahu , K.C. Raut	Vikas Publication House Pvt	

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			Limited	
5.	Personal Selling and Salesmanship	Neeru Kapoor	Pinnacle Learning	

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Syllabus for B. Com. Semester –II
Subject Name :-Salesmanship and Advertising-II
Course code :- SA
Credit 3

Depth of the program – fundamental Knowledge
Objective of the Program

1. To know the role of advertising in consumer oriented market.
2. To understand importance of latest media of advertising.
3. To know importance of advertising agency in making of an advertisement

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1.	ADVERTISING AND MEDIA ADVERTISING.	Concept, Meaning, Need, objectives of Advertising, Merits & Limitations of Advertising, Impact of advertising on Indian Economy. Print Media, Electronic media, outdoor Media, Social Media- Concept, Merits & limitations of every medium.	a) To get acquainted with the concept of advertising. b) To understand different media of advertising.
2.	ESSENTIALS OF ADVERTISEMENT COPY AND LAYOUT FOR PRINT MEDIA	Concept of Layout of Ad Copy, Elements & types of AD Copy, Role of Animation in advertising.	c) To develop a creative thinking for preparing an advertisement for different media.

3.	APPEALS IN ADVERTISING, ROLE OF ADVERTISING AGENCY & AD BUDGET	Emotional, Moral and rational appeals in advertising, Ethics in Advertising. Role of advertising agency and its functions, Concept of Ad- Budget, Essential factors for preparing AD-Budget.	a) To understand various appeals used in advertising. b) To understand the working of Ad-Agency.
4.	EVENT MANAGEMENT	Concept, Need of Event Management in present scenario, Services provided by event management company.	To develop various skills to manage an event.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1.	12	Visit/Guest lecture	Audio visual media will be used as per need	Media of advertising	To understand different media of advertising
2.	12	Visit/Guest lecture	Audio visual media will be used as per need	Creation of an advertisement	To create an advertisement for print medium
3.	12	Visit	Audio visual media will be used as per need	Role of AD Agency	To know the functions of ad agency
4.	12	Visit/Guest lecture	Audio visual media will be used as per need	Event Management	To Know the services provided by Event Management Company

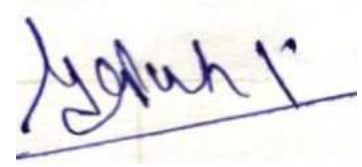
Method of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested Add on Course
Unit – I	Internal Continuous assessment : 30 marks	University Theory Examination: 50 marks	-
Unit – II		University practical Exam: : 20 Marks	-
Unit – III			-
Unit – IV		Total 70 marks	-

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	‘Advertising, Sales and Promotion Management’	S.A.Chunawala	Himalaya Publishing House.	
2.	‘Advertising Management’	Dr.M.M. Varma and R.K.Agrawal	Forword Book depot	
3.	‘Advertising’- A Critical Approach	Dr.Keval J.Kumar	Nirali Prakashan.	
4.	‘Multimedia in Practice Technology and Application’	Judith Jeffcoate	Prentice Hall of India Pvt. Ltd.	New Delhi
5.	‘Advertising ,Principles & Practice’	Ruchi Gupta	S. Chand.	
6.	‘Sustainable Event Management’	Jones Meegan	Google Books	





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Steering Committee
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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Statistical Techniques

Syllabus for B.Com Semester- I & II

Subject Name:- Statistical Techniques

Course Code:- Statec (Restructure)

Objectives:- This subject is meant to make students understand basic concepts of Statistics, give quantitative methods of data analysis and develop in them professional skills which can be used in corporate life.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Introduction to Statistics and Data Analysis	Statistics – Meaning, Scope and Applications Descriptive Statistics compared to Inferential Statistics Types of Data Summation operation Rules of Sigma Σ operations Presentation of data using charts and diagrams	To get acquaint with the subject of Statistics
2	Measure of Location and Counting Techniques	Mean, Median, Mode (for ungrouped and grouped Data), Combine mean, Weighted mean, Quartiles Multiplication and Addition Principle Permutation and Combination Simple problems	To get idea of basics of the
3	Measure of Dispersion, Correlation and Analysis of	Measure of Dispersion: Range, coefficient of range, mean deviation from median, standard deviation, combined standard	To subje


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	Univariate and Bivariate Data	deviation, coefficient of variation(C.V.), it's applications and interpretation. Measure of Correlation: Introduction to Regression, Line of Regression of X on Y and Y on X, Coefficient of Regression Analysis of Univariate Data: Construction of frequency distribution, Concept of central tendency and dispersion – and their measures, Partition values, Moments, Skewness and measures, Kurtosis and measures Analysis of Bivariate data: Linear Regression, Correlation, Types of Correlation, Scatter diagram, Covariance, Karl Pearson's Coefficient of Correlation for ungrouped data and examples.	
4	Index Number	Meaning, Types and Uses Methods of constructing price and quantity indices (simple and aggregate) Test of adequacy, Chain-base index numbers Base shifting, splicing and deflating Problems in constructing index numbers Consumer price index	To get idea of index number and uses
SECOND TERM			
5	Analysis of Time Series	Causes of variations in time series data Components of a time series Decomposition – additive and multiplicative models Determination of trend – moving averages methods and method of least squares (including linear, second degree, parabolic and exponential trend) Computation of seasonal indices by simple averages, ratio-to-trend, ratio-to-moving average and link relative methods	To get acquaint with time series, its data and application
6	Forecasting and Methods	Forecasting – concept, types and importance General approach to forecasting	To


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		Methods of forecasting Forecasting demand Industry Vs Company sales forecast Factors affecting company sales	
7	Theory of Probability and Probability Distributions	Theory of Probability: Probability as a concept, The three approaches to defining probability, Addition and multiplication laws of probability Conditional probability, Baye's theorem, Expectation and variance of a random variable Probability Distributions: Concept, Binomial, Poisson and Normal distributions – their properties and parameters Empirical distribution – generating Application to business	To get acquaint with theory of probability and probability distribution
8	Data Interpretation	Problems related to Tables, Chart, Graphs, Pie Chart (Refer UPSC Prelims Paper II – CSAT)	To get acquaint with various practical dimension of Statistics in day-to-day life


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	-----	-----
7	12	Guest Lecture & Library Assignments	-----	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Basic statisticsl	Agrawal	---	---
2.	Introduction to discrete probability and Probability distribution.	M..B.Kulkarni and S.B.Ghatpande (2007)	SIPF academy.	Nashik
3.	Introduction to Statistics and Data Analysis	Roxy Peck, Chris Olsen, Jay L. Devore	Cenage Publication	Noida
4.	Fundamental of statistics	S.C. Gupta	Himalaya Publishing house)	New Delhi
5.	First course in probability	By T.K.Chandra and D.Chatterjee	Alpha Science International Ltd	---
6.	Forecasting: Methods and Applications	Spyros Makridakis, Steven Wheelwright, Rob J. Hyndman	Wiley	Noida

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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Computer Appreciation

Syllabus for B.Com Semester- I & II

Subject Name:- Computer Appreciation

Course Code:- Coap (Restructure)

Objectives:- This subject is meant to acquaint the students with various concepts related to Industrial Psychology and workforce management as are applicable in business.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Introduction to Computer	Definition, Computer Characteristics, Data vs Information, Classification of Computer, Applications of Computer, Block Diagram of Computer, Central Processing Unit and its parts Definition- Software and Hardware Computer Hardware: Input Devices; Output Devices , Storage Devices Types of Software: System Software, Application Software Storage devices: Primary and secondary memory, Types of memory, Memory capacity and enhancement, Memory devices, Various devices and comparison Definition- Operating System, Functions of O.S., Types of O. S. – Single user O.S., Multiuser O.S., Overview of Windows O. S., Android O. S., IOS	To discuss the basics of computers and terminology related to it in depth


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		Number Systems: Binary, Decimal, Octal, Hexadecimal and their conversion; EBCDIC and ASCII and their conversions Computer Arithmetic and Gates: Binary arithmetic, Complements, Conversion from one system to other, Logic Gates, their truthable and applications minimisation	
2	File Formats and Applications to Open Them	Difference between Microsoft Office 2007, Microsoft Office 2010 and various higher versions such as latest 2019 version Types of Applications- Word, PowerPoint, Spreadsheet, Database, Word, Notepad, Paint, Microsoft Office Picture Manager, Picasa Photo Viewer, PDF Types of Document- Document:- .doc and .docx; .ppt and .pptx; .xls and .xlsx ; .dbm; .txt; .rtf; .odt; .pdf Image:- JPEG (.jpg, .jpeg, .jpe, .jfif), Bitmap (.bmp, .dib); GIF (.gif); TIFF (.tif, .tiff) and PNG (.png) Audio:- (.mp3, .aac, .wma, .wav, m4a and others) Video:- (.mp4, .m4v, .mov, .flv, .avi, .mpg, .wmv and others) HTML:- (.htm, .html) WinRAR:- (.rar) and its importance Looking for appropriate program on Web if file is unknown	To make students acquaint with various file formats in computers and necessary application needed to operate that file
3	Computer Based Business Application	a. Word Processing: Meaning and role of word processing in creating word documents, editing, formatting and printing documents. Inserting images and using word art. Using tools like spell check, thesaurus etc. b. PowerPoint: Meaning and role of PPT in creating slides, text box, inserting text, images, audio, video, charts, tables, graphics and animations to create effective slideshows c. Spreadsheet: Meaning, structure and application in accounting,	To make students acquaint with basic computer software and their importance


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		finance and marketing functions of business. Using formulas and charts. Sorting, Queries, Graphs. Functions- Mathematical, Statistical, Logical, String, Date and Time. Copying data from Word to Excel sheet and vice-versa d. Database: Meaning and application in day-to-day life; Data field, records and files; Sorting and indexing data; Searching records; Designing queries and reports; Linking data files	
4	Terminology in Networking and Internet	Definition – Networking Types of Networks-LAN, WAN, MAN Network Topologies-Bus, Star, Ring, Tree, Hybrid Definition - Internet Internet Concept, Applications of the Internet, Services Provided by the Internet. Internet Service Provider (ISP) Internet Terminology: TCP/IP, DNS, Web, Websites, URL, Creating and Accessing web Web Browser (Google Chrome, Mozilla Firefox, Opera Mini, Internet Explorer, Apple Safari) Search Engine (Google Search, Microsoft Bing, Yahoo, Ask, AoI)	To get acquainted with computer networking and internet – its terminology and applications
SECOND TERM			
5	Digital Storytelling and Social Media	Digital Storytelling – Meaning, Types, Application Text Story vs Multimedia Story Storyboard – making, writing draft, editing and rewriting, collecting the photos, sketch, graphics, animation, video, background music Tools needed for Storytelling – a. Hardware: Digital Camera, Voice Recorder, Computer b. Software: (i) Video: Adobe Premiere Pro, Adobe After Effects, Final Cut	To get acquainted with Digital Storytelling tools and its application from job opportunity point of view. To So comp ad


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		Pro, Canopus Edius (ii) Audio: Audacity, Adobe Edition (iii) Images/Graphics: Adobe Photoshop, Lightroom, Indesign, Corel Draw, Adobe Illustrator (iv) Sharing stories on YouTube, Facebook, Twitter, Flickr, Tumblr, Pinterest, LinkedIn Social Media – Meaning, Types and Application Platforms – Facebook, Twitter, Instagram, Snapchat, YouTube, LinkedIn, Pinterest, WeChat and their comparison Blogs – Meaning, Various Platforms – free and paid, applications Blog platforms – WordPress, Tumblr, Medium, Squareface	security
6	Use of Internet	a. Use of internet for development – Government, Education, Corporate, NGOs, Politician and Political Parties b. Use of Internet in - Politics 2.0, Virtual Democracy, Social Activism, Campaigns, Human Rights c. Ticket booking – hotel and restaurant, flight, bus, train, movie Payment – electricity, water bill, various Govt and corporation taxes d. Apps for Payment – BHIM, Google Pay, PhonePe, PAYTM e. Apps for Transportation – Ola, Uber, redBus, IRCTC, Make My Trip etc f. Apps for Food – Swiggy, Uber Eats, Zomato etc g. Apps for Shopping – Amazon, Flipkart, eBay, Snapdeal, Jabong	To get acquaint with uses of Internet in contemporary era and study the various websites and applications of the same
7	Emerging Trends in IT	Introduction to- Artificial Intelligence (AI) Cloud Computing Internet of Things (IoT)	To discuss the latest trends in the field of Information and
8	Cyber Crimes and IT Laws	Cyber Crime- Meaning , Types (Hacking, Phishing, Identity Theft, Credit/Debit Card Fraud, Trolling and Hate Speech, Fake News, Cyber Stalking, Prohibited/Illegal Content, Violation of	To Cyb punis


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		Intellectual Property Rights, Plagiarism) Net War, Cyber Terrorism Laws and Punishment IT Laws, Need of ICT Policy	malafide use of Internet


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Use ICT or presentation on Basics of Computer	YouTube Tutorial on Computer Fundamental	-----	-----
2	12	Use ICT or presentation on Basics of Computer	-----	-----	-----
3	12	Use ICT or presentation on Basics of Computer	YouTube Tutorial on Computer Fundamental	-----	-----
4	12	Use ICT or presentation on Basics of Computer	Live Demo	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	Live Demo	-----	Students must know about latest tools and emerging fields in contemporary times from job opportunity perspective. Practical demo of Digital Storytelling Software mentioned is optional for teachers.
6	12	Guest Lecture	Live Demo	-----	


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7	12	Guest Lecture & Library Assignments	Live Demo	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----

Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Computer Fundamentals	P. K. Sinha	BPB Publication	New Delhi
2.	Introduction to Computers	Peter Nortons	Tata McGraw Hills	New Delhi
3.	Introduction to Computer Network	Andrew S. Tanenbaum	Pearson Publications	Chennai
4.	Cloud Computing: Concepts, Technology & Architecture	Thomas Erl	Pearson Publications	Chennai
5.	Cyber Law and Cyber Crimes Simplified	Prashant Mali	Cyber Infomedia	Mumbai

Prof. Dr. Gangadhar V. Kayandepatil

Chairman

Steering Committee

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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Industrial Psychology & Workforce Management

Syllabus for B.Com Semester- I & II

Subject Name:- Industrial Psychology & Workforce Management

Course Code:- Indpsy (Restructure)

Objectives:- This subject is meant to acquaint the students with various concepts related to Industrial Psychology and Workforce Management as are applicable in business.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Industrial Psychology	Role of Industries in Indian Economy Review of Development of Industries specially after Independence Need of study of Industrial Psychology Meaning, Definition and Importance of Industrial Psychology in present era	To discuss the concept of Industrial Psychology and its relevance in LPG era
2	Industrial Production	Meaning of Industries, Selection of Location, Proposal – Finance and Plant Purchasing of Machinery Starting of Production Need of Society and their Expectations, Industrial Product/ Service, Expectations of Customers	To focus on different aspects relat
3	Industrial Marketing and its	Comparison of Industrial Marketing with Consumer Marketing	T


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	Importance	Characteristics and Classification of Capital and Other goods, Firm Market, Institutional Market and Government Market Need for Industrial Marketing Research Process and Problems in Industrial Marketing	Industrial products
4	Industrial Psychology regarding Demand	Demand and Product Characteristics User and their Classifications (Standard Industrial Classification Systems) Regional Concentration, Vertical and Horizontal Markets Buying Power of Industrial Users, Buying Motives of Industrial Buyers Industrial Market Segmentation Vendor Analysis and Selection Buying Stages, Buying Patterns and Length of Negotiations, Frequency of Purchase and Size of Order, Direct Purchases Reciprocity Arrangements, Leasing vs Buying, Service and Quality Consideration	To take review of various points to be considered at the time of buying products
SECOND TERM			
5	Workforce Management	Different factors of Production Labour as an Active Human Product of Production Factors affecting Labour Market Labour vs Human Resources – its role in Indian Economy Establishment of Quality Educational and Professional Institute after Independence Review of Educational and Professional Institutions in the eyes of increasing Workforce	To discuss the concept of Workforce Management
6	Recruitment Management	Methods of Recruitment – Procedure of Recruitment Demand of Human Resources Administrative Approval, Preparation of Advertisement Publication, Receiving Application, Scrutiny of Application Planning and Conducting at Written / Computer Based Test, Declaration of Results, Interview, Selection, Sending	T i


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		Appointment Orders, Joining , Necessary Documents of Job Training Performance Appraisal, Permanent Appointment	
7	Exploitation of Human Resources	Outsourcing, Contractual Appointment through Contractor\ Various types of Harassment Salary/Wages Minimum – Maximum, Payment of Less Salary Physical and Mental Health of Human Resources Role of Trade Union and Changes in Trade Union Act	To examine various aspects of exploitation of Human Resources
8	Visiting different Medium and Large Scale Industries in Nashik District and Writing Report	Visits and Report Writing Visiting Different Multinational of Domestic Companies in Nashik where minimum 50 Workers are Working	To take review of different Medium and Large scale industries in Nashik


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	-----	-----
7	12	Guest Lecture & Library Assignments	-----	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Industrial Marketing	Richard M. Hill	Taraporewala	Mumbai
2.	Industrial and Organizational Psychology	Spector Paul E.	John Wiley and Sons Ltd	Noida
3.	Industrial Psychology	Narendar Singh	McGraw Hill	New Delhi
4.	Work Rules: Insights from Inside Google That Will Transform How You Live and lead	Laszlo Bock	Hodder & Stoughton	Gurgaon
5.	Industrial Economics: An Introductory Textbook	R.R. Barthwal	NEW AGE	New Delhi

Prof. Dr. Gangadhar V. Kayandepatil

Chairman

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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Personality Development

Syllabus for B.Com Semester- I & II

Subject Name:- Personality Development

Course Code:- Perdevp (Restructure)

Objectives:- This subject is meant to develop the personality and effective communication skills among the students for self assessment as well as job selection in near future.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Introduction to Personality Development	Definition, Meaning, Characteristics and Elements of Personality Importance of Personality in present era Inner traits and outer traits of personality Self vs Personality Personality traits vs Body feature Control mechanism of personality	To know the concept of personality development
2	Pillars of Personality Development	First pillar – Introspection: Meaning, Need and Process Second pillar – Self Assessment: Meaning, Approach, Life Orientations, Personal Attributes, Comprehensive List of Attributes, Method for Assessment Third pillar – Self Appraisal: Meaning, Technique, Salient Features of Self Appraisal, Life Aspirations, Academic Performance	To know the concept of personality development


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		Fourth pillar – Meaning, Purpose, Influencing factors, External factors, Self driving factors, Self driven attributes, Self development process, Road map for self development, Setting personal mission, Watch and guard against pitfalls Fifth pillar – Meaning, Self questioning, Self appraisal report, Self introspective questions	
3	Self Identification and Self Assessment	Meaning of self identification and introspection, SWOT Analysis, Self centric process, Self belief system, Self concept system, Scale for assessment, Self qualifying factors, Self identification matrix	To analyze your strength and weaknesses and focus on self identification
4	Mission and Vision Statements and Goals and Objectives of Your Life	Mission, vision, goals and objectives – meaning and the difference between them Personal mission, Modality for Self questioning, Observing your response Process: Basis, Values, Principles Roles and Responsibilities: Projection, Identifying role – personal, professional, social/community Winning factors: Your strength and role, Positive attributes, Negative attributes, Relationship and upgradation, Impression and opinion about you Human dispensation: Characteristics of a personal mission statement, Monitoring and evaluation, Multidimensional areas	To critically examine the personal mission, vision, goals and objectives and plan for achieving it
SECOND TERM			
5	Personality Building	Motivating and leading people at work – Concept and theories of motivation, Financial & non-financial incentives Leadership – concept and styles – developing the qualities for ideal leadership	To discuss various aspects and points of personality building
6	Self Attributes and Selection of Job	Self attributes – Intellect, Genius, Intelligence, Talent, Synergetic aspects Purpose of Job, Different career and courses, Criteria of selection – basic qualification, Interest, Aptitude, Family background and	To C acco


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		support, Health and physical fitness, Promotional aspects, Employer's expectations Self Employment, Entrepreneur Attribute needed to become entrepreneur, Prior planning, Government subsidy and other schemes	
7	Advising and Counseling	Advice – Meaning, Importance, Advantage, Limitations Role of an Advisor Quality of an Advice Guidance for an Advisor Counseling – Meaning, Importance, Advantage, Limitations Role of a Counselor Quality of Counseling Ethics for Advisor and Counselor Advice for Students from rural areas	To elucidate the importance of advising and counseling
8	Study of Renowned Personality	Mahatma Gandhi, Indira Gandhi, Rajiv Gandhi – IT Revolution, Narendra Modi Bill Gates, Dhirubhai Ambani, Shantanu Rao Kirloskar, Ratan Tata Homi Baba, Vijay Bhatkar, Stephen Hawking, APJ Abdul Kalam Dr. B.R. Ambedkar, Dr. Chintamanrao Deshmukh, Principal Dr. M.S. Gosavi President of NIMA, President or MD of five MNCs in Nashik Study of Personality of five women entrepreneur in Nashik and report writing / Conducting of interview	To examine the contribution and personality of renowned person


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	-----	-----
7	12	Guest Lecture & Library Assignments	-----	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Personality Development and Career Management	Onkar R.M.	S. Chand	New Delhi
2.	Personality Development and Soft Skills	Barun Mitra	Oxford University Press	Noida
3.	Theories of Personality	Calvin S. Hall Gardner Lindzey John B. Campbell	Wiley	Noida
4.	The Monk Who Sold His Ferrari	Robin Sharma	Jaico	Mumbai
5.	Get Your Dream Job: A Step-by -step Guide to Clear Any Interview With Confidence	Piyush Bhatia	Createspace Independent Pub	---

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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Agricultural Production and Marketing

Syllabus for B.Com Semester- I & II

Subject Name:- Agricultural Production and Marketing

Course Code:- Agprma (Restructure)

Objectives:- This subject is meant to explain core concepts related to Agriculture and its Marketing. This subject will imbibe the importance of Agriculture in students and connect them with farmers and their problems. Students will suggest remedies to cure problems associated with farming.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Role of Agricultural in Indian Economy	Agriculture – Meaning, Importance Agricultural Production – Food crops, Commercial crops Trends in production of - food crops, commercial crops Agricultural development during plan five year plan National Agricultural policy, Evaluation of agricultural development – land development, land reforms, cultivation tenure system, irrigation	To take review of the role of Agriculture in Indian Economy
2	Marketing of Consumer	Durable and non-durable goods and services in rural market Product planning, Pricing, Promotion and Management and Distribution Channel for Marketing durable and non-durable goods in rural areas	T ma


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		Media Planning: Planning and Organizing Personal Selling in Rural Markets	
3	Marketing of Agricultural Inputs	Meaning of Agricultural inputs and its importance in the eyes of agricultural production Marketing of Fertilizers, Pesticides, Seeds, Tractors and other Agricultural implements in Rural areas, Irrigation Government policies regarding agricultural inputs	To take review of marketing inputs
4	Agricultural Production	Meaning of Agricultural production and its importance Average growth rate of agricultural production Factors determining agricultural productivity Low agricultural productivity Trends of agricultural productivity Importance of increase in agricultural productivity Measures employed to develop agriculture	To study the importance of agricultural production
SECOND TERM			
5	Agricultural Marketing	Classification of agricultural products with particular reference to seasonality and perishability Market structure for agricultural product and its performance Processing facilities for different agricultural products Role and types of warehousing Marketable surplus, Conditions of satisfactory agricultural marketing, Present agricultural marketing system in India Defects of agricultural marketing Govt measures to improve agricultural marketing Co-operative marketing Report of Shankarlal Guru Committee Agricultural Exports Agricultural Marketing Reforms	To study various aspects related to Agricultural Marketing
6	Distribution Channels and Physical Distribution	Distribution channels – concept and role, Types of distribution channels, Factors affecting choice of a distribution channel Retailer and Wholesaler	To chan


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		Physical distribution of goods, Transporting and Warehousing Inventory control, Order processing	
7	Agriculture Price Determination and Commodity Training	Agricultural Price Policy – Meaning, Objectives, Need Main features of Agricultural Price Policy in India, Effects and Suggestions for Agricultural Price Policy Role of Agricultural Price Commission, Role of Central and State Government institutions and Organizations in Agricultural Marketing Minimum Support Price (MSP), Method of calculation of MSP Unique features of Commodity Markets in India	To study various factors regarding Agriculture Price Determination and Commodity Training
8	Agricultural Production and Marketing in Nashik District	A case study of Production – input – warehousing – agricultural status; Marketing – prices, Agricultural produce; Marketing committee – Financial status, Socio-economic status Study of Farmers, Farmer suicides and rural indebtedness Export of Onion, Grapes, Roses and other agricultural products Interview of ten ideal farmers/families in Nashik district	To conduct an interview of successful farmers and their families on subject matter


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	-----	-----
7	12	Guest Lecture & Library Assignments	-----	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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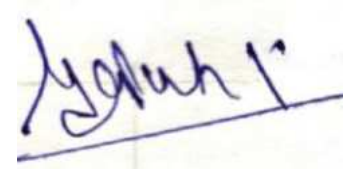
Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Agricultural Marketing	Mamoria C.B	Himalaya Publishing House	New Delhi
2.	Globalisation and Agricultural Marketing	Nayyar H and Ramaswamy	Rawat Publications	Jaipur
3.	Agricultural Economics	Kayandepatil Gangadhar	Chaitanya Publications	Nashik
4.	कुरुक्षेत्र	Govt of India	---	New Delhi
5.	Annual Reports and Survey Reports	Ministry of Agriculture, Govt of India	---	New Delhi
6.	Indian Economy	Datta Sundaram	S. Chand	New Delhi



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Steering Committee

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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Catering, Hotel and Event Management

Syllabus for B.Com Semester- I & II

Subject Name:- Catering, Hotel and Event Management

Course Code:- Cahoem (Restructure)

Objectives:- This objective of this course is to help students understand the concept and practical working of catering, hotel and event management firm and job opportunities available in these sectors.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Introduction to Hotel Industry / Business	Introduction to Hotel Industry Target Market and Potential in Hotel Industry Different Types of Hotel Ownerships Hotel's Functional Areas Classification of Hotels Types of Room Tariff Structure and Plans Partnership with MakeMyTrip (MMT), Goibibo and OYO Different License required to start Hotel Business	To give detailed introduction about Hotel Industry
2	Hotel Operations	Front Office: Accepting reservation on phone and answering guest enquiries, Maintaining record, Booking confirmation and cancellation, Computerized ledger and billing Housekeeping and laundry operations – organizational structure,	1 dep th relat


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		Staff hierarchy, Lines of authority and areas of responsibility, Essential qualities in housekeeping staff – communication and interpersonal skills, Amenities provided in standard and deluxe rooms, VIP amenities, Cleaning schedules and Pest Control Kitchen Stewarding – Hierarchy, responsibility and relation with other department Safety Officer(s) – Hierarchy and relation with other department Cashiering and Auditing Department - Hierarchy, responsibility and relation with other department	
3	Introduction to Catering Business	Introduction to Cookery – from History to Modern era Kitchen equipments – heavy and light equipments; utensils; care and maintenance Various culinary terms – origin of modern cookery Personal Grooming, Hygiene, Uniform and Safety procedure in handling equipment Food Production Department – Organizational Structure, Layout, Duties and Responsibilities, Relation between various departments Composition of different ingredients & the action of heat on fats, carbohydrates, proteins, vitamins and minerals Full service restaurant, hotel and beverage facilities, catering halls, independent caterers and private clubs Meals & Menu planning - Origin, objective, types Types of Meals – Early Morning Tea, Breakfast, Lunch, Afternoon Tea, Dinner, Supper	To give detailed introduction about Catering Business
4	Catering Operations	Food & Beverage department – organization, structure, principal	1


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		staff, duties and responsibilities, inter-departmental relationship Serving in restaurant, hotel, events – marriages, birthday party, corporate event, Government events Methods of service – Table laying for different meals, receiving and seating the guests, taking the order, food serving types: Banquet-Buffer-Table, procedure of service, presentation and encashing the bill License from FSSAI and other licenses required to start catering business	operations in Catering business, their method of service and licenses required to start catering business
SECOND TERM			
5	Introduction to Event Management	Event Management – Meaning, Importance and Application 5C's of Event, 5W's of Event, Types of Event Elements and objectives of Event Management Business Communication and negotiation skills Public Relations Event Risk Management	To give detailed introduction about Event Management industry
6	Event Management Operations	Process of Event Planning, Event Organizer – Need, Role and Qualities, Venue, Types of Venue– Indoor and Outdoor, Criteria to choose venue Steps in Organizing an Event Pre-Event: Finalizing service provisions, budget finalization and venue selection Execution of Event – Developing a hierarchy with personnel having fixed role and responsibilities to conduct the event smoothly Networking Components – Print, Radio, TV, Outdoor Media, Social Media, Direct Media Post Event- Taking feedback, Engage on Social Media, Update the Website and Social Media handles, Take internal review	To examine the process of planning an event and different elements required to make the event successful


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7	Problems and Challenges in Hotel, Catering Business and Event Management	Problem and challenges (Hotel and Catering) – high competition, improper marketing, poor customer satisfaction, lack of productive chef and manager, high service rate, cleanliness issue, no proper transportation and security challenge especially to women Problem and challenges (Event Management) – budget, right venue, vendor, technological, tracking live event, time management and customer expectation and satisfaction, multiple events being managed by one single organizer or staffing problem and planner's block	To examine the different problems and challenges in Hotel, Catering Business and Event Management
8	Case Study of Catering, Hotel Business and Event Management And different career opportunities available	A case study of any Caterer, Hotel Business and Event Management Company in Nashik District and Preparing Report Explore different career opportunities present in this sector	To get first hand information about the status of the subject matter and exploring different career opportunities available


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	-----	-----
7	12	Guest Lecture & Library Assignments	-----	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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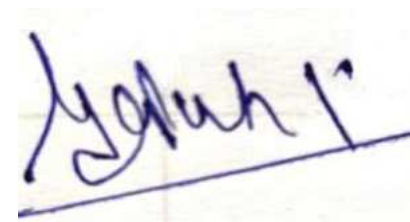
Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Hotel Front Office Operations and Management	Jatashankar R Tewari	Oxford University Press	Mumbai
2.	Hotel Facility Planning	Tarun Bansal	Oxford University Press	Mumbai
3.	Guide for Hotel Management 2019	---	Arihant	New Delhi
4.	Food Services And Catering Management	Saxena R P	Centrum Press	New Delhi
5.	Event Management 1 Edition	Wagen	Pearson	Noida



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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Travel and Tourism Management

Syllabus for B.Com Semester- I & II

Subject Name:- Travel and Tourism Management

Course Code:- Trtoma (Restructure)

Objectives:- The objective of this subject is to help students understand various issues in Travel and Tourism business in India and job availability and job creation in this sector.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Career in Travel and Tourism Industry	Tour Manager, Tour Guide, Travel Manager, Travel Counselor, Sales and Public Relation Officer, Itinerary Planner Information Assistant (through SSC Exam), Reservation and Counter Staff, Interpreter Adventure Tour Operator, Travel Media Specialist, Travel Educationist, Global Distribution Service Manager Amusement and Recreation Attendant, Cruise Ship Director Airlines: Ground Staff (Traffic Assistance, Counter Staff, Booking and Reservation); In-flight staff (Airhostesses, Stewards)	To discuss the various job opportunities available in Tourism Industry


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		Hotels: Operations, Front office, Housekeeping, Food and beverages, Accounting, Maintenance, Sales, Public Relation Officer, Security Entrepreneurship, Retailer (Franchise), Freelance Writer or Travel Blogger	
2	History and Development of Travel and Tourism Industry	History and Development of Travel and Tourism Industries in India India's rich history dating back to centuries and scope of travel in India Various aspects of Travel and Tourism business Constituents of Tourism Industry and Tourism Organizations Govt. policies and programmes related to Travel and Tourism in India Tourism Regulations Statistics and Measurement related to Tourism industry	To discuss History and Development of Travel and Tourism Industry
3	Tourism Services and Operation	Modes of transport, Tourist Accommodation, Informal Services in Tourism, Subsidiary Services: Categories and Roles, Travel Agency, Tour Operators, Guides and Escorts, Tourism Information Centers	To examine various modes of transport in tourism services and its operations
4	Geography and Tourism	India's Biodiversity: Landscape features – Himalaya (North), Bay of Bengal (East), Indian Ocean (South), Arabian Sea (West), Thar Desert (North-West), Eastern and Western Ghats, Tropical and Evergreen Forests, Gangetic Plains, Deccan Plateau and hilly and mountainous terrain India's Environment and Ecology Season's in India and Prominent Destination Map and Charts	To examine geography of India and study it's tourism trends all over the year
SECOND TERM			
5	Tourism Marketing and	Relevance, Product Design, Market Research, Promotional	To e


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	Communication	Events, Advertising, Publicity, Selling, Role of Media, Writing for Tourism, Personality Development and Skills required for Tourism Industry	and communication skills required for this industry
6	Tourism: Planning and Policy	Tourism Planning and Policy Infrastructural Development Local Bodies, Officials and Tourism Development, Dependency and Manila Declaration Surge of Travel and Tourism websites and other platforms in India – Indian Railway Catering and Tourism Corporation (IRCTC), Make My Trip (MMT), Yatra, Cleartrip, Ixigo, Goibibo, Travelguru, redBus, Confirmktkt etc and the discounts they offer while booking and cashback received after successful booking	To discuss tourism planning and policy and undergo detail scrutiny of latest websites and platforms for booking
7	Innovative Practices in Tourism and Case Studies	Adventure tourism, Himalayan Trekking, Lake side camping, Culinary tourism, Sustainable tourism Solo tours especially for Women, Eco travel, Local experience Bleisure Travel (Leisure + business travel) Ice hotel (Western concept), World Tour Robot, chatbots, automation, artificial intelligence, Internet of Things (IoT) and Virtual Reality in Tourism industry Five different cases studies of innovative practices in modern tourism industry	To discuss the innovative practices in Tourism industry and examining various case studies
8	Challenges in Travel and Tourism	Impact – Economic, Social, Environmental and Political Threats and Obstacles to Tourism National Travelling: Security and Safety concerns International Travelling: Passport and Visa availability	To examine challenges in travel and tourism


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	To get the knowledge of diverse job opportunities in tourism sector
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	To understand the geography of India and travel trends throughout the year
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	Make a detailed report of any six travel and tourism websites and compare them	To get first hand information and enable students to use ICT in Travel
7	12	Guest Lecture & Library Assignments	-----	Five different cases studies of innovative practices in modern tourism industry	To cope up with modern means of travel and tourism industry and consider this sector as profession
8	12	Group Discussion/ Workshop/ Visits	-----	-----	


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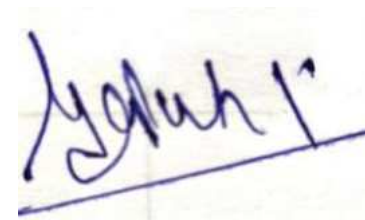
Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Geography and Transport and Market Centre	Saxena Hari M.	S.Chand and Co.	New Delhi
2.	Road Transport Management	Manchandra	Himalaya Publishers	Mumbai
3.	Tourism Development, Principles and Practices	Bhatia A.K.	Sterling Publishers	New Delhi
4.	Tourism Law in India - A Comprehensive Manual of Concepts, Regulations & Guidelines	Shashank Garg	Universal Law Publishing	Prayagraj
5.	Lonely Planet India (Travel Guide)	Lonely Planet	Lonely Planet	Gurgaon



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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Share and Security Management

Syllabus for B.Com Semester- I & II

Subject Name:- Share and Security Management

Course Code:- SSMA (Restructure)

Objectives:- The subject aims at acquainting the students with the working of Financial Markets in India and specially focuses on Share and Security Management

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Investment and overview of various Financial concepts	Different terms and terminology used in Financial Market operations Investment, Speculation, Gambling, Increasing Popularity of Investment, Features of Investment Programmes, Risk of Investment, Finance vs Investment, Interacting Decision Elements, Investment Management and other discipline Interest Calculation	To take review of Investment and Overview of various financial concepts
2	New Issue Market	Introduction to New Issue Market, concept, function, organization, understanding, distribution and role of new issue market Recent trends in primary and secondary market Listing of securities, advantages of securities, listing requirements – withdrawal and insider training	To s and r


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3	Money Market and Capital Market	Indian Money Markets' composition and structure (a) Acceptance houses (b) Discount houses (c) Call Money Market Recent trends in Indian Money market Security Market- (a) New issue market (b) Secondary market Functions and role of stock exchange Listing procedure and legal requirements Public Issue- Pricing and Marketing Stock Exchanges – National Stock Exchange and over the counter exchange	To throw light on money and capital market in India
4	Securities and Contract Act and Investment Alternatives	Main Provisions of Securities Act, SEBI Act, Contract Act Investment Alternatives – Bonds, Debentures, Govt Securities, Preference Shares, Equity Shares, Non-securities forms of Investment, Private Equity and Venture capital Dividend policies and decision Unethical practices – financial fraud, insider trading, money laundering, hostile merger and acquisition, causes of unethical practices and methods to prevent investors from such practices	To study the provision of important Acts related to Security and contract
SECOND TERM			
5	Investor Protection	Grievances concerning stock exchange – dealings and their removal Grievance cells in stock exchanges SEBI Company Law Board – Press, Remedy through courts	To take review of various provisions regarding Investor's provisions
6	Functionaries on Stock Exchange and the Brokerage Business	Brokers, Sub-brokers, Market Makers, Jobbers, Portfolio Consultants, Institutional Investors and NRI Primary and Secondary Market – Role functions and methods of selling securities, allotment procedure	To study Stock


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		SEBI Guidelines on Public Issues Functionaries of Brokerage Firm, Brokerage Information, Selecting of a Broker and a Brokerage Firm, Types of Exchange in Stock Exchange	
7	Financial Services	Merchant banking – Functions and roles, SEBI Guidelines Credit rating – Concept, functions and types, role and importance Depositories Act 1996 – Role and need, Valuation of Bonds, Debentures, Preferential shares, Equity shares etc Weak, Semi strong and Strong Market	To study various financial services
8	Fundamental and Technical Analysis and Career Opportunities in Financial Markets	Current State of the Economy, Industrial Growth Cycle, Fundamental Security Analysis, Basic Technical Assumptions and Various elements of Technical Analysis Portfolio Analysis – Estimating rate of return and standard deviation of portfolio Effect of combining the securities, Markowitz Risk – return optimization, Single index model or Market model Portfolio unique risk, Simple Sharpe's optimization solution Measure of return, Risk adjusted, Measures of return, Market timing, Evaluation criteria and Procedures Various career opportunities available in Stock and Money Market and Brokerage Business in India	To examine various job opportunities available for commerce graduate


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	-----	-----
7	12	Guest Lecture & Library Assignments	-----	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Financial Markets and Institutions	Bhole L.M.	Tata McGraw Hill	New Delhi
2.	Indian Securities Market – Investor's View Point	Hooda R.P.	Excell Books	New Delhi
3.	Indian Financial System	Machiraju H.R.	Vikas	New Delhi
4.	Money Market Operations in India	Sengupta A.K and Agrawal M.K.	Skylark Publications	New Delhi
5.	RBI Report on Currency and Finance	RBI	RBI Publications	New Delhi
6.	Economic Survey	Govt of India	Ministry of Finance	New Delhi
7.	Investment Management	Bhalla V.K.	S. Chand & Co.	New Delhi

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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Commercial and Co-operative Banking with GDCA

Syllabus for B.Com Semester- I & II

Subject Name:- Commercial and Co-operative Banking with GDCA

Course Code:- Combank (Restructure)

Objectives:- This subject enables the students to understand the working of commercial and co-operative banking as well as job opportunities available in commercial and co-operative banking.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Career Opportunities in Commercial and Co-operative Banking	Advertisement – Different Posts – Qualification – Application – Syllabus – Preparation for Examination – Appearing for Examination – Interview – Training	To examine the career opportunities available in commercial and co-operative banking
2	Indian Banking System	Structure and Organization of Banks Reserve Bank of India (RBI) – apex banking institutions Commercial banks, Regional Rural Banks, Co-operative banks, Development banks History, Objectives, Functions, Structures, Organizations, Working and Progress of Commercial, Co-operative and State Bank of India	To take review of the development of Indian Banking System in India
3	Banking Regulation Act 1949	History, Social Control, Banking Regulation Act as applicable to Banking Companies and Public Sector Banks	To stu of Ba


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		Banking Regulation Act as applicable to Co-operative banks	
4	Terminology Used in Banks	Different Terminology used in Commercial and Co-operative Banking	To memorize various technical and non-technical terms used in day-to-day banking
SECOND TERM			
5	Functioning of Commercial Banks	Meaning, Definition, Features of Commercial Banks, Types of Commercial Banks, Functioning of Commercial Banks, Organization Structure of Commercial Banks – head office, regional office, training centre, main district office and branch	To get acquaint the functions of commercial banks
6	Functioning of Co-operative Banks	Meaning, Definition, Features of Co-operative Banks, Types of Co-operative Banks, Functioning of Co-operative Banks, Organization Structure of Co-operative Banks – head office, regional office, training centre, main district office and branch	To get acquaint the functions of co-operative banks
7	Government Diploma in Co-operative and Accountancy (GDCA)	Syllabus – Preparation for Examination – Appearing for Examination	To study the syllabus of GDCA and mentally prepare for appearing GDCA exams
8	Case Study of Functioning of Commercial / Co-operative Banks in Nashik	Branch, Location, Customers, A/c opening, KYC Procedure, Withdraw, Pay in, Customer relationship, Observation of day-to-day activity, Maintenance of records Visit to any five commercial and five co-operative banks in Nashik District and preparation of reports and visits	To get expertise in Indian Banking system


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	Collection and solving of ten question papers of Banking Exam
6	12	Guest Lecture	-----	-----	Collection and solving of ten question papers of Banking Exam
7	12	Guest Lecture & Library Assignments	-----	-----	To solve atleast five years question paper of GDCA exam
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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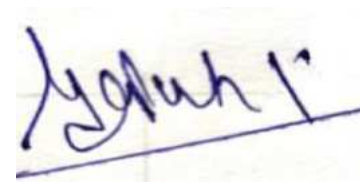
Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Fundamentals of Banking – Theory and Practice	Basu A.K.	Mukherjee & Co.	Kolkata
2.	Banking Theory and Practice	Shekhar and Shekhar	Vikas Publishing House	New Delhi
3.	Practice and Law of Banking	Khubchandani B.S.	Macmillan	New Delhi
4.	Banking Awareness for SBI & IBPS Bank Clerk/PO/RRB/RBI Exams	Disha Experts	Disha Publications	New Delhi
5.	Management and Operations Of Co-Operative Banks	IIBF	Macmillan	New Delhi



Prof. Dr. Gangadhar V. Kayandepatil

Chairman

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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Official Correspondence & Drafting Skills with Tally

Syllabus for B.Com Semester- I & II

Subject Name:- Official Correspondence & Drafting Skills with Tally

Course Code:- Corres (Restructure)

Objectives:- This subject will make students acquaint with terminology and expertise in official correspondence. This subject will educate about Tally and drafting skills.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Modern Office Management and its Function	Meaning of office, Characteristics of Modern Office , Role and importance of modern office, Role of Office Manager/ In-charge and his position and status	To know the importance of modern office management
2	Modern Office Organization and Office Automation	Basic steps in Modern office organization Organization – Principles and techniques Effective use of Office Committees The idea organization Delegation and decentralization of authority Features of Good office systems Importance of flow for smooth work Objectives of office layout Guidelines in designing modern office layout Elements of supervision	To focus light on modern office organization and office


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		Qualities of good supervisor Supervisor and good human relation	
3	Records Indexing, Office Furniture, Office Machines and Equipments	Definition of records, importance of records, objectives of maintaining records, record management, element of record management system, filing system and its qualities, types of filing systems Objectives of indexing, selection of suitable indexing Need of office furniture – various types of furniture required in office Principles of the selection of furniture – modern modular furniture Office mechanization – purpose of office machines, various machines used in modern office Various equipments required for office	To take review of the importance of records indexing, furniture, office, machines and equipments
4	Management and Control	Office forms and kinds of forms, advantages, form design, guidelines in form design Objectives of form control, its management and control	To examine the importance of various forms used in day-to-day office functioning and focus on guidelines regarding form control
SECOND TERM			
5	Office Correspondence and Mail	Meaning of Office Correspondence, external and internal correspondence, centralized and decentralized correspondence, drafting of correspondence, methods of drafting correspondence, skill, language, techniques, selection of proper words in drafting etc Importance of reproduction, business mail service, planning the business mail service, classification of business mail, postal services, maintaining record Enterprise resource planning (ERP)	To discuss and draft the various types of office correspondence and mail
6	Office Manual, Stationery and Reports	Need, benefits, types of office manual Effective preparation of office manual Office stationery and need to control office stationery	To study and prepare office manual


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		Demand and supply, issue of stationery, importance of stationery, essentials of good system of regulatory stationery Nature and functions of personal management in motivation, work measurement and standardization Meaning of office reports, types of reports, basic principles of reports, qualities of good reports, drafting of report writing, specimen reports drafting, precise writing	
7	Development of Communication	Process of communication, importance of office communication, types of office communication, factors affecting choice of the methods of external communication, common barriers to communication, on job training of communication, drafting correspondence	To focus on the need of effective communication and steps to be taken
8	Career Opportunities	Career opportunities in Govt, Semi Govt, Multinationals and renowned companies Various certificate courses - MS-CIT, Tally, Data entry courses	To study the various career opportunities available in Govt, Semi Govt and Multinational companies


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	-----	-----
7	12	Guest Lecture & Library Assignments	-----	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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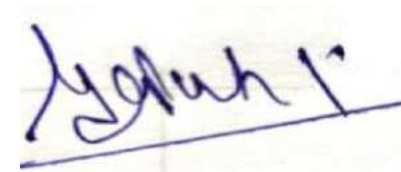
Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Business Correspondence and Report Writing	R.C. Sharma and Krishna Mohan	McGraw Hill	New Delhi
2.	Modern Office Management	Jain J.N. and Singh P.P.	Regal Publication	New Delhi
3.	Oxford Handbook of Commercial Correspondence	Ashley A.	Oxford University Press	New Delhi
4.	Effective Office Communications Noting and Drafting (CAP)	Shital Parkash, M.K.Agarwal	Pustak Mahal	New Delhi
5.	Writing Skills: Success in 20 Minutes a Day	Judith F. Olson	Goodwill Publishing House	New Delhi



Prof. Dr. Gangadhar V. Kayandepatil

Chairman

Steering Committee

Savitribai P



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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Professional Ethics, Values & Integrity

Syllabus for B.Com Semester- I & II

Subject Name:- Professional Ethics, Values & Integrity

Course Code:- Ethics (Restructure)

Objectives:- This subject will teach about issues relating to integrity and probity in public life and develop problem solving approach related to society.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Introduction to Ethics and Morality	Meaning and Objectives of Ethics and Morality Difference between Ethics and Morality Moral Standards and Moral Development Essence determinants and consequences of Ethics in human actions Dimensions of ethics Ethics in public and private relationships Human values – lessons from the lives and teachings of great leaders, reformers and administrators Role of family, society and educational institutions in inculcating values	To know the concept of Ethics and Morality
2	Business Ethics	Business Ethics - Meaning, Objectives, Need to study and Scope Views in Business Ethics – Separatist, Unitarian, Integration	To


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		Principles of Business Ethics	
3	Theories of Business Ethics	Meaning and Relevance of Theory of Business Ethics Foundation of Theories of Business Ethics Theories of Business Ethics – Teleological and Deontological Theories	To take review of various theories of Business Ethics and its importance in present era
4	Human Values and Professional Ethics	Meaning and Formation of Human Values Importance of Human Values at the Workplace Meaning of Profession and Professional Ethics Difference between Professional Ethics and Personal Ethics Professional Ethos – Meaning and Significance	To consider the significance of Human values and Professional Ethics in present era
SECOND TERM			
5	Ethical Dilemmas in Business	Ethical Dilemma – Meaning and Types Resolving Ethical Dilemmas at Workplace Case Study to resolve Ethical Dilemma	To explain the ethical dilemma in business
6	Ethical Decision Making	Ethical Decision Making – Meaning and Importance Determinants of Ethical Decision Making – Individual and Situational Factors Models of Ethical Decision Making – Consequentialist and Non-consequentialist Theory Kohlberg's Model of Moral Development and Decision Making Ethical Decision Making Process Limitations in Making Ethical Decision	To teach the importance of ethical decision making and its application in students near future
7	Code of Ethics	Code of Ethics – Meaning, Importance and Advantage Clauses in Code of Ethics Procedure of preparing Code of Ethics Implementation of Code of Ethics	To examine various aspects of code of ethics
8	Case Study	Various Case Studies related to Code of Ethics to be taken from UPSC Mains Examination Paper of Ethics, Integrity and Aptitude	To Ethi pro


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	-----	-----
7	12	Guest Lecture & Library Assignments	-----	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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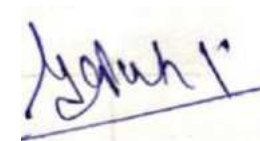
Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria	Excel Books	New Delhi
2.	A Textbook on Professional Ethics and Human Values	R.S. Naagarazan	New Age International Pvt Ltd	New Delhi
3.	Professional Ethics and Human Values	Govindarajan M	Prentice Hall India Learning Private Limited	New Delhi
4.	Ethics, Integrity & Aptitude: For Civil Services Examination 2019	G. Subba Rao, P.N. Roy Showdhury	G.K. Pub	New Delhi
5.	Business Ethics and Corporate Governance	A.C. Fernando	Pearson	Chennai
6.	Making Ethical Decisions	Weeks Louis B.	Westminster/John Knox Press,	USA



Prof. Dr. Gangadhar V. Kayandepatil

Chairman

Savitribai P



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Revised Syllabus (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester:- I & II

Subject:- Foundation Course

Syllabus for B.Com Semester- I & II

Subject Name:- Foundation Course

Course Code:- FC (Restructure)

Objectives: - To make the student acquaint with social, religious, cultural economic aspect and problems of India. The course will also imbibe scientific temper and progress of Indian after Independence.

UNIT NO.	TITLE	CONTENTS	PURPOSE SKILLS TO BE DEVELOPED
FIRST TERM			
1	Career Guidance and Counseling	Meaning and importance of career guidance & counseling Preparation for UPSC, MPSC, Banking, Railway, Insurance and other exams planning and discussion Syllabus and Exam pattern of UPSC, MPSC, Banking, Insurance and other exams Preparation for CA, ICWA, CS and other professional exam	To focus on career opportunities available for Commerce students after graduation
2	Social Problems in India	Meaning, Definition, Nature & Characteristics of Indian Society. Features of Indian Social Structure – Institutions, Valuable & Symbolic Meaning and Definition of Caste, Features of Indian Caste System, Merit and Demerits of Caste System Schedule Caste, Schedule Tribes, Vimukt & Nomadic Tribes, Other Backward Class and Economically Backward Classes and their problems. Various measures to solve the problems. Problems of	To take review of Social Problems in In


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		untouchability in India. Effects of Superstitions Educational growth and its impact on Society after Independence Intercaste marriages, migration of various people of different caste to urban & other countries.	
3	Religious and Cultural Aspect of India	Meaning, Definition and Type of Culture, Characteristics of Indian Culture Meaning, Definition and Type of Culture, Characteristics of Religious Religion as General concept, Religious comparison of Indian Population, Role of Religion in society, Importance of Religion in Indian Society. Indian Religious Philosophy and various changes including Liberation Movement Meaning, Definition and Type of Culture, Characteristics of National Integration and factors responsible for binding. Measures for promotion of National Integration. National Integration Committee and Council. Conferences of State Chief Ministers Minorities in India – Jains, Buddhists, Muslims, Sikhs and other minorities. Constitutional Provisions and Minorities Commission and its recommendations	To take review of Religious and Cultural aspects of India from historic time till date
4	Economic Problems in India	Characteristics of Indian Economy Economics equality vs Economic inequality, types of Economics inequality National income – per capita income Extent of inequalities of Income in India Causes of Economic inequality in India Effects of Economic inequality Various schemes and programmes for removing of Economic inequality in India Meaning, Definition, Features, Measurements of Poverty, Poverty Line, Types & Indicators of Poverty, Poverty in India, Causes of Poverty	To know and discuss the economic problems in India and probable solution to removing it


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		in India, Effects of Poverty, Various schemes & programmes for removal of poverty in India Meaning, Types and Causes of Unemployment, Rural Unemployment and Causes of increasing rural unemployment Urban unemployment, causes of increasing Urban Unemployment, various schemes & programmes for removal of rural & urban unemployment in India Review of 5 year plan and role of Planning Commission (1951-2014) and role of NITI Aayog since 2014 Review and impact of LPG (Liberalization, Privatization and Globalization) since 1991	
SECOND TERM			
5	Political Science	Basic Concepts of Political Science – Constitution, State, Government, Nation, Parliament, Executive, Judiciary, Rule of Law Democracy – a form of Government, Meaning, Definition, Type, Merit and Demerit of Democracy Success & Drawbacks of Democracy in India. Measures to be taken to remove drawbacks of Democracy in India Features and important provisions of Indian Constitution, Significance of Preamble of Indian Constitution Fundamental Rights and Duties of Indian Citizen, Liberty, Equality, Fraternity	To know the basic concepts of Political Science and focus on basics of Indian Constitution
6	Introduction of Science and Scientific Method	Meaning, Definition, Nature and Characteristics of Science, Objectives, Importance, Presupposition of Science, Classification of Science, Distinction between Natural and Social Sciences Knowledge and Science Limitations of Science Meaning, Definition, Features, Nature of Scientific Method. Sciences and their methods. Steps involved in Scientific Methods Limitations of Scientific Method Difficulties in Social Sciences Meaning, Definition, Characteristics of Hypothesis	To study Science and Scientific Methods and develop Research Ap


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		Some examples of Hypothesis, Construction of Hypothesis Types of Hypothesis Functions and Importance of Hypothesis Use of Hypothesis in Research Meaning of Analogy, Reasoning from Analogy, Analogy and Scientific Induction, Strength of Analogical Reasoning, Misuse of Analogy, False Analogy, Analogy and Model. Critical Experimental Progress	
7	Development & Impact of Science & Technology	Introduction – Modern Period, Steam Engines, Invention of Aeroplane, Discovery of an atom, Invention of X-Ray, Computers. Space Era. Robot Effects of Science and Technology on Nature of Indian Agriculture – Importance of Agriculture in Indian Economy Effects of Science and Technology on Agriculture, Agriculture Production & Technology, White & Green revolution Population in India – Concept, Size – Growth of Population in India Causes of Rapid growth in population and its effect in Economic Development. Effects of Science and Technology on Population Growth and its control Measures to control the increasing population Effects of Science & Technology on Distribution, Transport, Rural Development, Human Values and Superstitions	To explain the role of Science and Technology for welfare of Humanity
8	Modernization in India after Independence	Meaning, Definitions, Types of Modernization Effects of Modernization on Indian Society Meaning and role of Scientific Temper Impact of Education on Modernization Impact of Industrial Revolution, Meaning and Type of Pollution, Impact of Pollution on Society, Various Acts related to control of Pollution Meaning and Importance of Disaster Management	To take review of the effects of Modernization on Indian Society


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Teaching Methodology for First and Second Term

Unit No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
FIRST TERM					
1	12	Guest Lecture and Group Discussion	-----	-----	-----
2	12	Guest Lecture	-----	-----	-----
3	12	Guest Lecture & Library Assignments	-----	-----	-----
4	12	Group Discussion/ Workshop/ Visits	-----	-----	-----
SECOND TERM					
5	12	Guest Lecture and Group Discussion	-----	-----	-----
6	12	Guest Lecture	-----	-----	-----
7	12	Guest Lecture & Library Assignments	-----	-----	-----
8	12	Group Discussion/ Workshop/ Visits	-----	-----	-----


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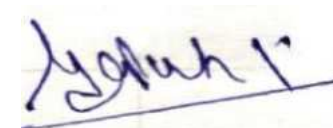
Method of Evaluation

Subject	Internal Evaluation	External Evaluation
FIRST TERM		
Unit – I	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – II		
Unit – III		
Unit – IV		
SECOND TERM		
Unit – V	Internal assessment : 30 Marks	Final University exam: 70 Marks
Unit – VI		
Unit – VII		
Unit – VIII		


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References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Introduction to Indian Society	V.Shrivastva	Mahaveer & Sons Publication, (2011)	Delhi
2.	Indian Economy	Gaurav Dutt and Ashwini Mahajan	S.Chand Publications, (2016)	Delhi
3.	Agriculture and Environment in India	Surya Bhushan	New Century Publications,(2016)	Delhi
4.	Indian Economy	S.K. Mishra and V.K.Puri	Himalaya Publishing House (2018)	Mumbai
5.	Indian Economy	Gaurav Dutt and Ashwini Mahajan	S.Chand Publications, (2016)	Delhi
6.	Indian Economy	S.K. Mishra and V.K.Puri	Himalaya Publishing House, (2018-19)	Mumbai
7.	Constitution of India	Agrawal P.K. and K.N.Chaturvedi	Prabhat Prakashan,(2017),	Delhi
8.	Foundation Course	Dr. Gangadhar Kayandepatil & Ors	Chaitanya Publication	Nashik



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SAVITRIBAI PHULE PUNE UNIVERSITY

(formerly University of Pune)

F.Y.B.A. HISTORY

Syllabus

(Semester & Choice Based Credit System)

(To be implemented from the Academic Year, 2019-20)


PRINCIPAL
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Hadapsar, Pune- 28.

F.Y.B.A. HISTORY

Under the Faculty of Humanities

Total Credits: 03

Semester-I Early India: From Prehistory to the Age of the Mauryas

Objectives:

The history of Early India is a crucial part of Indian history. It is a base for understanding the entire Indian history. The course is aimed at helping the student to understand the history of early India from the prehistoric times to the age of the Mauryas. It attempts to highlight the factors and forces behind the rise, growth and spread of civilization and culture of India along with the dynastic history. It also attempts to help the students to understand the contribution of Early Indians to polity, art, literature, philosophy, religion and science and technology. It also aims to foster the spirit of enquiry among the students by studying the major developments in early Indian history.

Unit I: Early India: Sources and Prehistory

[12]

- (a) Importance of Early History
- (b) Sources and Tools of historical reconstruction – Archaeology (Material remains), Epigraphy (Inscriptions), Numismatics (Coins), Literary Sources, Foreign Accounts
- (c) Palaeolithic, Mesolithic, Neolithic and Chalcolithic Cultures: A Brief Review

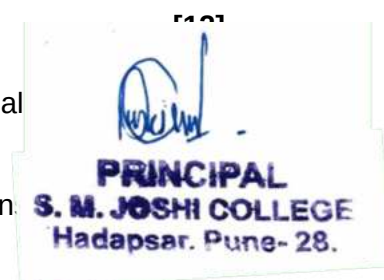
Unit II: Harappan Culture: Bronze Age Civilization

[12]

- (a) Geographical Extent, Town Planning, Trade, Religious Practices
- (b) Art, Crafts and Technology: Pottery, Seals, Beads, Images, Terracotta Figurines
Metallurgy, Script and Decline

Unit III: Vedic Culture, Religious Protest: Jainism and Buddhism

- (a) Vedic and Later Vedic Culture: Original home, Tribal Polity, Social Rituals and Philosophy
- (b) Jainism and Buddhism: Causes of Origin, Doctrines, Contribution
Importance



Unit IV: Emergence of the Mahajanpadas and the Age of the Mauryas

[12]

- (a) The Mahajanpadas, Rise and Growth of the Magadhan Empire
- (b) The Age of the Mauryas: Chandragupta, Ashoka and his policy of Dhamma
- (c) The Mauryan Administration, Economy, Decline and Significance



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Semester-II

Early India: Post Mauryan Age to the Rashtrakutas

Objectives:

The history of India after the Mauryas is very important to understand the developments in early India after the Mauryas, which finally led to the transition to medieval India. The course is aimed at introducing the students to the developments in different parts of India through a brief study of regional kingdoms up to the tenth century C.E. It attempts to highlight the consequences of the foreign invasions, particularly on the polity, economy, society and art and architecture. The attempt is also to instill the spirit of enquiry among the students.

Unit I: Central Asian Contacts and the Age of the Shung-Satvahanas [12]

- (a) The Indo-Greeks, The Shakas, The Parthians, The Kushanas: Economy, Society, Religion and Culture
- (b) The Age of Shung-Satvahanas: Polity and Administration, Society, Economy, Culture

Unit II: Early History of South India [12]

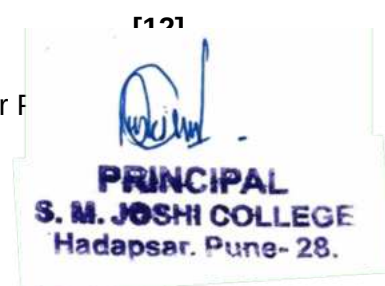
- (a) Period of Sangam Literature –Society and Culture, early polities
- (b) Economy: Towns, Trade and Crafts

Unit III: North India: Gupta and Harshvardhan [12]

- (a) The Gupta Empire – Brief Political History, Administration, Society, Trade, Science and Technology
- (b) Harshvardhan: Administration, Religion, Education

Unit IV: Regional Kingdoms: A Brief History

- (a) The Chalukyas, Pallavas, Pandya - Struggle for Supremacy over F
- (b) Rashtrakutas, Palas, Parmaras- Tripartite Struggle
- (c) Literature, Religion, Art and Architecture



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Syllabus in History for FYBA under CBCS from the Academic Year 2019-20

Under the Faculty of Humanities

Total Credits: 03

Semester-I Early India: From Prehistory to the Age of the Mauryas

प्रारंभिक भारत: प्रागैतिहासिक काळ ते मौर्यकाळ

उद्दिष्टे:

प्रारंभिक भारताचा इतिहास हा एकूणच भारतीय इतिहासाचा अतिशय महत्वाचा भाग आहे. कारण तो संपूर्ण भारतीय इतिहासाचे योग्य आकलन करण्यासाठी मूलाधार आहे. हा पेपर विद्यार्थ्यांना प्रागैतिहासिक काळ ते मौर्य काळापर्यंतच्या इतिहासाचे आकलन होण्याच्या उद्देशाने तयार केलेला आहे. भारतीय सभ्यता आणि संस्कृती तसेच राजकीय घराणी यांच्या उदय आणि विकासाला कारणीभूत असणाऱ्या घटकांवर प्रकाश टाकण्याचा प्रयत्न केलेला आहे. विद्यार्थ्यांना राजकीय व्यवस्था, कला, साहित्य, तत्वज्ञान, धर्म, विज्ञान आणि तंत्रज्ञान या विविध महत्वाच्या बाबींसाठी प्रारंभिक काळातील भारतीयांनी दिलेल्या योगदानाचा परिचय करून देण्याचा उद्देश आहे. प्रारंभिक भारतीय इतिहासाच्या अभ्यासाद्वारे विद्यार्थ्यांमधील जिज्ञासू वृत्तीला चालना देण्याचा प्रयत्न केलेला आहे.

घटक I: प्रारंभिक भारत: साधने आणि प्रागैतिहासिक काळ

[12]

(अ) प्रारंभिक इतिहासाचे महत्व

(ब) इतिहासाची साधने – पुरातत्वीय (भौतिक अवशेष), आलेख (शिलालेख, गुफालेख इ.), नाणकशास्त्र (नाणी), वाङ्मयीन साधने, परकीय प्रवासवर्णने

(क) पुरापाषाण युग, मध्यपाषाण युग, नवाश्म युग आणि ताम्रपाषाणयुगीन संस्कृती : संक्षिप्त आढावा

घटक II: हडप्पा संस्कृती : कांस्ययुगीन सभ्यता

[12]

(अ) भौगोलिक विस्तार, नगररचना, व्यापार आणि धार्मिक रीतीरिवाज

(ब) कला, हस्तकला आणि तांत्रिक ज्ञान : मृदभांडी, मुद्रा, मणी, प्रतिमा, मातीच्या शोभेच्या मूर्ती, धातुकाम, लिपी आणि ज्ञान



घटक III: वैदिक संस्कृती, धार्मिक विद्रोह : जैन आणि बौद्ध धर्म

[12]

- (अ) वैदिक उत्तर-वैदिक काळातील संस्कृती: मूळ स्थान, जमातींची राज्यव्यवस्था, सामाजिक विभागणी, धार्मिक विधी आणि तत्वज्ञान
- (ब) जैन आणि बौद्ध धर्म: उदयाची कारणे, शिकवण, योगदान आणि महत्व

घटक IV: महाजनपदांचा उदय आणि मौर्यकाळ

[12]

- (अ) महाजनपदे, मगधच्या साम्राज्याचा उदय आणि विकास
- (ब) मौर्य काळ : चंद्रगुप्त मौर्य, सम्राट अशोक आणि त्याचे धर्मविषयक धोरण
- (क) मौर्यांचे प्रशासन, अर्थव्यवस्था, ङ्हास आणि महत्व

Reference Books: English

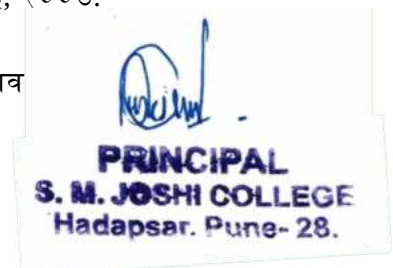
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17. Gazetteer of Maharashtra
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२. थापर रोमिला, 'अर्ली इंडिया', अनुवाद, प्रा. र. ना. गायधनी व वासंती फडके, केसागर प्रकाशन, पुणे, २००६.
३. झा डी. एन. 'प्राचीन भारत: एक ऐतिहासिक रूपरेखा', अनुवाद, पारधी मा. कृ. केसागर प्रकाशन, पुणे, २००५.
४. मेहता जे. एल., 'हिस्ट्री ऑफ एन्शंट इंडिया' अनुवाद, काळे एम. व्ही. केसागर प्रकाशन, पुणे, २००८.
५. शर्मा आर. एस., 'प्राचीन भारताचा परिचय' अनुवाद, बिंदा परांजपे, ओरीएंट लॉगमन, मुंबई, २००७.
६. रायचौधरी हेमचंद्र, 'प्राचीन भारताचा राजकीय इतिहास', अनुवाद, प्राचार्य सदाशिव बोपडीकर, डायमंड पब्लिकेशन्स, पुणे, २००६.
७. शर्मा आर. एस., 'एन्शंट इंडिया' अनुवाद वासंती फडके, केसागर प्रकाशन, पुणे, २००९.



८. तांबे- काटदरे, ' प्राचीन भारत' केसागर प्रकाशन, पुणे, २००४.

९. गायधनी र. ना. ' प्राचीन भारताचा इतिहास' अनिरुद्ध पब्लिशिंग हाउस, पुणे, १९९७.

१०. कोलारकर एस. जी. 'प्राचीन भारताचा राजकीय सामाजिक सांस्कृतिक इतिहास- आरम्भापासुन १२०५ पर्यंत'
श्री मंगेश प्रकाशन नागपूर.

११. कुलकर्णी ए. आर. 'प्राचीन भारत: संस्कृती आणि इतिहास', स्नेहवर्धन प्रकाशन पुणे.

१२. गॅझेटीअर ऑफ महाराष्ट्र

१३. शिरगावकर शरावती, 'अशोक आणि मौर्यांचा इतिहास', महाराष्ट्र ग्रंथनिर्मिती मंडळ.



Semester-II

Early India: Post Mauryan Age to the Rashtrakutas

प्रारंभिक भारत : उत्तर- मौर्यकाळ ते राष्ट्रकुट काळ

उद्दिष्टे:

मौर्येत्तर भारताचा इतिहास हा मौर्य काळानंतरच्या घडामोडी आणि त्यामुळे भारताची मध्ययुगीन काळाकडे झालेली वाटचाल समजावून घेण्यासाठी महत्वाचा आहे. हा पेपर विद्यार्थ्यांना मौर्य काळानंतरच्या प्रादेशिक राज्यांच्या इतिहासाची थोडक्यात ओळख करून देण्याच्या उद्देशाने तयार केलेला आहे. राजकीय व्यवस्था, अर्थव्यवस्था, समाज, कला आणि स्थापत्य यावरील परकीय आक्रमणामुळे झालेले परिणाम यावर प्रकाश टाकण्याचा प्रयत्न यामध्ये केलेला आहे. विद्यार्थ्यांमधील जिज्ञासा वृत्तीला चालना देण्याचाही प्रयत्न याद्वारे करण्यात आला आहे.

घटक I: मध्य आशियाशी संबंध आणि शुंग-सातवाहन काळ

[12]

- (अ) भारतीय ग्रीक, शक, पार्थियन, कुषाण: अर्थव्यवस्था, समाज, धर्म आणि संस्कृती
- (क) शुंग-सातवाहन काळ: राजकीय व्यवस्था आणि प्रशासन, समाज, अर्थव्यवस्था, संस्कृती

घटक II: दक्षिण भारताचा प्रारंभिक इतिहास

[12]

- (अ) संगम साहित्याचा कालखंड : समाज, संस्कृती आणि प्रारंभिक राजकीय व्यवस्था
- (ब) अर्थव्यवस्था, शहरे, व्यापार आणि हस्तकला

घटक III: उत्तर भारत: गुप्तसाम्राज्य आणि हर्षवर्धन

[12]

- (अ) गुप्त साम्राज्य: संक्षिप्त राजकीय इतिहास, प्रशासन, समाज, व्यापार, विज्ञान आणि तंत्रज्ञान
- (ब) हर्षवर्धन: प्रशासन, धर्म आणि शिक्षण

घटक IV: प्रादेशिक राज्ये: संक्षिप्त इतिहास

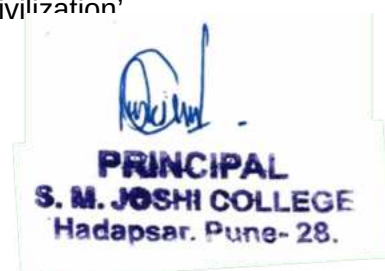
[12]

- (अ) चालुक्य, पल्लव, पंड्या – द्वीपकल्पीय भारतावरील प्रभुत्वाचा संघर्ष
- (ब) राष्ट्रकुट, पाल, परमार – त्रिपक्षीय संघर्ष
- (क) साहित्य, धर्म, कला आणि स्थापत्य



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३. कोसंबी डी. डी., 'प्राचीन भारतीय संस्कृती व सभ्यता' डायमंड पब्लिकेशन्स, पुणे, २००६.
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६. शर्मा आर. एस., 'प्राचीन भारताचा परिचय' अनुवाद, बिंदा परांजपे, ओरीएंट लॉगमन, मुंबई.
७. शर्मा आर. एस., 'एन्शंट इंडिया' अनुवाद वासंती फडके, केसागर प्रकाशन, पुणे, २००९.
८. मेहता जे. एल., 'हिस्ट्री ऑफ एन्शंट इंडिया' अनुवाद, काळे एम. व्ही. केसागर प्रकाशन, पुणे.
९. तांबे-काटदरे, 'प्राचीन भारत' केसागर प्रकाशन, पुणे, २००४.
१०. कोलारकर एस. जी. 'प्राचीन भारताचा राजकीय सामाजिक सांस्कृतिक इतिहास- आरम्भापासून १२०५ पर्यंत' श्री मंगेश प्रकाशन नागपूर.
११. गायधनी र. ना. 'प्राचीन भारताचा इतिहास' अनिरुद्ध पब्लिशिंग हाउस, पुणे, १९९७.
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१४. गॅझेट्डीअर ऑफ महाराष्ट्र



F. Y. B. A Compulsory English
(w. e. f. 2019-2020)
(Choice Based Credit System)
70:30-Pattern
(70-Semester-End Exam & 30-Internal Evaluation)

Prescribed Text: *Literary Gleam: An Anthology of Prose and Poetry* (Board of Editors-Orient BlackSwan)

Objectives:

- a) To expose students to the best examples of prose and poetry in English so that they realize the beauty and communicative power of English
- b) To instill human values and develop the character of students as responsible citizens of the world
- c) To develop the ability to appreciate ideas and think critically
- d) To enhance employability of the students by developing their linguistic competence and communicative skills
- e) To revise and reinforce structures already learnt in the previous stages of learning.

Semester-I

Prose:

- 1. Engine Trouble — R. K. Narayan
- 2. On Saying 'Please' — A. G. Gardiner
- 3. The Gift of the Magi — O. Henry

Poetry:

- 1. A Red, Red Rose — Robert Burns
- 2. Leave this Chanting and Singing — Rabindranath Tagore
- 3. The Felling of a Banyan Tree — Dilip Chitre

Grammar:

- 1. Articles
- 2. Prepositions
- 3. Verbs
 - Regular and Irregular Verbs
 - Auxiliary Verbs: Primary and Modal
- 4. Punctuation

Communication Skills:

- 1. Greeting and Taking Leave



2. Introducing Yourself
3. Introducing People to One Another
4. Making Requests and Asking for Directions
5. Making and Accepting Apology

Semester- II

Prose:

1. In Sahyadri Hills, A Lesson in Humility — Sudha Murthy
2. The Model Millionaire — Oscar Wilde
3. The Eyes are not Here — Ruskin Bond

Poetry:

1. My Heart Leaps Up — William Wordsworth
2. Ozymandias — P. B. Shelley
3. Success is Counted Sweetest — Emily Dickinson

Grammar:

1. Tenses
2. Subject–Verb Agreement
3. Vocabulary

Communication Skills

1. Inviting and Accepting/Declining Invitations
2. Making a Complaint
3. Congratulating, Expressing Sympathy and Offering Condolences
4. Making Suggestions, Offering Advice and Persuading

- Each semester shall have 3 credits for teaching. Each credit is equal to 15 hours, so this course shall have 45 teaching hours. In addition to that there shall be three hours allotted to internal evaluation. Changes as per the university guidelines shall be communicated from time to time.


PRINCIPAL
S. M. JOSHI COLLEGE
Hadapsar, Pune- 28.

F. Y. B. A- Optional English (General Paper-1)
(w. e. f. 2019-2020)
(Choice Based Credit System)
70:30-Pattern
(70-Semester-End Exam & 30-Internal Evaluation)

Prescribed Text: *Initiations: Minor Literary Forms & Basics of Phonology* (Board of Editors- Orient BlackSwan)

Objectives:

- a) To expose students to the basics of literature and language and develop an integrated view about language and literature in them
- b) To acquaint them with minor forms of literature in English and help them to appreciate the creative use of language in literature
- c) To introduce them to the basics of phonology of English so that they can pronounce better and speak English correctly.
- d) To prepare students to go for detailed study and understanding of literature and language
- e) To enhance the job potential of students by improving their language skills

Semester - I

Prose Pieces:

- 1. A Lesson My Father Taught Me - A.P.J. Abdul Kalam
- 2. Toasted English - R. K. Narayan

Short Stories:

- 1. The Romance of a Busy Broker - O. Henry
- 2. The Open Window - Saki



Poetry:

1. Sonnet 29: 'When in disgrace with Fortune and men's eyes' - William Shakespeare
2. The World is too much with Us - William Wordsworth
3. The Listeners - Walter de la Mare
4. No Men are Foreign - James Kirkup

Language Studies:**Introduction to the Sounds of English: Part - I**

(Discrepancy between English Spelling and Pronunciation, Phonetic Symbols and Transcription, The Concept of Phoneme and Minimal Pairs.)

Semester - II**Short Stories:**

1. The Doll's House - Katherine Mansfield
2. The Thief - Ruskin Bond

Poetry:

1. I remember; I remember - Thomas Hood
2. Where the Mind is without Fear - Rabindranath Tagore
3. The Mountain and the Squirrel - R. W. Emerson
4. Up - Hill - Christina Rossetti

One Act Plays:

1. The Monkey's Paw - W.W. Jacobs
2. Swansong - Anton Chekhov

Language Studies:**Introduction to the Sounds of English: Part - II**

(The Concept of Syllable, Monosyllabic and polysyllabic Words, The Concept of Word Stress and Different Standards of Pronunciation i.e. British Received Pronunciation, American English and General Indian English.)



- Each semester shall have 3 credits for teaching. Each credit is equal to 15 hours, so this course shall have 45 teaching hours. In addition to that there shall be three hours allotted to internal evaluation. Changes as per the university guidelines shall be communicated from time to time.

Question paper Pattern (2019-20)

(Choice Based Credit System)

F Y B A Compulsory English: Text: LITERARY GLEAM: A SELECTION OF PROSE AND POETRY

(70-Semester-End Exam & 30-Internal Evaluation)

SEMESTER-I Hours: Three

Marks: 70

Q. 1) A. Attempt any One from the following questions:

(Two questions on **Prose piece -1**)

B. Attempt any One from the following questions:

(Two questions on **Prose piece -2**)

Marks 14

Q. 2 A. Attempt any One from the following questions:

(Two questions on **Prose piece -3**)

B. Attempt any One from the following questions:

(Two questions on **Poem - 1**)

Marks 14

Q. 3) A. Attempt any One from the following questions:

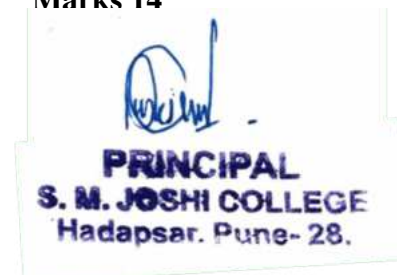
(Two questions on **Poem -2**)

B. Attempt any One from the following questions:

(Two questions on **Poem -3**)

Marks 14

Q.4) Objective Questions on Grammar and Punctuation as under:



- a. Use correct articles in the blank space in the sentences given below. (3 out of 5)
- b. Fill in the blanks with correct preposition given in the brackets. (3 out of 5)
- c. Look at the underlined verbs in the sentences below and specify whether it is a regular verb or irregular verb: (3 out of 5)
- d. Look at the underlined auxiliaries in the sentences below and specify whether it is a primary or a modal auxiliary: (3 out of 5)
- e. Punctuate and rewrite the following sentence correctly. **Marks 14**

Q.5) Practical Questions on Communication Skills: 1, 2, 3, 4, 5.

Marks 14

Total Marks: 70

SEMESTER - II

Question Paper Format

Q. 1) A. Attempt any One from the following questions:

(Two questions on **Prose piece -1**)

B. Attempt any One from the following questions:

(Two questions on **Prose piece -2**)

Marks 14

Q. 2 A. Attempt any One from the following questions:

(Two questions on **Prose piece -3**)

B. Attempt any One from the following questions:

(Two questions on **Poem - 1**)

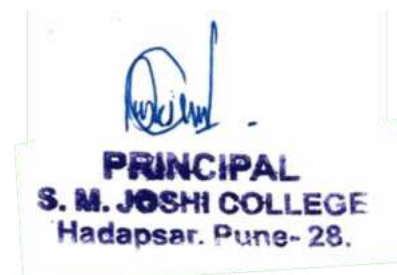
Marks 14

Q. 3) A. Attempt any One from the following questions:

(Two questions on **Poem -2**)

B. Attempt any One from the following questions:

(Two questions on **Poem -3**)



Q.4) Objective Questions on Grammar and Vocabulary as under:

a. Fill in the blanks with correct tense form of the verb given in the brackets.

(6 out of 9)

b. Fill in the blanks using the appropriate form of the verb given in the brackets.

(4 out of 6)

c. Practical questions on vocabulary (e. g. Give synonyms/antonyms of the following words,
Give a list of words related to computer/mobile/wild animals etc.)

(4 out of 6)

Marks 14

Q.5) Practical Questions on Communication Skills: 1, 2, 3, 4.

Marks 14

Total Marks: 70

Pattern for Internal Evaluation in both the semesters:

1. Internal Mid-Semester Examination – 20

2. Home Assignments/Tutorials/Oral/Lecture Notes/Project - – 10

TOTAL – 30 Marks

F Y B A -Optional English (General Paper-1)

Text: INITIATIONS: MINOR LITERARY FORMS & BASICS OF PHONOLOGY

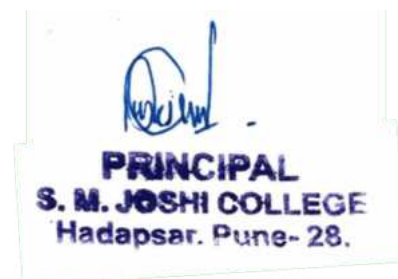
(70-Semester-End Exam & 30-Internal Evaluation)

SEMESTER-I Hours: Three

Marks: 70

Question Paper Format

Q. 1) A. Attempt any One from the following questions:



(Two questions on **Prose piece -1**)

B. Attempt any One from the following questions:

(Two questions on **Prose piece -2**)

Marks 14

Q. 2 **A.** Attempt any One from the following questions:

(Two questions on **Short Story -1**)

B. Attempt any One from the following questions:

(Two questions on **Short Story -2**)

Marks 14

Q. 3) Attempt any 02 out of the 04 given questions:

(Questions on the **Poems for the I st sem**)

Marks -14

Q. 4) Explain with reference to context (Any 2 out of 4)

(Questions on **Poems for the Ist sem**)

:

Marks 14

Q.5) A. Write short notes: (any 2 out of 4) :

Marks 10

B. Practical questions on phonology (any 4 out of 6) :

Marks 04

(Questions on topics from **Introduction to the Sounds of English Part –I**)

Total Marks: 70

SEMESTER - II

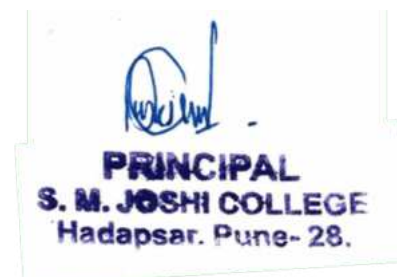
Hours: Three

Marks: 70

Question Paper Format

Q. 1 **A.** Attempt any One from the following questions:

(Two questions on **Short Story -1 from II nd Sem**)



B. Attempt any One from the following questions:

(Two questions on **Short Story -2 from IInd Sem**)

Marks 14

Q.2 Attempt any 02 out of the 04 given questions:

(Questions on the **Poems for the II nd Sem**)

Marks -14

Q. 3 Explain with reference to context (Any 2 out of 4)

(**Questions on Poetry for the II nd Sem**)

:

Marks 14

Q. 4 A. Attempt any One from the following questions:

(Two questions on **the First One Act Play**)

B. Attempt any One from the following questions:

(Two questions on **the Second One Act Play**)

Marks 14

Q.5) A. Write short notes: (any 2 out of 4) :

Marks 10

B. Practical questions on phonology (any 4 out of 6) :

Marks 04

(**Questions on topics from Introduction to the Sounds of English Part –II**)

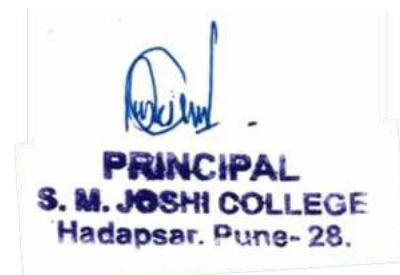
Total Marks: 70

Pattern for Internal Evaluation in both the semesters:

1. Internal Mid-Semester Examination – 20

2. Home Assignments/Tutorials/Oral/Lecture Notes/Project/Seminar/G D – 10

TOTAL – 30 Marks





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CBCS 2019 Pattern

Practical Exam Pattern for F. Y. B. Sc.

Course CH-103

Total marks = 50

- **Internal Examination = 15 marks**

- i) 05 Marks Journal
- ii) 05 Marks Performance during practical including attendance
- iii) 05 Mark for oral during regular practical

- **External Examination = 35 marks**

- i) Experiment for 30 marks
- ii) Oral for 05 marks

Pattern for experiments:

- i) 50% students shall be assigned Physical chemistry experiment while remaining 50% students shall be assigned organic chemistry experiment.
- ii) Student will perform one physical chemistry experiment = **30 Marks**

Or

Student will perform organic chemistry experiments

- a) Chromatography = **15 marks**
- b) Elemental detection = **15 marks**

Course CH-203

Total marks = 50

- **Internal Examination = 15 marks**

- i) 05 Marks Journal
- ii) 05 Marks Performance during practical including attendance
- iii) 05 Mark for oral during regular practical

- **External Examination = 35 marks**

- i) Experiment for 30 marks
- ii) Oral for 05 marks

Pattern for experiments

- i) 50% students shall be assigned Inorganic chemistry experiment while remaining 50% students shall be assigned organic chemistry experiment.

- ii) Student will perform one Inorganic chemistry experiment = **30 Marks**

Or

Student will perform organic chemistry experiment = **30 marks**



Savitribai Phule Pune University
Faculty of Commerce & Management
Structure for Three - Year
B.Com. Degree course (Choice Based Credit System)
(2019 Pattern)
With effect from June 2019

Preamble:-

Commerce education is that area of education, which develops the required knowledge, skills and attitudes for the handling of Trade, Commerce and Industry. Commerce education is entirely different from other disciplines. Hence, it must charter Course routes to service the aspirations of the nation. To meet the growing needs of the business society, there is greater demand for sound development of commerce education. The relevance of commerce education has become more imperative, this means a marked change in the way commerce and management education is perceived in India. The Commerce education is dedicated to developing tomorrow's leaders, managers, and professionals.

The existing education system of imparting commerce education needs to be more dynamic to incorporate all local and global changes in the field of trade and commerce. The curriculum needs to be restructured accordingly. The learning inputs are required to be more update, skill based and with appropriate applications. This will be achieved through the introduction of Choice based Credit System at undergraduate level.

The choice based credit system offers a cafeteria approach where the students have the liberty to choose courses of their own choice. The credit system allows students to opt for additional courses where he /she can score more than the required credits. The system will focus on student centric learning methods, which include use of Information and Communication Technology, innovative methods of teaching and learning and emphasis on industry interaction to enable the learners to take up professional challenges more effectively.

1. INTRODUCTION

The B.Com Degree Course (2019 pattern) will be introduced in the following:

a. First Year B.Com.	2019-2020
b. Second Year B.Com.	2020-2021
c. Third Year B.Com.	2021-2022



The B.Com. Degree Course will consist of six semesters divided into three Years.

The first year (Semester I and II) choice based credit system examination will be held at the end of the each semester.

The Second Year (Semester III and IV) and Third Year (Semester V and VI) choice based credit system examination will be held at the end of each semester.

2. ELIGIBILITY

- a) No Candidates shall be admitted to the First Year of the B.Com. Degree Course (**2019 pattern**) unless he/she has passed the Higher Secondary School Certificate Examination of the Maharashtra State Board of Higher Secondary Education Board or equivalent or University with English as a passing Course.
- b) No candidate shall be admitted to the Third Semester examination of the second year unless he/ she has cleared first two semesters satisfactorily for the course at the college affiliated to this University.
- c) No candidate shall be admitted to the Third Year B.Com. (Fifth semester) Degree Course (**2019 pattern**) unless he/she has cleared all the papers of first and second semester Examination of F.Y. B.Com. and has satisfactorily kept terms for the second year (Third and Fourth Semester) and also fifth semester for the third year of B.Com) satisfactorily in a college affiliated to this University.

3. A.T.K.T. Rules :

- If a candidate fails in all the courses (subject heads) of passing of semester I shall be allowed to proceed semester II. However, a student who fails in four theory courses and two practical courses at semester I and II taken together may be admitted to semester III & IV.
- If a candidate fails in all the courses (subject heads) of passing of semester III shall be allowed to proceed to semester IV.
- If a candidate fails in all the courses (subject heads) of passing of semester V shall be allowed to proceed to semester VI. However, a student who fails in four theory courses and two practical courses at semester III and IV taken together may be admitted to semester V & VI.
- No candidate shall be allowed to proceed to semester V unless he/she has cleared semester I & II in all courses (Subjects).
- ATKT rules are applicable for 2nd and 4th semester.



4. COURSES CARRYING PRACTICALS

- Each practical course will be of one credit.
- There will be practical and practical examination for semester I and II of the F.Y.B.Com. For the Course Financial Accounting.
- There will be practical and practical examinations for the special Courses (Discipline Special Elective) of S.Y.B.Com. (Semester III and IV) and of T.Y.B.Com. (Semester V & VI)
- There will be Practical for the S.Y.B.Com level Compulsory Course Business Communication (Semester III and IV) & for T.Y.B.Com Auditing and Taxation (Semester V) & (Semester VI)
- A Student must offer the same Special Course at T.Y.B.Com. (Semester V & VI) which he / she has offered at S.Y.B.Com. (Semester III and IV)
- In an exceptional case, a student may change the Course chosen by him at third and fourth semester of second year during the first semester of the third year provided he keeps the additional terms of the Course at S.Y.B.Com.

Course having practical examination:-

Semester	Type of Course	Name of Practical Course	Course Code
I	Core Course	Financial Accounting – I	PR - 112
II	Core Course	Financial Accounting – II	PR – 122
III	Core Course	Business Communication – I	PR - 231
III	Discipline Specific Elective	Special Course Paper (I) - Business Administration - Banking and Finance - Business Law and practices - Cooperation and Rural Development - Cost and Works Accounting - Business Statistics - Business Entrepreneurship - Marketing Management - Agricultural and Industrial Economics - Defence Budgeting, Finance and Management - Insurance, Transport and Tourism - Computer Programming and Application	PR- 236
IV	Core Course	Business Communication – II	PR - 241
IV	Discipline Specific Elective	Special Course Paper (I) - Business Administration - Banking and Finance - Business Law and practices - Cooperation and Rural Development - Cost and Works Accounting - Business Statistics	 PRINCIPAL S. M. JOSHI COLLEGE Hadapsar, Pune- 28.

		g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	
V	Core Course	Auditing & Taxation – I	PR- 354
V	Discipline Specific Elective	Special Course Paper (II) a) Business Administration b) Banking and Finance c) Business Law and practices d) Cooperation and Rural Development e) Cost and Works Accounting f) Business Statistics g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	PR- 355
V	Discipline Specific Elective	Special Course Paper (III) a) Business Administration b) Banking and Finance c) Business Law and practices d) Cooperation and Rural Development e) Cost and Works Accounting f) Business Statistics g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	PR- 356
VI	Core Course	Auditing & Taxation – II	
VI	Discipline Specific Elective	Special Course Paper (II) a) Business Administration b) Banking and Finance c) Business Law and practices d) Cooperation and Rural Development	


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		e) Cost and Works Accounting f) Business Statistics g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	
VI	Discipline Specific Elective	Special Course Paper (III) a) Business Administration b) Banking and Finance c) Business Law and practices d) Cooperation and Rural Development e) Cost and Works Accounting f) Business Statistics g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	PR- 366

5. MEDIUM OF INSTRUCTION

The medium of instruction for B.Com. Degree course shall be either Marathi or English except languages. The Medium of instructions for Business Communication (S.Y.B.Com) shall be English only.

6. UNIVERSITY TERMS

The dates for the commencement and conclusion of the first and the second terms shall be as determined by the University Authorities. Only duly admitted students can keep the terms. The present relevant ordinances pertaining to grant of terms will be applicable.

7. VERIFICATION AND REVALUATION

The candidate may apply for verification and revaluation or result through College which will be done by the University as per ordinance framed in the



8. RESTRUCTURING OF COURSES

This revised course structure shall be made applicable to the colleges implementing 'Restructured Programme at the undergraduate level from June, 2019. The Colleges under the Restructured Programme which has revised their structure in the light of the "2019 Pattern" shall be introduced with effect from academic year 2019-20.

9. STANDARD OF PASSING.

A candidate is required to obtain 40% marks in Internal Assessment, Practical Examination and Semester End University Examination.

It means that passing separately at internal assessment, practical examination and semester end university examination is compulsory.

10. METHODS OF EVALUATION, PASSING, AND EVALUATION CRITERIA:-

The evaluation of students will be done on three parameters:-

- a. Internal assessment
- b. Practical Examination (list of Courses having practical is given in note No. 4)
- c. University examination

For university examination, question papers will be set for seventy marks (three hours duration)

Evaluation will be done on a continuous basis, three times during each semester. Internal assessment will be of 30 marks. The colleges need to adopt any three out of the following methods for internal assessment:-

- a. Written examination
- b. Quiz
- c. Presentations
- d. Projects
- e. Assignments
- f. Tutorials
- g. Oral examination



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11. STRUCTURE OF TRANSCRIPT:

Conversion of percentage into credit(s) and grade(s): The following illustrations could be taken as an example for computing SGPA and CGPA from percentage to credits for Honours courses in all disciplines, degree Program courses in Science subjects and degree Program courses in Humanities, Social Sciences and Commerce subjects:

1. Percentage to Grades and Grade Points

The following formula may be used to convert marks (%) into letter grades.

Let $\bar{X}$ = mean of % age marks of all student appeared in the paper.

σ = Standard deviation

m = % of marks obtained

Letter grade	Numerical grade	Formula
O (outstanding)	10	$m \geq \bar{X} + 2.5 \sigma$
A+ (Excellent)	9	$\bar{X} + 2.0 \sigma \leq m < \bar{X} + 2.5 \sigma$
A (Very Good)	8	$\bar{X} + 1.5 \sigma \leq m < \bar{X} + 2.0 \sigma$
B+ (Good)	7	$\bar{X} + 1.0 \sigma \leq m < \bar{X} + 1.5 \sigma$
B (Above average)	6	$\bar{X} \leq m < \bar{X} + \sigma$
C (Average)	5	$\bar{X} - 0.5 \sigma \leq m < \bar{X}$
D (Pass)	4	$\bar{X} - \sigma \leq m < \bar{X} - 0.5 \sigma$
F (Fail)	0	$m < \bar{X} - \sigma$
Ab (Absent)	0	

* Minor variations may be adjusted by the individual institution.

- 1 A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.
- 2 For non credit courses 'Satisfactory' or 'Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.
- 3 The Universities can decide on the grade or percentage of marks required to pass in a course and also the CGPA required to qualify for a degree taking into consideration the recommendations of the statutory professional councils such as AICTE, MCI, BCI, NCTE etc.,
- 4 The statutory requirement for eligibility to enter as assistant professor in colleges and universities in the disciplines of arts, science, commerce etc., is a minimum average mark of 50% and 55% in relevant postgraduate degree respectively for reserved and Hence, it is recommended that the cut-off marks for grade B shall not be


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12. RESTRUCTURING OF COURSES – EQUIVALENCE AND TRANSITORY PROVISION:

The University will conduct examination of old course (2013 Pattern) for next three academic years from the date of implementation of course.

The candidate of old course will be given three chances to clear his/her Courses as per the old course (2013 Pattern) and thereafter he/she will have to appear for the Courses as per the equivalence given to old course (2013 Pattern).

13. SCHEMES OF CREDITS –

Total credits for three year integrated B.Com. Course is as follows:-

Sr. No.	Semester No	No. of courses	Lecture Hours	Credit per course	Credit for practical courses	Add on course credit (*)	Lectures + Practical + add on courses= Total Credits
1	I	7	48	3	1	1	21 +2 =23
2	II	7	48	3	1	1	21 +2 =23
3	III	6	48	3	2	0	18+2 =20
4	IV	6	48	3	2	2	18+2+2 =22
5	V	6	48	3	3	0	18+3=21
6	VI	6	48	3	3	2	18+3+2 =23
Total No. of credits							132

Suggested Add On courses (*)

Sr. No.	Add on course	Class	Semester	Credit
1.	Value added course - I	F.Y.B.Com.	I	1
2.	Value added course – II	F.Y.B.Com.	II	1
3.	Environment Awareness	S.Y.B.Com.	IV	?
4.	Specific Add - on Course related to specialized Course/ Internship	T.Y.B.Com.	VI	
Total				


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Revised structure of Choice Based Credit System Course
First Year B. Com. Semester – I w.e.f. 2019- 20

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	No of Credits	Internal Assessment	University Assessment		Total Marks	Duration of Theory Examination
						Univ. Exam	Practical Exam		
111	Compulsory English- I	Ability Enhancement Compulsory Course	4	3	30	70	--	100	3 Hours
112	Financial Accounting - I	Core Course	4	4	30	50	20	100	3 Hours
113	Business Economics- I	Core Course	4	3	30	70	--	100	3 Hours
114 (A)	Business Mathematics and Statistics - I	Core Course	4	3	30	70	--	100	3 Hours
114 (B)	Computer Concepts and Application- I								
115	Optional Group. (A) (Any one of the Following) a) Organization Skill Development b) Banking and finance c) Commercial Geography d) Defence Organization and Management in India e) Cooperation f) Managerial Economics	Generic Elective Course	4	3	30	70	--	100	3 Hours

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	No of Credits	Internal Assessment	University Assessment		Total Marks	Duration of Theory Examination
						Univ. Exam	Practical Exam		
116	Optional Group. (B) (Any one of the Following) a) Essentials of E-Commerce b) Insurance & Transport c) Marketing & Salesmanship d) Consumer Protection and Business Ethics e) Business Environment & Entrepreneurship f) Foundation Course in Commerce	Generic Elective Course	4	3 -	30	70	--	100	3 Hours
117	Any one of the following Language Additional English/ Marathi/ Hindi/ Gujarati/ Sindhi/ Persian/ Urdu/ French/ German / Sanskrit / Arabic	Ability Enhancement Course	4	3	30	70	--	100	3 Hours

First Year B. Com. Structure of the Syllabus w.e.f. 2019- 20

Semester – II

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	No. of Credits	Internal Assessment	University Assessment		Total Marks	Duration of Theory Examination
						Univ. Exam	Practical Exam		
121	Compulsory English- II	Ability Enhancement Compulsory Course	4	3	30	70	--	100	3 Hours
122	Financial Accounting - II	Core Course	4	4	30	50	20	100	3 Hours
123	Business Economics- II	Core Course	4	3	30	70	--	100	3 Hours
124(A)	Business Mathematics and Statistics - II	Core Course	4	3	30	70	--	100	3 Hours
124(B)	OR Computer Concepts and Application- II								
125	Optional Group. – (A) (Any one of the Following) a) Organization Skill Development b) Banking and finance c) Commercial Geography d) Defence Organization and Management in India e) Cooperation f) Managerial Economics	Generic Elective Course	4	3	30	70	--	100	3 Hours

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	No. of Credits	Internal Assessment	University Assessment		Total Marks	Duration of Theory Examination
						Univ. Exam.	Practical Exam.		
126	Optional Group. (B) (Any one of the Following) a) Essentials of E- Commerce b) Insurance & Transport c) Marketing & Salesmanship d) Consumer Protection and Business Ethics e) Business Environment & Entrepreneurship f) Foundation Course in Commerce	Generic Elective Course	4	3	30	70	--	100	3 Hours
127	Any one of the following Language- II Additional English/ Marathi/ Hindi/ Gujarati/ Sindhi/ Persian/ Urdu/ French/ German / Sanskrit / Arabic	Ability Enhancement Course	4	3	30	70	--	100	3 Hours

Second Year B. Com. w.e.f. 2020- 21.

Semester – III

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	Total No. of Credits	Internal Assessment	University Assessment		Total Marks	Duration of Theory Examination
						Univ. Exam	Practical Exam		
231	Business Communication- I	Core Course	4	4	30	50	20	100	3 Hours
232	Corporate Accounting- I	Core Course	4	3	30	70	--	100	3 Hours
233	Business Economics - I (Macro)	Core Course	4	3	30	70	--	100	3 Hours
234	Business Management - I	Core Course	4	3	30	70	--	100	3 Hours
235	Elements of Company Law- I	Core Course	4	3	30	70	--	100	3 Hours
236	Special Course Paper- I (Any One) a) Business Administration b) Banking and Finance c) Business Law and practices d) Cooperation and Rural Development e) Cost and Works Accounting f) Business Statistics g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	Discipline Special Elective	4	4	30	50	20	100	3 Hours

Second Year B. Com. w.e.f. 2020- 21

Semester – IV

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	Total No. of Credits	Internal Assessment	University Assessment		Total Marks	Duration of Theory Examination
						Univ. Exam	Practical Exam		
241	Business Communication- II	Core Course	4	4	30	50	20	100	3 Hours
242	Corporate Accounting- II	Core Course	4	3	30	70	--	100	3 Hours
243	Business Economics – II (Macro)	Core Course	4	3	30	70	--	100	3 Hours
244	Business Management - II	Core Course	4	3	30	70	--	100	3 Hours
245	Elements of Company Law- II	Core Course	4	3	30	70	--	100	3 Hours
246	Special Course Paper- I (Any One) a) Business Administration b) Banking and Finance c) Business Law and practices d) Cooperation and Rural Development e) Cost and Works Accounting f) Business Statistics g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	Discipline Special Elective	4	4	30	50	20	100	3 Hours

Third Year B. Com. w.e.f. 2021- 22

Semester – V

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	No. of Credits	Internal Assessment	University Assessment			Total Marks	Duration of Theory Examination
						Univ. Exam	Pract. Exam	Internship		
351	Business Regulatory Framework - I	Core Course	4	3	30	70	--	--	100	3 Hours
352	Advanced Accounting - I	Core Course	4	3	30	70	--	--	100	3 Hours
353	Indian and Global Economic Development - I Or International Economics - I	Core Course	4	3	30	70	--	--	100	3 Hours
354	Auditing & Taxation - I	Core Course	4	4	30	50	20	--	100	3 Hours
355	Special Course Paper – II (Same Special Course Offered at S.Y.B.Com) a) Business Administration b) Banking and Finance c) Business Law and practices d) Cooperation and Rural Development e) Cost and Works Accounting f) Business Statistics g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	Discipline Specific Elective	4	4	30	50	--	20	100	3 Hours

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	No. of Credits	Internal Assessment	University Assessment			Total Marks	Duration of Theory Examination
						Univ. Exam	Pract. Exam	Inter-ship		
356	Special Course Paper – III (Same Special Course Offered at S.Y.B.Com)	Discipline Specific Elective	4	4	30	50	--	20	100	3 Hours
	a) Business Administration									
	b) Banking and Finance									
	c) Business Law and practices									
	d) Cooperation and Rural Development									
	e) Cost and Works Accounting									
	f) Business Statistics									
	g) Business Entrepreneurship									
	h) Marketing Management									
	i) Agricultural and Industrial Economics									
	j) Defence Budgeting, Finance and Management									
	k) Insurance, Transport and Tourism									
	l) Computer Programming and Application									

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Semester – VI

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	No. of Credits	Internal Assessment	University Assessment			Total Marks	Duration of Theory Examination
						Univ. Exam	Practical Exam	Internship		
361	Business Regulatory Framework - II	Core Course	4	3	30	70	- -	- -	100	3 Hours
362	Advanced Accounting - II	Core Course	4	3	30	70	- -	- -	100	3 Hours
363	Indian and Global Economic Development - II Or International Economics - II	Core Course	4	3	30	70	- -	- -	100	3 Hours
364	Auditing & Taxation - II	Core Course	4	4	30	50	20	- -	100	3 Hours
365	Special Course Paper – II (Same Special Course Offered at S.Y.B.Com) a) Business Administration b) Banking and Finance c) Business Law and practices d) Cooperation and Rural Development e) Cost and Works Accounting f) Business Statistics g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	Discipline Specific Elective	4	4	30	50	--	20	100	3 Hours

Course No.	Course / Title of Paper	Course	No. of lectures (Per Week)	No. of Credits	Internal Assessment	University Assessment			Total Marks	Duration of Theory Examination
						Univ. Exam	Practical Exam	Internship		
366	Special Course Paper – III (Same Special Course Offered at S.Y.B.Com) a) Business Administration b) Banking and Finance c) Business Law and practices d) Cooperation and Rural Development e) Cost and Works Accounting f) Business Statistics g) Business Entrepreneurship h) Marketing Management i) Agricultural and Industrial Economics j) Defence Budgeting, Finance and Management k) Insurance, Transport and Tourism l) Computer Programming and Application	Discipline Specific Elective	4	4	30	50	--	20	100	3 Hours

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**Semester: I
Financial Accounting- I**

Course Code - 112

No. of Credits :- 03 and for practical – 01

Objective of the Course:-

1. To impart knowledge of basic accounting concepts
2. To create awareness about application of these concepts in business world
3. To impart skills regarding Computerised Accounting
4. To impart knowledge regarding finalization of accounts of various establishments.

Unit No.	Unit Title	Contents	Purposed Skills to be developed
1	Accounting Concepts, Conventions and Principles and an overview of Emerging Trends in Accounting	(A) Accounting Concepts, Conventions and Principles 1. Money Measurement 2. Business Entity 3. Dual Aspect 4. Periodicity Concept 5. Realization Concept 6. Matching Concept 7. Accrual / Cash Concept 8. Consistency Concept 9. Conservatism Principle 10. Materiality Concept 11. Going Concern Concept 12. Historical Cost Concept (B) Emerging Trends in Accounting 1. Inflation Accounting 2. Creative Accounting	• Knowledge about various accounting Concepts, Conventions and Principles. • Understanding emerging trends in accounting and its effect on accounting Practices.

		3. Environmental Accounting 4. Human Resource Accounting 5. Forensic Accounting	
2	Piecemeal Distribution of Cash	1. Surplus Capital Method only, Asset taken over by a partner, 2. Treatment of past profits or past losses in the Balance sheet, 3. Contingent liabilities 4. Realization expenses/amount kept aside for expenses 5. adjustment of actual, Treatment of secured liabilities, 6. Treatment of preferential liabilities like Govt. dues/labour dues etc., Excluding: Insolvency of partner and Maximum Loss Method.	Knowledge about process of dissolution of partnership firm.
3	Accounts from Incomplete Records (Single Entry System)	1. Meaning of single entry system 2. Features of Single Entry System 3. Conversion of Single Entry into Double Entry	- Knowledge about single entry systems. - Purpose and advantages of double entry system - Process of conversion of single entry into double entry system.
4	Introduction to Goods and Services Tax laws and Accounting	1. Constitutional Background of GST, Concepts and definition of GST. 2. IGST, CGST and SGST 3. Input and Output Tax credit 4. Procedure for registration under GST	- Knowledge about conceptual framework of the GST - Knowledge about various components of GST. - Types of taxes under GST - Registration process under GST for busi

Practical for Semester– I

Topic	Mode of Practical
Constitutional Background of GST, Concepts and Implications of GST.	Library Assignment
IGST, CGST and SGST	Guest Lecture
Procedure for registration under GST	Visit to a business establishment
Input and Output Tax credit	PowerPoint Presentation

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	12	PowerPoint Presentations	Videos available on YouTube	Library assignment on Types of accounting principles and conventions with its usage and emerging trends in accounting	Students will be able to acquire in-depth knowledge
2	12	Group Activity	Videos available on YouTube	--	Students will be able to acquire in-depth knowledge
3	12	PowerPoint Presentations	Videos available on YouTube	Group activity of conversion of single entry into double entry system	Students will be able to understand the process and importance of conversion of en
4	12	Visit and interview	Videos available on YouTube	Compilation of information about the contents in the syllabus in a journal	St kn its

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Advanced Accounts	M.C. Shukla, T.S. Grewal, S.C. Gupta	S. Chand Publication	New Delhi.
2.	Financial Accounting for B.Com	CA (Dr.) P.C. Tulsian S.C. Gupta	S. Chand Publication	New Delhi.
3.	Introduction to Accountancy	S.R.N Pillai & Bhagavathi	S.Chand & CompanyLtd	New Delhi
4.	Corporate Accounting	Raj Kumar Sah	Cengage Publications	Noida, Uttar Pradesh
5.	Advanced Accounting	S. N. Maheshwari		
6.	GST Law and Analysis with Conceptual Procedures	Bimal Jain and Isha Bansal (Set of 4 Volumes)	Pooja Law Publishing Company	New Delhi
7.	Guidance Note on GST by ICAI	--	The Institute of Chartered Accountants of India	New Delhi

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**Semester-I
Business Economics (Micro) - I**

Course Code - 113

No. of Credits :- 03

Objectives of the course:-

1. To impart knowledge of business economics
2. To clarify micro economic concepts
3. To analyze and interpret charts and graphs
4. To understand basic theories, concepts of micro economics and their application

Unit No.	Unit Title	Contents	Purpose & skills to be developed
1	Introduction and Basic Concepts	1.1 Meaning, Nature, Scope and Importance of Business Economics 1.2 Concept of Micro and Macro Economics 1.3 Tools for Economic Analysis- Functional Relationship, Schedules, Graphs and Equations 1.4 Basic Concepts: Household, Consumer, Firm, Plant and Industry 1.5 Goals of Firms- Economic and Non-Economic	• To make the students aware of concepts in micro economics • To help the students understand the difference between micro and macro economics • To make the students understand economic and non-economic goals of firms. Skills : Analyze and think critically, develop writing skills
2	Consumer Behavior	Utility: Concept and Types 2.2 Cardinal Approach: Law of Diminishing Marginal Utility and Law of Equi Marginal Utility 2.3 Consumer Surplus: Concept and Measurement 2.4 Ordinal Approach: Indifference curve Analysis- Concept, Characteristics, Consumer Equilibrium	• To help the students understand the concept of utility • To impart knowledge of cardinal and ordinal approach • To make them understand the concept of consumer surplus Skills: Understanding complex theories and Geometrical skills, mathematical apti

3.	Demand and Supply Analysis	3.1 Concept of Demand 3.2 Determinants of Demand 3.3 Law of Demand 3.4 Elasticity of Demand 3.4.1 Price Elasticity of Demand - Meaning, Types, Measurement, Uses and Significance 3.4.2 Income Elasticity of Demand-Meaning and Types 3.4.3 Cross Elasticity of Demand-Meaning and Types 3.5 Supply : Concept, Determinants and Law of Supply 3.6 Equilibrium of Demand and Supply for Price Determination	- To understand the concept of demand and elasticity of demand - To impart knowledge of law of supply and the determinants of law of supply - To help the students understand price determination in varied demand and supply condition Skills imparted: Applying mathematical and statistical analysis methods extracting information, drawing conclusions
4.	Production Analysis	4.1 Concept of Production Function 4.2 Total, Average and Marginal Production 4.3 Law of Variable Proportions 4.4 Law of Returns to Scale 4.5 Economies and Diseconomies of Scale- Internal and External	- To help the students understand the relation between revenue concepts - To understand theories of production function - To make students know about economies and diseconomies of scale Skills: Interpret economic theories, writing skills, understand charts and graphs.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	12	• Open book discussion • Case studies • Problem solving based learning	You tube lectures on micro and macro economics	• Functional relations • Goals of firms	• Students will understand basic concepts of micro economics, • Will be able to analyze and interpret
1.	12	• Digital lectures • Jigsaw reading	You tube lectures	Types of utility	• Will know cardinal and ordinal approach • Will understand the concept of consumer surplus
2.	12	• Game oriented classes • Pair learning • Group discussion	• Films • You tube lectures	Type of goods and elasticity of demand	• Will understand the concept of demand and elasticity of demand • Will understand the concept of supply • Able to interpret equilibrium in the market
3.	12.	• Group discussion • Teacher driven power point presentation • Games and simulation	• You tube lectures • Online PPTs	Effect of economies of scale on industries (with example of an industry)	• Will understand revenue concept • Will know economies and diseconomies of scale

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1	Microeconomics	B. Douglas Bernheim and Michael D. Whinston	Tata McGraw Hill	
2	Microeconomics	Pindyck, R.S. and D.L. Rubinfeld	Pearson Education	

3	Principles of Economics	Stiglitz, J.E. and C.E. Walsh	Oxford Univ. Press	United Kingdom
4	Microeconomics: Theory and Applications	Salvatore, D.L	Oxford Univ. Press	United Kingdom
5	Intermediate Microeconomics: A Modern Approach	Varian, H.R.,	W.W. Norton	United Kingdom, United states
6	Microeconomic Theory,	Sen, Anindya	Oxford Univ. Press	United Kingdom
7	Modern Microeconomics	Koutsoyiannis, A	MacMillan Press	India
8	Principles of Microeconomics	H.L. Ahuja	S. Chand	New Delhi

Suggested references

Web reference

Sr. no	Lectures	Films	Animation	PPTs	Articles
1.	https://mitpress.mit.edu/books/lectures-microeconomics	https://www.economicsnetwork.ac.uk/teaching/Video%20and%20Audio%20Lectures/Principles%20of%20Microeconomics	https://www.youtube.com/redirect?q=http%3A%2F%2Fwww.thateconstutor.com&v=Zre4tp90Aog&redir_token=6U11cd7zsOZt8fGKACK3B5JHJNh8MTU1NzkyNzkyMUAxNTU3ODQxNTMx&event=video_description	https://ctaar.rutgers.edu/gag/ppc2_files/ppc2.ppt	http://scholar.google.co.in/scholar?q=articles+on+microeconomics&hl=en&as_sdt=0&as_vis=1&oi=scholar
2.	https://www.amazon.com/Lectures-Microeconomics-Questions-Approach-Press/dp/0262038188	https://nptel.ac.in/courses/109104125/	https://www.youtube.com/watch?v=ewPNugIqCUM	https://www.slideshare.net/tribhuwan64/presentation-on-importance-of-microeconomics	http://theconversation.com/global/topics/microeconomics-3328

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Semester: I

Business Mathematics & Statistics- I

Course Code – 114 (A)

No. of Credits :- 03

Objective of the Program

1. To introduce the basic concepts in Finance and Business Mathematics and Statistics
2. To familiar the students with applications of Statistics and Mathematics in Business
3. To acquaint students with some basic concepts in Statistics.
4. To learn some elementary statistical methods for analysis of data.
5. The main outcome of this course is that the students are able to analyze the data by using some elementary statistical methods

Unit No.	Unit Title	Contents	Purpose/Skills to be developed
1	Interest and Annuity	Interest: Concept of Present value and Future value, Simple interest, Compound interest, Nominal and Effective rate of interest, Examples and Problems Annuity: Ordinary Annuity, Sinking Fund, Annuity due, Present Value and Future Value of Annuity, Equated Monthly Installments (EMI) by Interest of Reducing Balance and Flat Interest methods, Examples and Problems.	1. To understand the concept of Simple interest, compound interest, effect of compounding. 2. To understand the concept of Annuity and its applications for EMIs and Amortization Schedule.
2	Shares and Mutual Funds	Shares: Concept of share, face value, market value, dividend, brokerage, equity shares, preferential shares, bonus shares. Examples and Problems Mutual Funds: Concept of Mutual Funds, Problems on calculation of Net Income after considering entry load, Dividend, Change in Net Asset Value (NAV) and exit load. Averaging of price under the Systematic Investment Plan (S.I.P.). Examples and Problems	1. To understand the concept of shares and mutual funds. 2. To understand contribution of shares and mutual funds in systematic investment plans 3. To solve problems related to shares and mutual funds
3	Population and Sample	Definition of Statistics, Scope of Statistics in Economics, Management Science and Industry. Concept of population and sample, methods of data collection: Census and sampling with illustration. Methods of random sampling – SRSWR, SRSWOR, Stratified, Systematic (Description of sampling procedures only).	1. Collection of data 2. Analyzing and interpreting data 3. Knowing difference between population and sample

4	Measures of Central Tendency and Measures of Dispersion	Frequency distribution: Raw data, attributes and variables, Classification of data, frequency distribution, cumulative frequency distribution, Histogram and ogive curves. Requisites of ideal measures of central tendency, Arithmetic Mean, Median and Mode for ungrouped and grouped data. Combined mean, Merits and demerits of measures of central tendency, Geometric mean: definition, merits and demerits, Harmonic mean: definition, merits and demerits, Choice of A.M., G.M. and H.M. Concept of dispersion, Measures of dispersion: Range, Variance, Standard deviation (SD) for grouped and ungrouped data, combined SD, Measures of relative dispersion: Coefficient of range, coefficient of variation. Examples and problems.	1. To classify and represent data in tabular and graphical form. 2. To compute various measures of central tendency and measures of dispersion.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Expected Outcome
1	16	ICT	Students will be able to apply concepts of interests and annuities to calculate EMI, prepare amortization schedule, calculate insurance premiums etc
2	8	ICT	Students will be able calculate dividend, brokerage on shares and mutual funds. Also students will be able to identify the contribution of shares and mutual funds in systematic investment plans and to select best investment options
3	8	ICT	Students will be able to recognize and classify different types of data. Students will be able to take a sample of appropriate size using suitable method of sampling.
4	16	ICT	Students will be able to calculate measures of central measures of dispersion. Students will be able to use appropriate measure of ce measure of dispersion for given data to given problem economics.

References:

Sr. No.	Title of the Book	Author/s	Publication	Place
1	Practical Business Mathematics	S. A. Bari	New Literature Publishing Company	New Delhi
2	Mathematics for Commerce	K. Selvakumar	Notion Press	Chennai
3	Business Mathematics with Applications	Dinesh Khattar & S. R. Arora	S. Chand Publishing	New Delhi
4	Business Mathematics and Statistics	N.G. Das & Dr. J.K. Das	McFraw Hill	New Delhi
5	Fundamentals of Business Mathematics	M. K. Bhowal	Asian Books Pvt. Ltd	New Delhi
6	Operations Research	P. K. Gupta & D. S. Hira	S. Chand Publishing	New Delhi
7	Mathematics for Economics and Finance: Methods and Modeling	Martin Anthony and Norman Biggs	Cambridge University Press	Cambridge
8	Financial Mathematics and Its Applications	Ahmad Nazri Wahidudin	Ventus Publishing ApS	Denmark
9	Fundamentals of Mathematical Statistics	Gupta S. C. and Kapoor V. K.;	Sultan Chand and Sons	23, Daryaganj, New Delhi 110002
10	Statistical Methods	Gupta S. P.:	Sultan Chand and Sons	23, Daryaganj, New Delhi 110002
11	Applied Statistics	Mukhopadhyaya Parimal	New Central Book Agency Pvt. Ltd.	Calcutta.
12	Fundamentals of Statistics	Goon A. M., Gupta, M. K. and Dasgupta, B.	World Press	Calcutta.
13	Fundamentals of Applied Statistics	Gupta S. C. and Kapoor V. K.;	Sultan Chand and Sons	23, Daryaganj

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**Semester: I
Computer Concepts and Application - I**

Course Code – 114 (B)

No. of Credits :- 03

Objective:

1. To make the students familiar with Computer environment.
2. To make the students familiar with the basics of Operating System and business communication tools.
3. To make the students familiar with basics of Network, Internet and related concepts.
4. To make awareness among students about applications of Internet in Commerce.
5. To enable make awareness among students about e-commerce and M commerce.

Unit 1 Introduction to Computer and Operating system

[12]

Introduction to Computer

Definition, Block Diagram, Computer Hierarchy, (Classification),
Characteristics of Computer

Computer System Hardware

Computer Memory
Input and Output Devices

Definition – Software

Software Types - System Software, Application Software

Definition of Operating System

Types of Operating Systems,
Functions of Operating Systems

Working with Windows Operating System:

Introduction, The Desktop, Structure of Windows, Windows Explorer, File and Folder Operations, The Search, The Recycle Bin, Adding or Removing New Programs using, Control Panel, Applications in windows (Paint, Notepad, WordPad, and Calculator)

Introduction to Free and Open Source Software

Definition of Computer Virus, Types of Viruses, Use of Antivirus software.

Unit 2 Office automation tools

[12]

Definition of Information Technology (IT)
Benefits of Information Technology (IT)
Applications of Information Technology (IT)

Office automation tools

MS-Word: Introduction, Starting MS-Word, MS-Word Screen and its Components, Elementary Working with MS-Word

MS-Excel: Introduction, Starting MS-Excel, Basics of Spread sheet, MS-Excel Screen and Its Components, Elementary Working with MS-Excel

MS-PowerPoint: Introduction, Starting MS-PowerPoint, Basics of PowerPoint, MS-PowerPoint Screen and Its Components, Elementary Working with MS PowerPoint

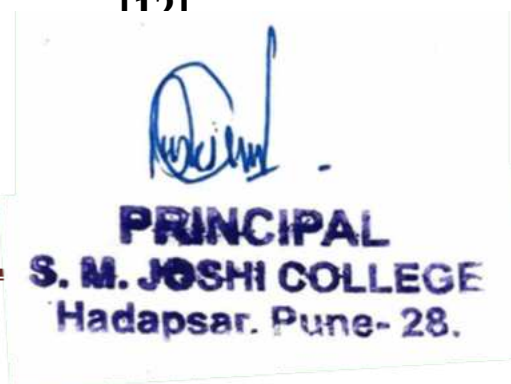
Data Processing: Files and Records, File Organization (Sequential, Direct/Random, Index)

Unit 3 Introduction to Computer Network

Introduction
Importance of Networking
Computer Network (LAN, WAN, MAN)

Network Components (Hub, Switch, Bridge, Gateway, Router, Modem)

[12]



Network Topology, Wireless Network
Internet and Internet application
Introduction, Internet evolution, Working of Internet, Use of Internet

Overview of World Wide Web (Web Server and Client)
Introduction to Search engine and Searching the Web, Downloading files, Introduction to Web Browsers, Working with E-mail (creation and use of the same)

Introduction to Internet Security
Security, Privacy, Ethical Issues & Cyber Law

Unit 4 Computer applications in Commerce

[12]

Computer Applications in Business – Need and Scope

Computer Applications in various fields of Commerce:
Personnel Administration, Accounting, Cost and Budgetary Management, Purchasing, Banking, Insurance and Stock-broking, e-governance

E-Commerce

Defining e-Commerce, Main Activities of Electronic Commerce, Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce – Communication, Process Management, Service Management, Transaction Capabilities;

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Semester: I

Organizational Skills Development- I

Course Code – 115 - A

No. of Credits :- 03

Objectives of the course

1. To introduce the students to the emerging changes in the modern office environment
2. To develop the conceptual , analytical , technical and managerial skills of students efficient office organization and records management
3. To develop the organizational skills of students
4. To develop Technical skills among the students for designing and developing effective means to manage records , consistency and efficiency of work flow in the administrative section of an organisation
5. To develop employability skills among the students

Depth of the program – Fundamental Knowledge

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	Concept of Modern Office	a. Modern Office :- Definition, Characteristics, importance and functions b. Office environment:- Meaning and Importance c. Office Location :-Meaning, Principles and factors affecting Office location d. Office Layout :- Meaning, Principles and factors affecting Office Layout	1. Conceptual Clarity on the meaning of a modern office 2. Developing understanding on the internal and external factors of an office environment 3. Developing analytical and technical skills to contribute towards planning office location and layout
2	Office Organisation and Management	a. Office Organisation : Definition, Importance, Principles and Types of Organisation b. Office Management:- Definition, Functions c. Scientific Office Management :- Meaning, Aims, Techniques of Scientific Office Management and Steps for installation of Scientific Office Management	1. Conceptual clarity on Scientific office 2. Development of techniques for s

3	Office Records Management	a. Office Records Management -Definition, Objectives, Scope of Records Management, Significance, Principles of Records management. b. Digitalization of records:- Advantages and Problems of Digitalization c. Form Design:- Objectives, types of forms, Significance, Principles of form designing d. Office Manual – Definition, Contents Types , benefits and limitations	1. Introduction to concept of digitalization of records 2. Technical skills and critical analysis skills for designing of various office documents for effective records creation and maintenance
4	Office work	Office work :-Meaning and Characteristics, Flow of work :- Significance, Features of Ideal flow of work ,benefits of flow of work ,problems in smooth flow of work , suggestions for even flow of work	1. Analytical skills for process improvement in office work.

Teaching Methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	12	Power Point Presentation	Online Videos	Making a model of office layout in groups	Conceptual Clarity on meaning of Modern Office, internal and external factors of an office environment
2	12	Power Point Presentation			Conceptual clarity on the meaning of Scientific office management and understanding various techniques for scientific manag

3	12	Guest Lectures by Experts	Visit to any organization , college, bank etc (group assignment)	Report on the records management system based on the visit	Technical skills and Critical analysis skills
4	12	PPT , Educational Videos	Visit to any organization , college, bank etc (group assignment)	Report on the visit and suggestions for improvement in work flow of the organization visited	Development of Technical and Analytical abilities

References :

List of Books Recommended :-

1. Modern Office Management – By Mills, Geoffrey
2. Office Management – By Dr. R.K. Chopra , Priyanka Gauri
3. Office Management – By R.S.N. Pillai
4. Office Management – By K.L.Maheshwari , R.K . Maheshwari
5. Modern Office Management : Principles and Techniques – By J.N.Jian , P.P.Singh

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Semester: I BANKING & FINANCE- I (Fundamentals of Banking I)

Course Code – 115 - B

No. of Credits :- 03

Objectives -

- To provide knowledge of fundamentals of Banking
- To create awareness about various banking concepts
- To conceptualize banking operations.

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1.	Evolution of Banking	• Meaning, Definition and Origin of 'Bank' • Evolution of Banking in Europe and Asia • Evolution of Banking in India • Structure of Indian Banking System	• Knowledge of evolution of banking. • Understanding structure of Indian Banking
2.	Functions of Bank	Primary Functions: - o Accepting Deposits: i. Demand Deposits - Current Deposit and Savings Deposits; ii. Time Deposits - Fixed Deposit and Recurring Flexi Deposits (Auto Sweep) - o Granting Loans and Advances- i. Short Term Loan- Overdraft Facility, Cash Credit Facility, Purchasing and Discounting of Bills, ii. Term Loan	• Understanding primary and secondary functions of a bank. • Understanding the

		Secondary Functions: A. Agency Functions- Payment and Collection of a Cheque, Bill and Promissory Note, Execution of standing instructions, Acting as a Trustee and Executor B. General Utility Functions- Safe Custody, Safe Deposit Vaults, Remittance of funds, Pension payments, Acting as a Dealer in Foreign Exchange (FOREX) Market. C. Distribution of Third Party Products, Bancassurance, Mutual Funds, Issuance of Credit Card and Debit Card D. Non Fund Based Credit Facilities- Letter of Credit, Bank Guarantee and Deferred Payment. E. Government Business – Collecting GST, Stamp Duty, Excise Payment, etc. • Concepts of Priority and non- priority sector lending Security Based and Purpose Oriented Lending, Bridge Loans, Reserve Ratios- CRR and SLR. Credit Appraisal and Credit Monitoring	

3.	Procedure for Opening and Operating of Deposit Account	Procedure for Opening of Deposit Account: Know Your Customer Norms, (KYC Norms), Application Form, Introduction, Proof of Residence, Specimen Signature, and Nomination Facility: Their Importance. No Frill Account Procedure for Operating Deposit Account: Pay-in-slip, Withdrawal slip, Issue of Pass Book, (Current, Savings or Recurring Deposit), Issue of Cheque Book, Issue of Fixed Deposit Receipt, Premature encashment of a Fixed Deposit and Loan against Fixed Deposit. Recurring Deposit: Premature encashment and loan against Recurring Deposit. a) Closure of Account b) Transfer of Account c) Death Claim Procedure Types of Account Holders a) Individual Account Holders- Individual Account, Joint Account, Illiterate, Minor, Married Woman, Pardahnashin Woman, Non-Resident Account b) Institutional Account Holders- Sole Proprietorship, Partnership Firm, Joint Stock Company, Hindu Undivided Family, Clubs, Associations, Societies and Trusts.	• Understanding the process of opening and operating procedure of bank accounts. • Understanding various types of bank accounts holders

4	Methods of Remittance	Demand Draft, Bankers' Cheque Electronic Funds Transfer (EFT) – Real Time Gross Settlement (RTGS), National Electronic Funds Transfer (NEFT), Procedure of fund transfer through NEFT/ RTGS, Society for Worldwide Interbank Financial Telecommunication (SWIFT) Immediate Payment Service (IMPS) - Interbank (Bank to Bank) and Intra Bank (Branch to Branch) Fund Transfer	Understanding various methods of remittance.

Teaching Methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1.	10	Lecture, PPT/ Poster Presentation, Group Discussion, Library / Home Assignment	Relevant YouTube videos	NA	- Knowledge of evolution of banking. - Understanding structure of Indian Banking
2.	14	Lecture, PPT/ Poster Presentation, Group Discussion, Library / Home Assignment	Relevant YouTube videos	Report writing of expert lecture	- Understanding primary and secondary functions of a bank. - Understanding the concepts related to lending and ratios.

3.	14	Lecture, Expert Lecture, PPT/ Poster Presentation, Group Discussion, Library / Home Assignment,	Relevant YouTube videos	Visit to a bank	- Understanding the process of opening and operating procedure of bank accounts. - Understanding various types of bank accounts holders
4.	10	Lecture, Expert Lecture, PPT / Poster Presentation, Group Discussion, Library / Home Assignment,	Relevant YouTube videos	Visit to a bank	Understanding various methods of remittance.

References:

1. Majumdar N. C., 'Fundamentals of Modern Banking', New Central Book Agency (P) Ltd., New Delhi.
2. Arondekar A.M. & Others, 'Principles of Banking', Macmillan India Pvt. Ltd.
3. Srinivasan D. & Others, 'Principles & Practices of Banking', Macmillan India Pvt. Ltd.
4. Agarwal O.P., (4th Edition, 2017), 'Banking and Insurance', Himalaya Publishing House.
5. Gopinath M. N., (1st Edition, 2008), 'Banking Principles and Operations', Snow White Publications Pvt. Ltd, Mumbai
6. Gordon E. & Natarajan K., 'Banking - Theory, Law and Practice', (21st Revised Edition), Himalaya Publishing House.
7. Joshi Vasant & Joshi Vinay, (3rd Edition), 'Managing Indian Banks', Sage Publication, New Delhi.
8. Varshney P.N. (12th Edition, 2003), 'Banking - Law and Practice', Sultan Chand & Co. New Delhi
9. Kothari V., (26th Edition) 'Tanna's Banking Law & Practice in India,' Lexis Nexis Publication.

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Semester- I

Defense Organization and Management in India

DEFENSE ORGANISATION AND MANAGEMENT IN INDIA-I

Course Code – 115 - D

No. of Credits :- 03

Objectives:

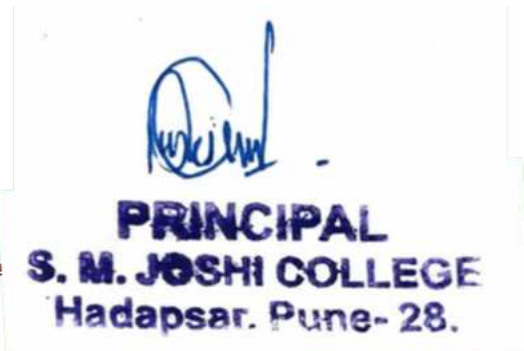
- 1) To understand the role of Armed Forces and Defense structure of Indian Armed Forces.
- 2) To know the vital elements of Indian Defense Organization in India.
- 3) To know the second line of Defense in India

Unit No.	Topic	No. of Lectures	Teaching Method	Skills to be developed
1.	Development of Defense Organization after Independence 1.1 Reconstruction of Indian Armed Forces since 1947. 1.2 Development of the Army after Independence. 1.3 Development of the Navy after Independence. 1.4 Development of the Air Force after Independence. 1.5 Principles of Defense Organisation.	12	Lecture, PPT, Group Discussion, Library Work, Assignment	• Understanding defence organization after independence. • Understanding the principles of Defense organization
2.	Elements of Defense Organization in India. 2.1 Powers of the President in relation to the Armed Forces. 2.2 Defense Committee of the Cabinet. 2.3 Ministry of Defense – its organizational & function.	12	Lecture, PPT, Group Discussion, Library Work, Study Visit	• Understanding the elements of d Indi

	2.4 National Security Council.			
3.	Defense Structure of Indian Armed Forces 3.1 Chief of Staff Committee. 3.2 Organization of Army, Naval & Air Headquarters. 3.3 Organization of Army, Naval & Air Commands.	12	Lecture,PPT, Group Discussion, Library Work,	Understanding the defense structure of Indian Armed Forces
4.	Para Military Forces of Defense 4.1 Border Security Force. 4.2 Coast Guard. 4.3 Territorial Army. 4.4 Home Guard. 4.5 Civil Defense. 4.6 National Cadet Corps (N.C.C.) 4.7 Central Reserve Police Force. 4.8 State Reserve Police Force.	12	Lecture,PPT, Group Discussion, Library Work, Assignment	Understanding the paramilitary force of defense.
	Total	48		

References:

- 1) Ron Mathews, "Defense Production in India" ABC, New Delhi.
- 2) Raju G. C. Thomas (1978), 'The Defense of India a Budgetary Perspective of Strategy and Politics', Mac Millan Publication, New Delhi.
- 3) Sam C.Sarhesian – The Military Industrial Complex a Reassessment', Sage Publication, New Delhi.
- 4) Maj. Gen. Pratap Narain [Retd] (1998), India's Arms Bazar," Shilpa Publication, New Delhi.
- 5) L t. Gen. R. K. Jasbir Singh(1999),Indias Defense Year Books', Nataraj Publication, Dehradun.
- 6) Chaudhari A.P., 'संरक्षणशास्त्र' Nilkantha Publication, Pune
- 7) Jadhav V.Y, 'भारताची राष्ट्रीय सुरक्षा', Snehvardhan Publication , Pune.
- 8) Venkateshwaram A. L. 'Defense Organisation in India'
- 9) C. Lakshmi (1998) 'Trends in India's Defense Expenditure,' ABC, New Delhi.



Revised Syllabi (2019 Pattern) for three years B.Com Degree Course (CBCS)

Semester- I

Theory and Practice of Co-operation- I

Course Code – 115 - E

No. of Credits :- 03

Objectives of the course:

1. To acquaint the students with the concept of co-operative movement.
2. To introduce the scope of Co-operation.
3. To make students build their career in the field of Co-operation and Rural Development.

Depth of Programme: - Fundamental Knowledge

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	Co-operation-	Meaning & Definitions, Objectives, Nature and Scope of Co-operation, Strength and Weakness of Co-operative Movement ,Principles of Co-operative International Co-operative Alliance (ICA) Meaning ,objectives, ICA Board Code of Governance, International Co-operative Alliance (I.C.A) Committee-1937,1966,1995 Problems & Challenges faced by the Co-operative sector	i. To understand the objectives, Nature and scope of co-operation ii. To understand the Co-operative Movement iii. To understand International Co-operative Alliance and ICA Committee 1937,1966,1995

2	History of Co-operative Movement in India	Introduction and Development of Co-operative Movement in Pre Independence period. Strength and weakness of Co-operative Movement , Sir Fedrick Nicholson Report 1904 , Maclagen Committee Report 1912 , Study of eminent supporters and their contribution	i. To understand the development of Co-operative Movement in India ii. To understand Sir Fedrick Nicholson Report and Maclagen Committee Report To understand eminent supporters and their contribution in Co-operative Movement of India
3	Development of Co-operative Movement in India in post Independent Era	Contribution of Co-operative Leaders in post Independent Era up to the present Stage, Gorewala Committee Report 1954 , Vaidyanathan Committee Report 2005 , Development of Co-operative Movement in Maharashtra , Current scenario of Co-operative Movement in India	i. To understand the Contribution of Co-operative Leaders in India ii. To understand the Gorewala Committee Report, Vaidyanathan Committee Report iii. To understand Current scenario of Co-operative Movement in India
4	Government and Co-operative Movement	Role of Central Government , Role of State Government Co-operative Vs Capitalism & Communism	i. To understand the role of Government in Co-operative Movement ii. To understand Co-operative Vs Capitalism & Communism

Teaching Methodology

Topic No.	Total Lectures	Innovative Methods to be used	Film Shows and AV Application	Project	Expected Outcome
1	12	Pre reading, Class discussion, examples from real life through newspapers and internet resources. Debate on The Strength and Weakness of co-operative movement in Maharashtra, Poster presentation	Short Film Show on Co-operative Movement, AV Application (Audio and Visual Application)	Project on Current scenario of Co-operative Movement in Maharashtra	Understanding of basic knowledge of co-operative movement Understanding Scope, Strength and Weakness of co-operative movement. Underst Alliance

2	12	Organise Semesterinar/workshop for students, Pre reading, Class discussion, Internet resources. case studies, Field visit to Co-operative Sugar Factory, visit to Agriculture Co-operative and Non Agriculture Co-operative society, Survey report	You Tube Video on History of Co-operative Movement in India	Project Report on Co-operative Sugar Factory, Rural Co-operative and Urban Co-operative credit Society	Understanding History and current scenario of Co-operative Movement in India
3	12	Guest Lectures of eminent personalities in co-operative movement and Rural Development , experience sharing, Pre reading, Class discussion, examples from real life through newspapers and internet resources, case studies, PPT, Interview of co-operative leader	Presentation on Contribution of Co-operative Leaders in post Independent Era up to the present Stage	Project Report on Development of Co-operative Movement in Maharashtra	Understanding Contribution of Co-operative Leaders in post Independent Era up to the present Stage , Development of Co-operative Movement in Maharashtra
4	12	Pre reading, Class discussion, examples of various co-operative institution through Newspapers and internet resources, Guest Lectures of eminent personalities ,PPT	Group discussion on Co-operative Vs Capitalism & Communism	Project Report on Role of Government in Co-operative Movement	Understanding Role of Government in Co-operative Movement

References

Sr. No	Title of Book	Author/s	Publication	Place
1	Co-operation and Rural Development	Principal Dr.Nitin Ghorpade	Success	Pune
2	Co-operation- Principles and Practice-	Dr. D.G. Karve		
3	Theory, History and Practice of Co-operation	Dr. R.D. Beddy		
4	Bhartiya Sahkari Chalval- Tatve va Vyavhar (Marathi)	Prof. Jagdish Killol; Prof. Arvind Bondre; Prof. A. C. Bhavsar		
5	Sahkari Chalval 1904-2004 (Marathi)	Prof. K. L. F ale		
06	Rural Development in India-Policies and Programme	Abdul Azees NP and S.M. Javed Aktar	Kalpaz Publication	
07	Human Resource Management Practices in Co-operative sector	Principal Dr.Shaikh Aftab Anwar	Idea Publication	New Delhi
08	Report of the High Power Committee on Co-operative May 2009 Ministry of Agriculture Government of India			
09	Journal of Commerce and Management Thought(JCMT)			
10	Journal Co-operative Organization and Management , Journal of Co-operative studies			

Revised Syllabi (2019 Pattern) for three years B.Com Degree Course (CBCS)

Defense Organization and Management in India

Semester - I

Managerial Economics- I

Course Code – 115 - F

No. of Credits :- 03

Objectives:

1. To acquaint the students with the concepts and techniques used in micro and macroeconomics.
2. To give the introduction to basic principles of microeconomics and to demonstrate how application of economic theory can improve decision making.
3. To build a perspective necessary for the application of modern economic concepts, precepts, tools and techniques in evaluating business decision taken by a firm.

Unit No.	Unit Title.	Content	Purpose Skills to be developed
1	Introduction	1.1 Nature, Scope and significance of managerial economics. 1.2 Managerial economics and microeconomics. 1.3 Managerial economics and macroeconomics. 1.4 Main characteristics of managerial economics. 1.5 Fundamental economic concepts- opportunity cost, Discounting Principle, Time perspective, incremental reasoning, equi-marginal concept. 1.6 Application of economics in managerial decision making. 1.7 Role and responsibilities of managerial economist in business.	i) To know the meaning, nature of managerial economics ii) To understand fundamental principles of economics. iii) To know the application of principles of managerial economics in business decision making.
2	Demand Analysis	2.1 Basis for demand - concept of utility 2.2 Cardinal Utility approach- Law of marginal utility, maximization of utility, consumer surplus. 2.3 Ordinal Utility approach- Indifference Curve, maximization of utility. 2.4 Law of demand- determinants of demand. 2.5 Elasticity of demand- Price, Income and Cross elasticity of demand. 2.6 Managerial application and importance of elasticity of demand.	i. To understand the concept of utility. ii. To understand the law of diminishing marginal utility in law of demand. iii. To understand the concept of elasticity and its importance in managerial

3	Demand forecasting	3.1 Demand forecasting-Meaning, Methods of demand forecasting- Expert opinion, surveys and market experiments, Time series analysis, Trend Projection, Barometric forecasting. 3.2 Demand forecasting for a new product.(Developing, Testing and launching of new products)	i. To understand the concept of demand forecasting and its utility in demand forecasting of new product. ii. To make the students understand different methods of demand forecasting
4	Production and Cost Analysis	4.1 Law of supply- Determinants of supply. 4.2 Theory of production- Meaning and concept of production, 4.3 Law of Variable Proportions and Returns to a Scale. 4.4 Cost Analysis- Types of Cost - Economic cost and accounting cost, Private cost and social cost, Actual cost and opportunity cost, Past cost and future cost, Explicit cost and implicit cost, Incremental cost and Sunk cost. 4.5 Cost and cost curves under short-run and long run- Fix cost and variable cost, Average cost and marginal cost, Relation between average cost and marginal cost. 4.7 Revenue Curves- Concept of average, marginal and total revenue under different market conditions, relation between average and marginal revenue.	i. To understand the law of supply. ii. To know the various concept of costs and revenues.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	14	i. Open book discussion ii. Interactive lectures	i. Online PPTs ii. You tube lectures	i. Study costs in a local project. ii. Application of cost principles	The students will be able to decipher, analyze and apply the theory and practice of Managerial Economics
2	12	i. Open book discussion. ii. Group discussion with examples.	i. Online PPTs ii. You tube lectures	i. Study of types of elasticity of demand. ii. Study of elasticity of demand in managerial decision.	Students will develop an understanding of business factors product and business
3	08	i.) Interactive lectures	i. Online PPTs ii. You tube lectures	i. Study of methods of demand forecasting in a local firm.	Student forecast

		ii.) Case studies. iii.) Teacher driven power point presentation.		ii. Comparative study of advantages of methods of demand forecasting.	product and its importance in managerial decision making.
4	14	i. Case studies. ii. Interactive lectures.	i. Online PPTs ii. You tube lectures	i. Study of law of variable proportions in a firm. ii. Study of concept of costs in short run and long run.	Students will understand the analytics of supply and its various uses. Students will follow the relationship between costs, revenue, profit and losses.

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1	Managerial Economics	Domnik Salvatore-	Oxford University Press	Oxford University Press
2	"Managerial Economics-	Mark Hirschey, .	2. Mark Hirschey, Log "managerial Economics-An Integrative Approach", Cengage Learning.	2. Mark Hirschey, Log "managerial Economics-An Integrative Approach", Cengage Learning.
3	Managerial Economics-	D.M.Mithani,	Himalaya Publishing House	Mumbai
4	Managerial Economics,	P.L.Mehatha,	S.Chand Publishing	Mumbai
5	Managerial Economics, Pearson Education	Craig Peterson, Lewis and Jain,	Pearson Education	Pearson Education
6	Modern Economic Theory	K.K.Dewett,		
7	Managerial Economics, Margham Publications, Madras	Shankaran S.	Margham Publications, Madras	Madras
8	Managerial Economics,	Thomas Christopher R. and Charles, Maurice S.	McGraw Hill Irwin, Boston.	McGraw Hill Irwin, Boston.

Suggested references

Web reference

1. <https://nptel.ac.in/courses/110101005/2>
2. <https://nptel.ac.in/downloads/110101005/>
3. <http://cec.nic.in/Pages/Home.aspx>
4. <http://en.wikipedia.org/wiki/Economics>
5. <http://www.investopedia.com/university/economics/#axzz1XwhFTmtm>
6. <http://www.tutor2u.net/blog/index.php/economics/>
7. <http://www.economicshelp.org/>
8. <https://www.intelligenteconomist.com/economics-blogs/>
9. <https://www.coursera.org/courses?query=managerial%20economics>
10. <https://www.edx.org/course/introduction-to-managerial-economics-0>
11. <https://www.mooc-list.com/tags/managerial-economics>
12. <https://online.stmary.edu/mba/courses/managerial-economics>
13. <https://www.tru.ca/distance/courses/econ3041.html>
14. <https://www.euomba.org/managerial-economic>

Revised syllabi (2019 Pattern) for three years B.Com. Degree course (CBCS)

Semester - I

Essentials of E- Commerce

Course Code – 116 A

No. of Credits :- 03

Objectives of the course

1. To acquaint the learner with knowledge on the basics of E-commerce.
2. To develop knowledge on various types of E-commerce business.
3. To develop practical knowledge on effective design of Website and Domain Registration.
4. To Develop knowledge on various modes of online transaction for crating convenience in day to day financial transactions and promoting cashless economy.
5. To introduce the learner to the concept of Electronic Data Inter exchange and its significance.

Depth of the program – Fundamental Knowledge

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	Overview of Electronic Commerce(EC)	Concept, Features and Functions of e-commerce practices v/s traditional practices ,scope and limitations of e-commerce , Recent trends in e-commerce , Risks in e- commerce and preventive measures	1. Conceptual understanding of basics of e-commerce
2	Types of e-Commerce Business	Definition and types of e-commerce business : B2B, B2C, C2B, C2C,B2G, C2G, B2A, C2A and P2P, B2B service provider.	1. Awareness on the various forms of e-commerce
3	Infrastructure	Internet and its role in e-commerce, Mobile and its role in e-commerce , procedure of registering an Internet domain , establishing connectivity to Internet ,tools and services of Internet , Requisites of selecting an appropriate domain name ,Website – Essential factors in designing and importance of an effective website	1. Technical knowled domain 2. Practical Knowledge commerce 3. Analytical skills an page designing

4	E- Payment and Electronic Data Inter exchange	A. <u>E- Payment</u> : Transactions through Internet , requirements of e-payments systems, functioning of Debit and credit cards, pre and post payment services Overview on Online Payment Portals and apps in India, CC Avenue, Paytm, BHIM, UPI, Phone Pe etc. Concept of Payment Gateway and Payment Processor B. <u>Electronic Data Inter exchange</u>: Evolution, uses, benefits, Working of EDI, EDI standards (includes variable length EDI standards), Cost Benefit Analysis of EDI, Electronic Trading Networks, EDI Components, File types, EDI Services , EDI Software.	1. Practical Oriented Skills on E-commerce 2. Conceptual Clarity on Online Payment Process 3. Conceptual Clarity on EDI and Electronic

Teaching Methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	10	Lecture Methods / Guest Lectures	Online Educational Videos		Developing understanding on E-commerce
2	12	Guest Lectures by subject Experts / Case Study	Online Educational Videos and Success stories	Case study on any one success story	Awareness on various e-commerce platforms
3	12	PPT / Lectures / Guest Lectures	Demonstration by Industry Expert		Technical , Practical , Analytical and Creative
4	14	Live Demonstrations/PPT/Lectures	Online Educational Videos	Actual online transactions of Money transfer and online purchase via online payment for small value orders (can be	

				undertaken as a group) Payments to vendors via various payment apps apps	

Method of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested Add on Course
Unit – I	MCQ /Written Test /PPT	As per University norms	Certificate Web Page Designing
Unit – II	MCQ/Written test /Report Writing	As per University norms	Certificate course on Digital Marketing
Unit – III	Written Test/ Report and /or PPT on any 5 well designed websites	As per University norms	
Unit – IV	Written Test / MCQ	As per University norms	

References :

List of Books Recommended :-

1. The Complete E-Commerce Book - By Janice Reynolds
2. E-Commerce Website optimization – By Dan Corxen- John and Johaan van Tonder
3. E- Commerce – An Indian Perspective – By P.T.Joseph S.J.
4. E- Commerce – Business, Technology, Society – By Kenneth c. Laudomn and Carol Guercio Traver
5. Essentials of E-Commerce Technology – By. V.Rajaraman
6. E Business R(Evolution)- By Daniel Amor
7. E-Commerce Management - By Krishnamurthy
8. E-Commerce: Strategy, Technologies and Applications By David Whiteley

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Semester - I Insurance and Transport- I (Insurance)

Course Code – 116 - B

No. of Credits :- 03

Objectives:

1. To acquaint students with the concepts of Insurance.
2. To create awareness regarding basic knowledge about Life Insurance, Fire Insurance and Marine Insurance.
3. To make the students aware of career opportunities in the field of Insurance

Unit No.	Topic	No. of Lectures	Teaching Method	Proposed skills to be developed
1.	Introduction to Insurance 1.1 Meaning and Nature of Insurance 1.2 Importance of Insurance 1.3 Scope of Insurance 1.4 Principles of Insurance 1.5 Risk and Insurance 1.6 Types – Life and General Insurance 1.7 Difference between Life and General Insurance 1.8 Career opportunities in Insurance Sector	16	Lecture, PPT, Group Discussion, Library Work, Assignment Companies	• Understanding the concept of insurance
2.	Life Insurance 2.1 Meaning and Features of Life Insurance 2.2 Nature of Life Insurance 2.3 Origin of Life Insurance 2.4 Importance of Life Insurance 2.5 Principles of Life Insurance 2.6 Types of Life Insurance Policies 2.7 Procedure of Life Insurance Contract	16	Lecture, PPT, Group Discussion, Library Work, Study Visit to Office of the Insurance	• Understanding the concept of life insurance.

3.	Fire Insurance 3.1 Meaning and Features 3.2 Nature of Fire Insurance Contract 3.3 Types of Fire Insurance Policies	08	Lecture,PPT, Group Discussion, Library Work,	Understanding the concept of fire insurance
4.	Marine Insurance 4.1 Meaning and Features 4.2 Marine Insurance Contract 4.3 Types of Marine Insurance Policies	08	Lecture,PPT, Group Discussion, Library Work, Assignment	Understanding the concept of marine insurance
	Total	48		

References:

1. Khan M.Y. (1997), Financial Services, Tata McGraw-Hill Publishing Company Limited New Delhi .
2. Mishra M.N. (2004) Insurance - Principles and Practice, S. Chand and Company Ltd. New Delhi.
3. Gulati Neelam C., Principles of Insurance Management, Excel Books.
4. Haridas R., Life Insurance in India, New Century Publication New Delhi.
5. Godwin Frank, The Principles and Practice of Fire Insurance, Isaac Pitman and Sons Ltd. London.
6. Panda G.S., Principles and Practice of Insurance, Kalyani Publishers Ludhiyana.
7. Kanwal L.S., Text Book of Insurance, Kalyani Publishers Ludhiyana.
8. Mathew M.J., Insurance, RBSA Publisher Jaipur.
9. सराफमोहन, त्रिमशाल, सी

.जमनादासआणकं पनी

Revised syllabi (2019 Pattern) for three years B.com Degree course (CBCS)

Semester - I

Marketing and Salesmanship- I

(Fundamentals of Marketing)

Course Code – 116 - C

No. of Credits :- 03

Objectives of the Course

1. To introduce the basic concepts in Marketing.
2. To give the insight of the basic knowledge of Market Segmentation and Marketing Mix
3. To impart knowledge on Product and Price Mix.
4. To establish link between commerce, business and marketing.
5. To understand the segmentation of markets and Marketing Mix.
6. To enable students to apply this knowledge in practicality by enhancing their skills in the field of Marketing.

Unit No.	Unit Title	Contents	Purposed Skills To Be Developed
1	Introduction to Market and Marketing	1.1 Meaning and Definition of Market 1.2 Classification of Markets 1.3 Marketing Concept: Traditional and Modern 1.4 Importance of Marketing 1.5 Functions of Marketing: Buying, Selling, Assembling, Storage, Transportation, Standardization, Grading, Branding, Advertising, Packaging, Risk Bearing, Insurance, Marketing Finance, Market Research and Marketing Information. 1.6 Selling vs. Marketing	The basic knowledge of Market and Marketing will be developed amongst students.

2	Market Segmentation and Marketing Mix	2.1 Market Segmentation: - 2.1.1 Introduction 2.1.2 Meaning and Definition 2.1.3 Importance 2.1.4 Limitations 2.1.5 Bases for Segmentation 2.2 Marketing Mix 2.2.1 Introduction 2.2.2 Meaning & Definition 2.2.3 Elements of Marketing Mix- Product, Price, Place and Promotion 2.2.4 Importance of Marketing Mix	Students will develop the Marketing Segmentation knowledge along with the basic concept of Marketing Mix.
3	Product Mix and Price Mix	3.2 Product Mix 3.2.1 Meaning and Definition 3.2.2 Product Line and Product Mix 3.2.3 Product Classification 3.2.4 Product Life Cycle 3.2.5 Factors Considered for Product Management 3.3 Price Mix 3.3.1 Meaning and Definition 3.3.2 Pricing Objectives 3.3.3 Factors Affecting Pricing Decision 3.3.4 Pricing Methods	Students will get proper insight of Product and Price Mix.

4	Place Mix and Promotion Mix	a. Place Mix i. Meaning and Definition of Place Mix ii. Importance iii. Types of Distribution Channels – consumer goods and Industrial Goods iv. Factors Influencing selection of Channels 4.2 Promotion Mix 4.2.1 Meaning of Promotion Mix 4.2.2 Elements of Promotion Mix- Personal Selling, Public Relation and Sales Promotion 4.2.3 Factors Affecting Market Promotion Mix 4.2.4 Promotion Techniques or Methods	Students will develop the skills of promoting a product along with gaining knowledge about the distribution channels.

Teaching Methodology

Topic No.	Total Lectures	Innovative Methods to be used	Film shows and AV Applications	Expected Outcome
1	14	Power Point Presentation, Survey Analysis	Short Film AV Application	Student will get acquainted with the basics of marketing field.
2	07	Power Point Presentation, Survey Analysis, Group Discussion	Short Film AV Application	It will highlight on the core marketing concepts namely 'Marketing Mix'. It will help students to implement this knowledge in practicality by enhancing their skills in the field of market segmentation.
3	14	Conceptual Learning Group Discussion	AV Application	Students will develop the skills of Pricing the product along with gaining knowledge on Product Mix
4	13	Conceptual Learning, Power Point Presentation, Group Discussion	Short Film, AV Application Use of You Tube	It will help the students to apply the various techniques of Promotion and understand the various channels of distribution

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1	Marketing Management	Philip Kotler	Pearson Publication	
2	Marketing Management	Rajan Saxena	McGraw Hill Education	
3	Principles of Marketing	Philip Kotler	Pearson Publication	
4	Sales & Distribution Management	Tapan K Panda	Oxford Publication	
5	Advertising Management	Rajiv Batra	Pearson Publication	
6	Retail Management	Swapna Pradhan	McGraw Hill Publication	
7	Retail Management	Gibson Vedamani	Jayco Publication	
8	Marketing Management	V. S. Ramaswamy & S. Namakumari	Macmillan Publication	
9	Supply Chain Management	Sunil Chopra, Peter Meindl & D. V. Karla	Pearson Publication	

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Semester - I

Consumer Protection and Business Ethics - I

Course Code – 116 - D

No. of Credits :- 03

Objectives of the Program

1. To develop general awareness of consumerism among the students.
2. To understand the consumers rights, responsibility and role of United Nations.
3. To have a comprehensive understanding about the existing law on consumer protection in India.
4. To create awareness among the students about dispute redresses machinery and basic procedures for handling consumer dispute.
5. To understand the issues relating to e-commerce, e-Banking emerging issues and internet regulations.

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	Consumer Protection - An Overview	Consumerism- Meaning, Evolution, Rational, Need and Importance of Consumerism, Consumer protection- objectives, scope and importance, Consumer rights and Standardization United Nations guideline on consumer protection- Objectives, scope of application , general principles and framework for consumer protection	understand the concept of consumerism Equip the students with knowledge the evolution, need and importance, of consumerism Understand the role of United Nations to protect consumer's interest.
2	Consumer Education and Awareness	Consumer education-Need and importance, Consumer Responsibility Role of consumer Association and Councils in consumer education and Awareness- Voluntary organization, Consumer protection councils, Media, Educational Institute and Government Skills required for career in Consumer studies field	Handling the emerging issues about consumer protection Acquaint know career opportu

5.	Consumer Protection Law in India *	Consumer Protection Movement in India Consumer Protection Act 1986- Overview features, important definitions-consumers, Goods, services, Defect , Deficiency, unfair trade practices, Dispute, Complaint - Objectives, Consumer Disputes Redressal Agencies. (Composition, Jurisdiction, Powers and Functions.) Procedure of filling complaint and Procedure to deal with complain.	Compressive understanding about the existing consumer protection Act 1986. Apply the Law for consumer protection
6.	E -Commerce and consumer Protection	E Commerce- scope and limitations, Need and importance of E commerce , Prospects and challenges of Ecommerce and its effect on consumer Need and importance of E-Education consumer Protection in E-Banking Recent Emerging Issues in E-Commerce	Understand the concept of E commerce and Consumer Protection Acquaint students about various issues of E commerce. Able to appreciate the emerging questions and policy issues

[Note: Recent amendments in the Acts and relevant Landmark cases decided by courts are expected to be studied]

Teaching Methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	12	Documentary , PPT, Narration, Quiz, Survey Analysis Article review	Short film about consumer movement, Role of UN	Report Review	Acquaint knowledge and maturity to understand the consumers interest
2	12	Project making, Street play, jingles, slogan Competition,	Use of You tube, Review of Movie	New Emerging Issues in consumer protection	To get training to face emerging issues To seek career field.

3	12	Case study, Poster making, Interview of lawyer , Mute court	Case Analysis, Mute court ,E filing of the case	Recent Laws and silent feature	To Acquaint knowledge and application of laws
4	12	Virtual Learning, Group Discussion,	Film on cyber security, Internet precautions	Project on E COMMERCE and Consumer protection	To defend and safety in e commerce. To learn e skills

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1	Grahak Darshan	Mr. Bindu Madhav Joshi	Akhil Bharti Grahak Panchayat	Pune
2	Grahak Sanrakshan Adhiniyam	Ad Ghare S S	Mukund Publication	Pune
3	E- Commerce : An Indian Perspective	Dr.P. T. Joshep	PHI Publication	New Delhi
4	E Banking in India	Dr R K Uppal	New Century Publication	New Delhi
5	Consumer education and empowerment	Dr. S. S. Singh, Dr.Sapna Chadah	Abhijit Publication	New Delhi
6	GrahakRaja Jaga Ho	Prof. G. V. Kayandepatil	Chaitanya Publication	Nashik
7	United Nations Guidelines on Consumer Protection	unctad.org	UNCTAD	UNCTAD Geneva Switzerland
8	The Consumer Protection Act, 1986	Act	Govt of India	Delhi
9	The law of E Commerce	Dr A Alghamdi	Auther House	Mum

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Semester - I

Business Environment & Entrepreneurship - I

Course Code – 116 - E

No. of Credits :- 03

Objectives of the course:

- 1) To understand the concept of Business Environment and its aspects
- 2) To make students aware about the Business Environment issues and problems of Growth
- 3) To examine personality competencies most common to majority of successful entrepreneurs and to show how these competencies can be developed or acquired
- 4) To understand the difference between Entrepreneurial and non-Entrepreneurial behaviour
- 5) To provide knowledge of the significance of Entrepreneurship in economy
- 6) To familiarize the students with the contribution of selected institutes working to promote Entrepreneurship
- 7) To generate entrepreneurial inspiration through the study of successful Entrepreneurs

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	Business Environment	Concept- Importance - Inter relationship, between environment and entrepreneur, Aspects of Environment- Natural- Economic - Political - Social - Technical - Cultural - Educational - Legal & Cross-cultural – Geographical etc.	Understanding the concept of Business Environment and its aspects Skill-correlating aspects of business environment and entrepreneur
2	Environment Issues	Pollution-Concept and types –Causes of pollution-Remedies of Pollution, Remedies of pollution-protecting the natural environment-Conservation of natural resources - Opportunities in Environment	Making students aware issues and problems of g Skills-capable of und environment issues a resolve these issues

3	Problems of growth	Unemployment- Concept-Types-Causes- Remedies, Poverty- Concept- Causes- Remedies , Regional Imbalance- Concept-Effects –Solutions , Social injustice- Concept, Effects, Solutions ,Black Money –Meaning – Sources –Effects- Measures, Lack of technical knowledge and information- Problems-Remedies	Understanding the problem of growth Skill-Application of mind to resolve the problem of growth
4	The Entrepreneur	Evolution of the term entrepreneur –Definition - Competencies of an Entrepreneur – Distinction between a) entrepreneur and manager- b)Entrepreneur and Enterprise, Intrapreneur- Concept and importance –Distinction between Entrepreneur and Intraprenuer	Understanding the concept of entrepreneur, competencies of a successful entrepreneur, realising the difference between various concepts Skill-knowing the entrepreneurial competencies and imbibing the same by students

Teaching Methodology- F.Y.B.Com Semester-I, Paper-I

Topic No.	Total Lectures	Innovative Methods to be used	Film Shows and A.V. Application	Project	Expected Outcome
1	12	Case Study-Role play	Related videos and PPT	Distribute aspects of business environment in group and ask them to prepare in brief report on it- Field Assignment	Understanding of various aspects business environment useful for would be entrepreneurs
2	12	Conducting survey and collecting information about various types of pollution	Film shows with the help of environment related organizations	Undertake survey of pollution level, its ill effects and remedies	Understanding of various aspects of pollution and its ill effects
3	12	Collecting necessary information through various resources	Related videos and PPT	Compilation of facts, figures and remedies	Understanding of Problems and their causes and remedies
4	12	Case Study	Biographical CDs of successful entrepreneurs	Interview of various types of entrepreneurs e.g. First Generation entrepreneur Women entrepreneur, Social entrepreneur and collect entrepreneurial competencies Collection of success stories	Understanding the

				of persons organisation in the area, arranging guest lecture by eminent entrepreneurs on various aspects of entrepreneur and entrepreneurship	

References

Sr. No	Title of Book	Author/s	Publication	Place
1	Business Environment	Francis Cherunilam	Himalaya Publishing House	New Delhi
3	Dynamics of Entrepreneurship Development and Management	Desai Vasant	Himalaya Publishing House	New Delhi
4	Entrepreneurial Development	Khanka S.S.	S. Chand	New Delhi
5	Entrepreneurial Development	Gupta, Shrinivasan	S. Chand	New Delhi
6	Udyog	--	Udyog Sanchalaya	Mumbai
7	Indian Economy	Ruddar Datt, K.P.M. Sundharam	S. Chand	New Delhi

Revised syllabi (2019 Pattern) for three years B.com Degree course (CBCS)

Semester – I

Foundation Course in Commerce

Course Code – 116 – F

No. of Credits :- 03

Objectives of the course

1. To acquaint the student with knowledge of forms of business organizations and new business models.
2. To understand the latest government regulations and policies with relation to business in India .
3. To introduce the students to the various entrepreneurial development programmes in India .
4. To update the students with the latest developments in Service sector in India.

Depth of the program – Fundamental Knowledge

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	Forms of Business Organization	A. Organization – Meaning , Importance B. Sole Proprietorship , Partnership , LLP , Joint Stock Companies, Joint Ventures , Cooperative, Government form of Business Organization(Departmental, Corporation , Government company), Non Government Organizations – Meaning , Definition , Structure , Advantages and Disadvantages	▪ Conceptual Understanding on the various forms of Business Organization,
2	Types of Business Models	Franchise, Brick and Mortar, e- Commerce, Bricks and Clicks ,Nickel and Dime, Freemium , Subscription ,Aggregator, Online Market Place , Data Licensing/ Data Selling , Digital Advertising ,Affiliate Marketing, Drop Shipping , Agency Based, Peer to Peer Catalyst/Platform, Block Chain	1. Overview of the emerging types of business models

3	Industrial Policies and Recent Programmes for Start ups in India	1. Overview of recent Industrial Policies in India –New Industrial Policy 1991, EXIM Policy , India New Foreign Trade Policy 2015 – 2020 , FDI Policy 2. Overview of : a. Start up India b. Atal Innovation Mission (AIM) c. Make in India d. Digital India e. Support To Training And Employment Programme For Women (STEP) f. Trade-Related Entrepreneurship Assistance And Development (TREAD) g. Pradhan Mantri Kaushal Vikas Yojana (PMKVY)	4. Overview of the various policies supporting business in India 5. Awareness on the recent programmes to promote and support for business
4	Emerging Trends in Service Sector	Overview of Recent trends – 1. Banking Sector - Internet and Mobile Banking 2. Indian Post Payments Bank 3. Insurance Sector –Malhotra Committee Report 4. Logistics 5. BPO, KPO , TPO , and LPO 6. New trends in Tourism- Religious, Rural, & Medical tourism	4. Awareness of Recent Trends in the Service Sector

Teaching Methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	12	PPT , Project Charts	Educational Videos	Individual assignment report	Developing understanding on various forms of business organizations
2	08	Guest Lectures by subject Experts / Industry Expert , Internet Assignments , Case Study Discussion on Real Life success stories	Educational Videos, Videos on Real Life success stories	Case analysis and Discussions, Business Games	Conceptual Clarity and Awareness on Latest Changes
3	14	PPT and Internet Research	https://www.india.gov.in/my-government/schemes	Report Writing , Presentation	Understanding on various Government Policies and Promotion of Entrepreneurial spirit among learners
4	14	Demonstration Method of Online Banking and Mobile Banking , Guest Lectures from experts of respective areas	Educational Videos	Field Visit Internet Research Report	Hands on Training to understand online Baking Awareness on emerging trends and knowledge enhancement

Method of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested Add on Course
Unit – I	MCQ / PPT / Written Test	As per University norms	
Unit – II	Chart Presentation / MCQ/ Written Test	As per University norms	Undertaking a small course under Pradhan Mantri Kaushal Vikas Yojana (PMKVY)
Unit – III	Written Test / Open Book Examination	As per University norms	Certificate Course on Soft Skills for Business
Unit – IV	PPT/ MCQ/Written Test/ Field Visit and Report	As per University norms	

References :

List of Books Recommended :-

1. Financial Management – I. M. Pandey.
2. Financial Management – Theory & practical – Prasanna Chandra
3. Financial Management – S. C. Kuchhal
4. Public Sector in India – Laxmi Nariyan
5. Indian Economy – Rudder Datt
6. Indian Economy – KPM Sundaram
7. Law & practice of banking – S. R. Davar
8. The Business Model Book – Adam J Bock , Gerard George
9. Business Model Innovation – Alexander Osterwalder , Yves Pigneur
10. <https://www.india.gov.in/my-government/schemes>

