

# **VIDYA JYOTHI INSTITUTE OF TECHNOLOGY**

**An Autonomous Institution**

**Aziznagar Gate, C.B. Post, Hyderabad – 500075, Telangana, India.**



## **B.Tech Syllabus (R-18)**

Department of  
Information Technology

## **ACADEMIC REGULATIONS (R18)**

### **Definitions of Key Words**

**Academic Year:** An academic year is referred as the period consisting of two consecutive semesters with 16 weeks each of instructional period followed by both the semester exams.

**Course:** A plan of study of a particular subject leading to an examination. All the courses need not carry the same weight. A course may be designed to comprise of lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/ viva/ seminars/ assignments/ presentations etc. or a combination of some of these.

**Choice Based Credit System (CBCS):** Choice Based Credit System (CBCS) is the program in which the students have a choice to choose from the prescribed courses and can learn at their own pace and the entire assessment is graded-based on a credit system.

**Credit Point:** It is the product of Grade Point and Number of Credits for a course.

**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.

**Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student of all the semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to 2nd decimal place.

**Grade Point:** It is a numerical weight allotted to each letter Grade on a 10-point scale.

**Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.

**Programme:** An Educational Programme leading to the award of a Degree.

**Semester:** Each semester will consist of 16-18 weeks of academic work equivalent to 90 actual teaching days.

**Semester Grade Point Average (SGPA):** It is a measure of performance of the work done by the student in a semester. It is the ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to 2nd decimal place.

**Transcript or Grade Card or Certificate:** Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

**Types of Courses:** The Courses in under B. Tech, program may be of three kinds' viz., Core, Elective and Mandatory.

**a) Core Course:**

There may be a Core Course in every semester and are to be compulsorily studied by a student and is essential requirement for a given Programme.

**b) Elective Course:**

Elective Course is a course which can be chosen by the students from a pool of subjects. In general, the elective course is,

- Supportive to the discipline of study
- Providing an expanded scope of the course subjects
- Nurturing student's proficiency/skill.
- In case an elective is "Discipline centric" and is offered by the student's department itself, the elective is called **Professional elective**.
- On the other hand, if the elective is offered by the other departments or if the choice is given to the students to choose from other disciplines, the elective is called an "**Open Elective**."

**c) Mandatory Courses (Non-Credit Courses)**

AICTE considers that the Course work of certain subjects is essential and as such for the award of a B.Tech degree a pass in these subjects is made mandatory. Therefore, such types of courses are referred as **mandatory courses**. As the AICTE also feels that only a familiarity with the subject content of these courses is essential, only a pass in each of these courses is required. Therefore, these subjects are included in the curriculum as non-Credit courses.

## ACADEMIC REGULATIONS FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2020-21 onwards.

### 1. Courses of Study:

The following Four-year Bachelor of Technology (B.Tech.) Programs under Choice Based Credit System (CBCS) are offered with effect from the Academic Year 2018-19 onwards:

S.	Branch	Branch Code
I	Civil Engineering	01
II	Electrical and Electronics	02
III	Mechanical Engineering	03
IV	Electronics and Communication	04
V	Computer Science and	05
VI	Information Technology	12

### 2. Admission Procedure

- 2.1. Admissions will be done as per the norms prescribed by the Government of Telangana State.
- 2.2. The Government orders with regard to the admissions in vogue shall prevail.
- 2.3. The candidate should have passed the prescribed qualifying examination on the date of Admission.

### 3. Award of B. Tech. Degree

A student will be declared eligible for the award of B. Tech. Degree if he/ she fulfills the following academic requirements:

- 3.1 The candidate shall register for 160 credits and secure all the 160 credits by securing a minimum CGPA of 5.0.
- 3.2 The external examination in all the subjects shall be conducted at the end of each semester for all the eight semesters.
- 3.3 Students joining the B.Tech. Programme shall have to complete the programme within 8 years from the year of joining. Similarly, the students joining the B.Tech. Programme in the third semester directly through Lateral Entry Scheme (LES) shall have to complete the programme within 6 years from the year of joining otherwise they shall forfeit they will not be permitted to pursue their studies nor will be allowed to write the exams.

### 4. Program details:

- 4.1 The course shall be of four Academic year's duration, each academic year having two semesters. Each semester shall have a minimum 16 weeks of instruction, with a minimum of 90 Instructional Days per Semester.

#### 4.2 Credits:

Credits shall be assigned to each Subject/ Courses with symbols L: T: P: C, where L stands for Lecture Period, T for Tutorial Period, P for Practical Period, C for Credits and the details are given in the following Table,

Type of course		Clock hours/			C
		L	T	P	
Theory	1	0	-	-	04
	2	0	-	-	03
	3	0	-	-	02
Practical		0	0	1	0.5
Drawing	1	0	04	-	02
	2	0	02	-	01
Mini project, Comprehensive Viva Voce Seminar, Major project		-	-	-	17

#### 5. Attendance Requirements

- 5.1 A student is eligible to write the Semester End examinations only if he/ she acquire a minimum of 75% of attendance in aggregate of all the subjects/ Courses in that Semester.
- 5.2 Condonation for the shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical grounds with a documentary evidence approved by the Academic Committee.
- 5.3 A stipulated fee shall be payable towards condonation of attendance shortage.
- 5.4 Students, whose shortage of attendance is not condoned, are not eligible to write semester end examinations of that semester. Such students are detained and their registration for the examination stands cancelled.
- 5.5 A student detained due to shortage of attendance in a semester may seek re-admission into that semester, as and when offered, within four weeks from the date of the commencement of class work with the academic regulations of the batch into which he/ she gets admitted.
- 5.6 A student will be promoted to the next semester if he/ she satisfies the attendance requirement of the present semester.
- 5.7 For all mandatory, noncredit courses offered in a semester, a "Satisfactory Participation Certificate" shall be issued to the student, only after securing 75% attendance in such course. Letter Grade shall be allotted for these courses.

**The courses offered in 8 semesters spread over 4 years have been classified into 8 categories under Choice Base Credit System (CBCS)**

<b>S. No.</b>	<b>Subject Categories</b>	<b>No. of Credits</b>
1	Humanities and Social Sciences including Management course	11
2	Basic Science Course	26
3	Engineering Science courses including workshop, drawing, basics of electrical/ mechanical/ computer etc...	24
4	Professional core Courses (Theory)	46
5	Professional core Courses (Labs)	09
6	Professional Elective courses relevant to chosen specialization/ branch	18
7	Open Elective subjects – Elective from other emerging subjects	09
8	Project work, seminar and internship in industry or appropriate work place/academic and research institutions in India/Abroad	<b>10+3+2+2 = 17</b>
9	Mandatory Course (Environmental Science & Gender Sensitization)	Nil
<b>Total Number of credits</b>		<b>160</b>

**B. Tech Year wise distribution of credits under CBCS**

<b>S. No.</b>	<b>Year</b>	<b>Semester</b>	<b>Credits</b>	<b>Total</b>
1	1 <sup>st</sup> Year	I	18/20	<b>38</b>
		II	20/18	
2	2 <sup>nd</sup> Year	I	20	<b>40</b>
		II	20	
3	3 <sup>rd</sup> Year	I	21	<b>42</b>
		II	21	
4	4 <sup>th</sup> Year	I	20	<b>40</b>
		II	20	
<b>Total No. of Credits</b>				<b>160</b>

**6. Promotion regulations**

- 6.1 A student shall be promoted from B.Tech., I Year to II Year only if he/she fulfils the academic requirements of securing 50% of total credits (19 credits out of 38 credits, up to I year II Semester), from all the examinations, whether or not the candidate takes the examinations.
- 6.2 A student shall be promoted from B.Tech., II Year to III Year only if he/she fulfils the academic requirement of securing 50% of total credits (39 out of 78 credits, up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.
- 6.3 A student shall be promoted from B.Tech., III year to IV year only if he/she fulfils the academic requirement of securing 50% of total credits (60 out of 120 credits) up to III year II semester), from all the examinations, whether or not the candidate takes the examinations.

## **7. Minimum Academic Requirements**

The following minimum academic requirements are to be satisfied in addition to the requirements mentioned under item no.5.

- 7.1 A student shall be deemed to have satisfied the minimum academic requirements and has earned the credits allotted to each theory/ practical/ design/ drawing subject/ project and secured not less than 35% marks in Semester End Examination (SEE), and minimum 40% of marks in the sum total of the internal evaluation and Semester end examination taken together.
- 7.2 The student has to pass the failed courses by appearing the supplementary examinations as per the requirement for the award of degree.
- 7.3 A student shall register and put up minimum Attendance and earn all 160 Credits for the award of degree.
- 7.4 Student, who fails to earn 160 credits as indicated in the course structure within eight academic years from the year of his/her admission, shall forfeit the seat in B. Tech. course and admission stands cancelled.
- 7.5 When a student is detained due to shortage of attendance in any semester, no Grade allotments or SGPA/CGPA calculations will be done for that entire Semester in which a student got detained.
- 7.6 When a Student is detained due to lack of Credits in any year, he may be readmitted after fulfilment of the Academic Requirements, with the Academic Regulations of the Batch into which he gets readmitted. If there are any Professional Electives/ Open Electives, the same may also be re-registered if offered. However, if those Electives are not offered in later Semesters, then alternate Electives may be chosen from the same set of Elective Subjects offered under that category.
- 7.7 A student is eligible to appear in the End Semester Examination in any Subject/ Course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that subject/ Course at the supplementary exam as and when the examinations are conducted. In such cases, his Continuous Internal Evaluation(CIE) assessed earlier for that subject/ Course will be carried over, and added to the marks to be obtained in the supplementary examinations, for evaluating the performance in that subject.
- 7.8 A student with a final CGPA (at the end of the UGP) < 5.00 will not be eligible for the Award of the Degree.

## **8 Evaluation - Distribution and weight age of Marks**

- 8.1 The performance of a student in each semester shall be evaluated Subject-wise (irrespective of Credits assigned) for a maximum of 100 marks for Theory or Seminar or Drawing/Design or Industry Oriented Mini-Project or Minor Course, etc. For Practical's a maximum of 75 Marks shall be evaluated. However, B. Tech. Project work (Major Project) will be evaluated for 200 Marks. These evaluations shall be based on 25% CIE (Continuous Internal Evaluation) and 75% SEE (Semester End Examinations) and a Letter Grade corresponding to the % marks obtained shall be given.
- 8.2 For theory subjects the distribution shall be 25 marks for Continuous Internal Evaluation (CIE) and 75 marks for the Semester End- Examination (SEE).

- 83 For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination will be conducted for 20 marks and consists of Part-A (Short Answer Questions) for 6 marks and Part-B (Long Answer Questions) for 14 marks with duration of 90 Minutes. First midterm examination shall be conducted for 2.5 units of syllabus and second midterm Examination shall be conducted for remaining 2.5 units. The Average marks secured by a student in I and II Midterm examination are considered and shall be taken as the final marks secured by the student towards Continuous Internal Evaluation in the theory subject.
- 84 In case a few students are absent due to health reasons or any other unavoidable circumstances, or if the performance of some of the students is very poor, all such cases will be referred to a standing committee consisting of the Controller of examinations (Chairman), HoD of the concerned dept. and the Academic coordinator. On the recommendation of the committee, a makeup test will be conducted on payment of fee fixed by the examination branch.
- 85 In order to improve the attendance and to encourage the students who are regular to the college, 5 marks in each subject will be given to the students as per the percentage of attendance shown in the table,

Table: - Marks for attendance

S. No	Percentage of attendance	Marks to be awarded
1.	Less than 75%	nil
2.	75% to 80%	3
3.	80% to 85%	4
4.	85% and above	5

- 86 The Semester End Examination will be conducted for 75 marks which consist of two parts viz. i). Part-A for 25 marks, ii). Part –B for 50 marks. Part-A is compulsory, which consists of ten questions (numbered from 1 to 10) two from each unit carrying 2/3 marks each. Part-B consists of five questions (numbered from 11 to 15) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice (i.e., there will be two questions from each unit and the student should answer any one question).
- 87 For practical subjects there shall be a continuous evaluation during the Semester for 25 marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the concerned laboratory teacher.
- 88 The Practical End Semester Examination shall be conducted with an external examiner and the laboratory teacher for 50 marks. The external examiner shall be appointed by the Principal from the panel of examiners recommended by the Chairman, Board of Studies of respective departments.
- 89 For the subject having design and/ or drawing, (such as Engineering Graphics, Engineering Drawing, and Machine Drawing), the distribution shall be 25 marks for Internal Evaluation (5 marks for day-to-day work and 20 marks for internal tests) and 50 marks for Semester End Examination. There shall be one internal test in a semester and shall be considered for the award of marks for internal test.

- 8.10 There shall be an industry-oriented mini-Project, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated in IV year I Semester at the time of practical exams. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, Head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.
- 8.11 There shall be a seminar presentation in IV-year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, Seminar Supervisor and a Senior Faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for the seminar.
- 8.12 There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a committee consisting of Head of the Department and two Senior Faculty members of the department and is evaluated for 100 marks. The Comprehensive Viva-Voce is intended to assess the students understanding of the subjects he studied during the B. Tech. course. There will be no External Examiner for the Comprehensive Viva-Voce.
- 8.13 Out of a total of 200 marks for the major project work, 50 marks shall be for Internal Evaluation and 150 marks for the End Semester evaluation. The End Semester evaluation (viva-voce) shall be conducted by committee. The committee consists of an external examiner, Head of the Department, the supervisor of project and a senior faculty member of the department. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year II Semester. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his project.
- 8.14 The Laboratory marks and the sessional marks awarded by the faculty are subject to scrutiny by the Institution whenever/wherever necessary. In such cases, the sessional and laboratory marks awarded by the teacher will be referred to a College Academic Committee. The Committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved as per the University rules and produced before the Committees of the University as and when asked for.
- 8.15 Candidates shall be permitted to apply for recounting/revaluation of SEE scripts within the stipulated period with payment of prescribed fee.

## 9.0. Malpractice Rules

S. No.	Nature of Malpractices/ Improper conduct during examinations	Punishment
	If the candidate:	
1 (a)	Possesses any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical)	
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter	<p>a) Expulsion from the examination of the performance in that subject only of all the candidates involved.</p> <p>b) In case of an outside, he/she will be handed over to the police and a case is registered against him/ her.</p>
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	
3	Impersonates any other candidate in connection with the examination.	<p>a) The candidate who has impersonated shall be expelled from examination hall.</p> <p>b) The candidate is also debarred and forfeits the seat in the college.</p> <p>c) The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/ year.</p> <p>d) The candidate is also debarred for two consecutive semesters from class work and all Semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>

4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	<p>a) Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.</p> <p>b) The candidate is also debarred for two consecutive semesters from class work and all Semester end examinations.</p> <p>c) The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Chief Superintendent/ Assistant Superintendent/ any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer in charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	<p>a) The concerned students will be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year.</p> <p>b) The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</p>

7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	<p>a) Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work &amp; shall not be permitted for the remaining examinations of the subjects of that semester/year.</p> <p>b) The candidate is also debarred for two consecutive semesters from class work and all Semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>
8.	Possess any lethal weapon or firearm in the examination hall (or) if a student comes in a drunken condition to the examination hall.	
9.	If a student of the college, who is not a candidate for the particular examination or any person not connected with the examination.	
10.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the head of Institute for further action for a suitable punishment.	

All the cases pertaining to malpractices in examinations will be referred to a committee constituted by the Chief Controller of Examination and the committee will suggest action as per the guidelines mentioned above.

#### 10. Grading Procedure:

10.1. Marks will be awarded to indicate the performance of each student in each theory subject, or Lab/Practical, or Seminar, or Project, or Mini-Project, Minor Course etc., based on the % marks obtained in CIE+SEE (Continuous Internal Evaluation + Semester End Examination, both taken together) as specified, and a corresponding Letter Grade shall be given.

10.2. As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed.

Letter	Performance	Grade Points	% of marks Secured (Class Intervals)
O		10	Greater than or equal to
A		9	80% and less than 90%
A	Very	8	70% and less than 80%
B	Good	7	60% and less than 70%
B		6	50% and less than 60%
C	Pass	5	40% and less than 50%
F	Fail	0	Below 40%
A	Absent	0	Absent

10.3. A student obtaining F Grade in any subject shall be considered 'Failed' and will be required to reappear as 'Supplementary Candidate' in the end Semester Examination (SEE), as and when offered. In such cases; his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

- 10.4. A Letter Grade does not imply any specific % of Marks.
- 10.5. In general, a student shall not be permitted to repeat any Subject/Course (s) only for the sake of 'Grade Improvement' or 'SGPA/ CGPA Improvement'. However, he has to repeat all the Subjects/Courses pertaining to that Semester, when he is detained.
- 10.6. A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/ course. Credit Points (CP) = Grade Point (GP) x Credits for a Course.
- 10.7. The Student passes the Subject/ Course only when he gets  $GP \geq 5$  (P Grade or above).

## **11. Registration/ Dropping**

- 11.1. Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the academic calendar. It is absolutely necessary for the student to register for courses in time.
- 11.2. A student at the end of III year I semester either having the CGP of  $\geq 7.0$  or having passed all previous courses in first attempt with a minimum CGPA  $\geq 5.0$  is allowed to register an additional theory course with the recommendations of the faculty advisor & HOD of the dept.
- 11.3. Departments will notify at the time of registration about the minimum number of students to be enrolled for a particular open elective to be offered.
- 11.4. Any student may be barred from registering for any course for specific reasons like disciplinary action or any other illegal activities carried out by a student, which is detrimental to the discipline of the college.
- 11.5. Dropping of Courses: Within four weeks after the commencement of the semester, the student may, in consultation with his / her faculty advisor, drop one or more courses without prejudice to the minimum number of credits. The dropped courses are not recorded in the Grade Card.
- 11.6. After Dropping, minimum credits registered shall be 20.

## **12. Earning of Credits**

A student shall be considered to have completed a Course successfully and earned the credits if he/she secures an acceptable letter grade in the range 'O' to 'P'. Letter grade 'F' in any Course implies failure of the student in that Course and no credits earned.

## **13. Passing Standards:**

- 13.1. A student shall be declared successful or 'passed' in a Semester, only when he gets a  $SGPA \geq 5.00$  (at the end of that particular Semester).
- 13.2. In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those obtained earlier. In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.
- 13.3. A Student shall be declared successful or 'passed' in any Non-Credit Subject/ Course, if he secures a 40% marks or **P** grade in the end sem. exam conducted by the college along with the other examinations.

13.4. After the completion of each Semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the registered students of that semester, indicating the Letter Grades and Credits earned. It will show the details of the courses registered (Course Code, Title, No. of Credits, Grade Earned etc.), Credits earned, SGPA, and CGPA.

**14. Eligibility for the award of B.Tech. Degree**

A student shall be eligible for award of the B. Tech degree if he/she fulfils all the following Conditions:

- 14.1. The students should successfully complete all the components prescribed in the Programme of study to which he/ she is admitted.
- 14.2. The student should also obtain CGPA greater than or equal to 5.0.
- 14.3. Not having any pending disciplinary action.

**15. Evaluating of Grade Point Averages:**

15.1. SGPA and CGPA the *credit index* can be used further for calculating the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA), both of which being important performance indices of the student. While SGPA is equal to the *credit index* for a semester divided by the total number of *credits* registered by the student in that semester, CGPA gives the sum total of *credit indices* of all the previous semesters divided by the total number of *credits* registered in all these semesters. Thus, The Grade Point Average (GPA) will be calculated according to the formula:

Where  $C_i$  = number of credits for the course  $i$ ,  $G_i$  = grade points obtained by the

$$GPA = \frac{\sum C_i G_i}{\sum C_i}$$

student in the course.

15.2. Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation. SGPA is rounded off to TWO Decimal Places.

SGPA will be computed as follows;

$$\frac{\sum [(Course\ credits) \times (Grade\ points)] \text{ (for all Courses passed in that semester)}}{\sum [(Course\ credits)] \text{ (for all courses registered in that semester)}}$$

15.3. To arrive at Cumulative Grade Point Average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time. CGPA is rounded off to TWO Decimal Places.

CGPA will be computed as follows:

$$\frac{\sum [(Course\ credits) \times (Grade\ points)] \text{ (for all Courses passed up to that semester)}}{\sum [(Course\ credits)] \text{ (for all Courses registered until that semester)}}$$

CGPA is thus computed from the I Year First Semester onwards, at the end of each Semester, as per the above formula. However, the SGPA of I year I Semester itself may be taken as the CGPA, as there are no cumulative effects.

#### 15.4. Illustrative Example:

An illustrative example given in below Table below indicates the use of the above two equations in calculating SGPA and CGPA, both of which facilitate the declaration of academic performance of a student, at the end of a semester and at the end of successive semesters respectively. Both of them shall be normally calculated up to the second decimal position, so that the CGPA, in particular, can be made use of in rank ordering the student's performance in a class. If two students get the same CGPA, the tie should be resolved by considering the number of times a student has obtained higher SGPA; But, if it is not resolved even at this stage, the number of times a student has obtained higher grades like O, A, B etc shall be taken into account in rank ordering of the students in a class.

Year and Semester	Course No.	Credits	Grade	Grade Points	Credit Points
I Year I sem	XX1	5	A	8	40
I Year I sem	XX1	4	F	0	00
I Year I sem	XX1	3	A+	9	27
I Year I sem	XX1	4	F	0	00
I Year I sem	XX1	5	C	5	25
I Year I sem	XX1	5	P	4	20
<b>Total</b>		<b>26(18*)</b>			<b>112</b>
<b>SGPA = 112/26 = 4.31</b>		<b>CGPA = 4.31</b>			
I Year II Sem	XX1	5	B+	7	35
I Year II Sem	XX1	4	A	8	32
I Year II Sem	XX1	3	C	5	15
I Year II Sem	XX1	5	P	4	20
I Year II Sem	XX1	4	A+	9	36
I Year II Sem	XX1	2	F	0	00
I Year II Sem	Xx1	2	A	8	16
<b>Total</b>		<b>25(23*)</b>			<b>154</b>
<b>SGPA = 154/25 = 6.16</b>		<b>CGPA = 266/51 = 5.22</b>			

\*Total No. of credits excluding those with 'F'; this is particularly important to keep track of the number of credits earned by a student up to any semester.

#### 16. Award of Division

16.1. After a student has satisfied the requirements prescribed for the completion of the program and is Eligible for the award of B. Tech. Degree, he shall be placed in one of the following four divisions:

CGPA	Class Awarded	From the CGPA secured from 160 credits
≥8.00	First Class with	
≥6.50 - <8.00	First Class	
≥5.50 - <6.50	Second Class	
≥5.00 - <5.50	Pass Class	

16.2. The marks obtained in Internal Evaluation (IE) and Semester End Examination (SEE) will be shown in the memorandum of marks.

- 16.3. For the purpose of awarding first Class with Distinction (CGPA  $\geq$  8.0), the student must obtain the minimum required CGPA within 4 academic years or within 3 academic years in case of Lateral Entry candidates by clearing all the courses.
- 16.4. Candidates with disciplinary action pending/ prevented from writing the end semester examinations due to reason in any semester are not eligible for the award of First Class with Distinction. Such candidate's even if the CGPA  $\geq$  8.0 shall be placed in first class.
- 16.5. For the purpose of awarding First, Second and Pass Class, CGPA obtained in the examinations appeared within the maximum period allowed for the completion of course shall be considered as per the regulations.
- 16.6. A student with final CGPA (at the end of the UGP)  $<$  5.00 will not be eligible for the award of the Degree.
- 16.7. The CGPA can be converted to equivalent percentage of marks by using the equation, % of Marks = (CGPA - 0.5) X 10.

### **17. Consolidated Grade Card**

A consolidated grade card containing credits & grades obtained by the candidates will be issued after completion of the four years B. Tech Programme.

### **18. Withholding of Results**

If a student is having any discipline related issues pending, the result of the student will be withheld and will not be allowed to move into the next semester. His/ her degree will be withheld in such cases and the matter will be referred to the academic council for final decision.

### **19. Transitory Regulations**

- 19.1. Discontinued, detained for attendance, detained for want of credits, or failed students are eligible for readmission as and when the course is offered during the subsequent academic year as per the college admission procedures.
- 19.2. Students on transfer from a non-autonomous or from an autonomous college shall complete all the courses of the concerned programme not covered in the earlier organization. However, he/ she should take the remaining courses in the programme along with the other students.
- 19.3. There shall be no branch transfers after the cut-off date of admissions made in the B.Tech. I year.

### **20. Transcripts**

After successful completion of the total program of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee.

### **21. Supplementary Examinations**

In addition to the Regular end semester examinations, Supplementary Examinations for the previous semesters will be conducted along with end sem. Examinations. A student can appear for any number of supplementary examinations till he/she clears all courses which he/ she could not clear in the first attempt. However, the maximum stipulated period cannot be relaxed under any circumstances.

## **22. Graduation Ceremony**

- 22.1. The College shall have its own annual Graduation Ceremony for the award of degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.
- 22.2. The College shall institute Prizes and Awards to meritorious students, for being given away annually at the Graduation Ceremony.

## **23. Termination from the Program**

The admission of a student to the program may be terminated and the student may be asked to leave the Institute in the following circumstances:

- 23.1. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.
- 23.2. The student fails to satisfy the norms of discipline specified by the institute from time to time.

## **24. Non-Credit Courses (Mandatory Courses)**

- 24.1. Requirement of 75% attendance as per the college regulations is compulsory of completing the mandatory courses.
- 24.2. Specified number of Mandatory Courses among the designated ones is compulsory requirement for all the students for the award of B.Tech. Degree.
- 24.3. Although these courses do not carry any credits, performance in these subjects is evaluated following the procedure adopted for other subjects with the same marks. However, their performance will be indicated in the student's memo of marks as Satisfactory/ Unsatisfactory.
- 24.4. Although mandatory courses are Non-Credit Course, all the students should secure a minimum of 40% marks in the end sem. exam conducted by the college along with the other examinations for the award of B.Tech, degree.

## **25. Amendments**

The Academic regulations here under are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.

## **26. General**

- 26.1. Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- 26.2. The academic regulation should be read as a whole for the purpose of an interpretation.
- 26.3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
- 26.4. The college may change the academic regulations, course structure & syllabi at any time.

## **ACADEMIC REGULATIONS FOR B. TECH. (LATERAL ENTRY STUDENTS)**

Applicable for the students admitted into II Year B. Tech. (Lateral Entry Scheme) from the Academic Year 2019-20 and onwards.

### **1. Eligibility for award of B. Tech. Degree (LES)**

- 1.1 The LES candidates shall pursue a course of study for not less than three academic years and not more than six academic years.
- 1.2 The candidate shall register for 122 credits and secure 122 credits by securing a minimum CGPA of 5.0 from the exams. of B.Tech. II to IV year for the award of B.Tech. Degree.
- 1.3 The students, who fail to fulfil the requirement for the award of the degree in six Academic years from the year of admission, shall forfeit their seats. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

### **2. Promotion Rule**

- 2.1. A student shall be promoted from B.Tech., II Year to III Year if he/ she gets at least a minimum of 20 out of 40 credits, up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.
- 2.2. A student shall be promoted from III year to IV year if he/ she gets a minimum of 41 out of 82 credits, up to III year II semester, from all the examinations, whether or not the candidate takes the examinations.
- 2.3. A student shall register and put up minimum attendance in all 122 credits and earn all 122 credits to be eligible for the award of B.Tech degree.
- 2.4. A student, who fails to earn 122 credits as indicated in the course structure within six academic years, shall forfeit his/ her admission in B.Tech. Course.

### **3. Award of Class**

A student, who satisfies all the requirements prescribed for the completion of the B.Tech program, is eligible for the award of the said degree, in any one of the following four classes:

<b>CGPA</b>	<b>Class Awarded</b>	
≥8.00	First Class with	From the CGPA secured from 122 credits
≥6.50 -	First Class	
≥5.50 -	Second Class	
≥5.00 -	Pass Class	

4. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme).
5. The malpractice rules and procedures for evaluating the SGPA and CGPA mentioned under points 9 - 27, are also applicable to the later entry students.

## COURSE STRUCTURE FOR B.TECH I YEAR

### B. Tech. I Year I Semester:

S.No	Course Category	Course Title	L	T	P	Credits
1	BS-1	Mathematics-I	3	1	0	4
2	BS-2	Applied Physics	3	1	0	4
3	BS-Lab 1	Applied Physics Lab	0	0	3	1.5
4	ES-1	Basic Electrical Engineering	3	0	0	3
5	ES-Lab 1	Basic Electrical Engineering Lab	0	0	2	1
6	ES-2	Engineering Graphics & Modeling	1	0	3	2.5
7	H&S-Lab 1	English Language Skills Lab (ELSL)	0	0	2	1
8	ES-3	Programming for Problem Solving-I	2	0	0	2
9	ES-Lab 2	Programming for Problem Solving Lab-I	0	0	2	1
<b>Total</b>			<b>12</b>	<b>2</b>	<b>12</b>	<b>20</b>

### B. Tech. I Year II Semester:

S.No	Course Category	Course Title	L	T	P	Credits
1	BS-3	Mathematics-II	3	1	0	4
2	BS-4	Chemistry	3	1	0	4
3	BS-Lab 2	Chemistry Lab	0	0	3	1.5
4	H&S-1	English	2	0	0	2
5	H&S-Lab 2	English Communication Skills Lab (ECSL)	0	0	2	1
6	ES-4	Programming for Problem Solving-II	2	0	0	2
7	ES-Lab 3	Programming for Problem Solving Lab-II	0	0	2	1
8	ES-Lab 4	Engineering Workshop	0	1	3	2.5
<b>Total</b>			<b>10</b>	<b>3</b>	<b>10</b>	<b>18</b>

## COURSE STRUCTURE FOR B.TECH II YEAR

### B. Tech. II Year I Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	BS-5	Probability and Statistics	3	0	0	3
2	ES	Digital Logic Design	3	0	0	3
3	ES	Electronic Devices Circuits	3	0	0	3
4	PC-1	Data Structures	3	0	0	3
5	PC-2	Mathematical Foundations of Computer Science	3	0	0	3
6	PC-3	Python Programming	3	0	0	3
7	PC Lab	Data Structures & Python Programming Lab	0	0	2	1
8	ES Lab	Digital Logic Design & Electronic Devices Circuits Lab	0	0	2	1
9	MC-1	Gender Sensitization/ Environmental Science	2	0	0	0
<b>Total</b>			<b>20</b>	<b>0</b>	<b>4</b>	<b>20</b>

### B. Tech. II Year II Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-4	Design & Analysis of Algorithms	3	1	0	4
2	PC-5	Computer Organization	3	0	0	3
3	PC-6	Java Programming	3	0	0	3
4.	PC-7	Software Engineering	3	0	0	3
5	PC-8	Database Management Systems	3	0	0	3
6	H&S-2	Professional Communication	1	0	2	2
7	PC Lab	Java Programming Lab	0	0	2	1
8	PC Lab	Database Management Systems Lab	0	0	2	1
9	MC-2	Gender Sensitization/ Environmental Science	2	0	0	0
<b>Total</b>			<b>18</b>	<b>1</b>	<b>6</b>	<b>20</b>

### COURSE STRUCTURE FOR B.TECH III YEAR

#### B. Tech. III Year I Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-9	Formal Languages and Automata Theory	3	0	0	3
2	PC-10	Computer Networks	3	0	0	3
3	PC-11	Operating Systems	3	0	0	3
4	H&S-3	Managerial Economics and Financial Analysis	3	0	0	3
5	PE-1	Cloud Computing Linux Programming Software Project Management Computer Graphics	3	0	0	3
6	OE – 1	Open Elective – 1	3	0	0	3
7	PC Lab-4	Computer Networks & Operating Systems Lab	0	0	2	1
8	H & S - Lab 3	Advanced Communication Skills Lab	0	0	2	1
9	Value added course -1	Personality Development & Behavioural Skills/ Quantitative Methods & Logical Reasoning	2	0	-	1
<b>Total</b>			<b>20</b>	<b>0</b>	<b>4</b>	<b>21</b>

#### B. Tech. III Year II Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-12	Web Technologies	3	0	0	3
2	PC-13	Compiler Design	3	0	0	3
3	PC-14	Data Warehousing & Data Mining	3	0	0	3
4	PC-15	Object Oriented Analysis & Design	3	0	0	3
5	PE -2	Artificial Intelligence Information Security Software Testing Methodologies Principles of Programming Languages	3	0	0	3
6	OE – 2	Open Elective – 2	3	0	0	3
7	PC Lab -6	Data Mining & Case Tools Lab	0	0	2	1
8	PC Lab-5	Web Technologies Lab	0	0	2	1
9	Value added course -2	Quantitative Methods & Logical Reasoning/ Personality Development & Behavioural Skills	2	0	0	1
<b>Total</b>			<b>20</b>	<b>0</b>	<b>4</b>	<b>21</b>

**B.TECH III YEAR I SEMESTER (FAST TRACK CURRICULUM SCHEME)**

S. No.	Category	Course Title	L	T	P	Credits
1	PC-9	Formal Languages and Automata Theory	3	0		3
2	PC-10	Computer Networks	3	0		3
3	PC-11	Operating Systems	3	0		3
4	H&S-3	Managerial Economics and Financial Analysis	3	0		3
5	PE-1	Cloud Computing Linux Programming Software Project Management Computer Graphics	3	0		3
6	OE – 1	Open Elective – 1	3	0		3
7	PC Lab-4	Computer Networks & Operating Systems Lab	0	0	2	1
8	H & S -Lab 3	Advanced Communication Skills Lab	0	0	2	1
9	Value added course -1	Personality Development & Behavioural Skills/ Quantitative Methods & Logical Reasoning	2	0	-	1
<b>Total</b>			<b>20</b>	<b>0</b>	<b>4</b>	<b>21</b>

**B.TECH III YEAR II SEMESTER (FAST TRACK CURRICULUM SCHEME)**

S. No.	Category	Course Title	L	T	P	Credits
1	PC-12	Web Technologies	3	0	0	3
2	PC-13	Compiler Design	3	0	0	3
3	PC-14	Data Warehousing & Data Mining	3	0	0	3
4	PC-15	Object Oriented Analysis & Design	3	0	0	3
5	PE -2	Artificial Intelligence Information Security Software Testing Methodologies Principles of Programming Languages	3	0	0	3
6	OE – 2	Open Elective – 2	3	0	0	3
7	PC Lab -6	Data Mining & Case Tools Lab	0	0	2	1
8	PC Lab-5	Web Technologies Lab	0	0	2	1
9	Value added course -2	Quantitative Methods & Logical Reasoning/ Personality Development & Behavioural Skills	2	0	0	1
10	PC-18	Semantic Web & Social Networks	3	0	0	3
<b>Total</b>			<b>23</b>	<b>0</b>	<b>4</b>	<b>24</b>

### COURSE STRUCTURE FOR B.TECH IV YEAR

#### B. Tech. IV Year I Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-16	Mobile Application Development	3	0	0	3
2	PC-17	Internet of Things	3	0	0	3
3	PE -3	Big Data Analytics Image Processing R Programming Data Science	3	0	0	3
4	PE-4	Machine Learning Block chain Technologies Advanced Databases Information Retrieval Systems	3	0	0	3
5	OE-3	Open Elective-3	3	0	0	3
6	PC Lab -7	Mobile Application Development Lab & IoT Lab	0	0	2	1
7	PE - 3 Lab	Big Data Analytics Lab Image Processing Lab R Programming Lab Data Science Lab	0	0	2	1
8	PW	Industry Oriented Mini Project	0	0	6	3
<b>Total</b>			<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>

#### B. Tech. IV Year II Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-18	Semantic Web & Social Networks	3	0	0	3
2	PC-19	E-Commerce	3	0	0	3
3	PW	Technical Seminar	0	0	4	2
4	PW	Comprehensive Viva-Voce	0	0	4	2
5	PW	Major Project	0	0	20	10
<b>Total</b>			<b>6</b>	<b>0</b>	<b>28</b>	<b>20</b>

**B.TECH IV YEAR I SEMESTER (FAST TRACK CURRICULUM SCHEME)**

S. No.	Category	Course Title	L	T	P	Credits
1	PC-16	Mobile Application Development	3	0	0	3
2	PC-17	Internet of Things	3	0	0	3
3	PE -3	Big Data Analytics Image Processing R Programming Data Science	3	0	0	3
4	PE-4	Machine Learning Blockchain Technologies Advanced Databases Information Retrieval Systems	3	0	0	3
5	OE-3	Open Elective-3	3	0	0	3
6	PC Lab -7	OMobile Application Development Lab & IoT Lab	0	0	2	1
7	PE - 3 Lab	Big Data Analytics Lab Image Processing Lab R Programming Lab Data Science Lab	0	0	2	1
8	PW	Industry Oriented Mini Project	0	0	6	3
9	PC-19	E-Commerce	3	0	0	3
<b>Total</b>			<b>18</b>	<b>0</b>	<b>10</b>	<b>23</b>

**B.TECH IV YEAR II SEMESTER (FAST TRACK CURRICULUM SCHEME)**

S. No.	Category	Course Title	L	T	P	Credits
1	PW	Technical Seminar	0	0	4	2
2	PW	Comprehensive Viva-Voce	0	0	4	2
3	PW	Major Project	0	0	20	10
<b>Total</b>			<b>0</b>	<b>0</b>	<b>28</b>	<b>14</b>

**MATHEMATICS I**  
**(Matrices and Calculus)**

L	T	P	C
3	1	0	4

**I Year I Semester**

**Course Outcomes:**

1. Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
2. Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
3. Analyze the convergence of sequence and series.
4. Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
5. Examine the extrema of functions of two variables with/ without constraints.

**UNIT-I:**

**Matrices and Linear System of Equations:**

Matrices and Linear system of equations: Real matrices Symmetric, skew - symmetric, orthogonal. Complex matrices: Hermitian, Skew Hermitian and Unitary. Rank-Echelon form, Normal form. Solution of Linear Systems Gauss Elimination, Gauss Jordan & LU Decomposition methods.

**UNIT-II:**

**Eigen Values and Eigen Vectors:**

Eigen values, Eigen vectors – properties, Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of matrix- Quadratic forms: Reduction to Canonical form, Nature, Index, Signature.

**UNIT-III:**

**Sequences & Series:**

Basic definitions of Sequences and series, Convergence and divergence, Ratio test, Comparison test, Cauchy's root test, Raabe's test, Integral test, Absolute and conditional convergence.

**UNIT-IV:**

**Beta & Gamma Functions and Mean Value Theorems:**

Gamma and Beta Functions-Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Generalized Mean Value theorem (all theorems without proof) – Geometrical interpretation of Mean value theorems.

**UNIT-V:**

**Functions of Several Variables:**

Partial Differentiation and total differentiation, Functional dependence, Jacobian Determinant- Maxima and Minima of functions of two variables with constraints and without constraints, Method of Lagrange Multipliers.

**Textbooks:**

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Advanced Engineering Mathematics, Jain & Iyengar, Narosa Publications.

**Reference Books:**

1. Calculus and Analytic Geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
3. Advanced Engineering Mathematics (2<sup>nd</sup> Edition), Michael D. Greenberg.

## APPLIED PHYSICS

I Year I Semester

L	T	P	C
3	1	0	4

### Course Outcomes:

1. Identify various optical phenomena of light.
2. Discuss the basic principles of quantum mechanics.
3. Classify solids based on the band theory.
4. Elucidate the characteristics of semiconductors and semiconductor devices.
5. Explain the working principle of lasers and optical fibers.

### UNIT – I:

#### Wave Optics:

Principle of Superposition, coherence and methods to produce coherent sources, Interference - Interference in thin films by reflection, Newton's Rings. Diffraction – Fraunhofer and Fresnel Diffraction, Fraunhofer diffraction due to single slit, Plane Diffraction Grating, resolving power of Grating. Polarization – Polarization of light waves, Plane of vibration, plane of polarization, Double refraction, Nicol's Prism, Applications of Polarization.

### UNIT-II:

#### Introduction to Quantum Mechanics and Free Electron Theory:

Classical free electron Theory, Electrical Conductivity and Ohm's Law – Drawbacks, Sommerfeld theory (Qualitative). Introduction to quantum physics: Black body radiation and Planck's Law (Qualitative), wave-particle duality, de-Broglie hypothesis of matter waves, Davisson and Germer experiment, Heisenberg uncertainty principle, time independent Schrodinger equation, Born interpretation of wave function, particle in an infinite potential well (one dimension).

### UNIT-III:

#### Band Theory of Solids and Semiconductors:

Kronig-Penny model (Qualitative), E-k diagram, Energy bands in solids, classification of materials into metals, semiconductors, and insulators, Effective mass, Density of States, Fermi distribution function, Fermi level and its importance. Intrinsic semiconductors, carrier concentration in intrinsic semiconductors, energy band diagram and position of Fermi level in intrinsic semiconductors, equation for electrical conductivity of semiconductors, extrinsic semiconductors.

### UNIT-IV:

#### Semiconductor Devices:

Direct and indirect band-gap semiconductors, Formation of p-n junction, energy diagram of PN junction, I-V characteristics of PN junction diode, Photo diode, solar cell-efficiency, light emitting diode and their characteristics, semiconductor laser: device structure and characteristics, Hall effect and its applications.

**UNIT-V:****Fiber Optics and Lasers:**

Introduction, total internal reflection, acceptance angle and numerical aperture, losses associated with optical fibers, step and graded index fibers, applications of optical fibers. Introduction to interaction of radiation with matter: stimulated absorption, spontaneous emission and stimulated emission, Einstein's coefficients and their relations, characteristics of a laser, important components of a laser: active medium, pumping source, optical resonator. Population inversion, Ruby laser, He-Ne laser, applications of lasers.

**Textbooks:**

1. Engineering Physics, P K Palanisamy, Sciotech publication.
2. Engineering Physics, V Rajendran, McGraw Hill Education.

**Reference Books:**

1. Engineering Physics, S O Pillai, Sivakami, New Age International (P) Limited.
2. Physics Volume I & II, Resnick and Halliday, John Wiley and sons, Inc.

## APPLIED PHYSICS LAB

I Year I Semester

L	T	P	C
0	0	3	1.5

### Course Outcomes:

1. Apply optical phenomena to characterize optical sources and components.
2. Determine the energy gap of a semiconductor diode and time constant of RC circuit
3. Describe the electrical characteristics of PN junction diode, photodiode, LED and solar cell.
4. Demonstrate the resonance in mechanical and electrical waves.
5. Identify the magnetic Induction along the axis of current carrying coil.

### List of Experiments

1. Newton's rings: Determination of the radius of curvature of the lens by forming Newton's rings.
2. Diffraction grating: To determine the number of lines per inch of the grating.
3. Dispersive power: To determine the dispersive power of prism by using spectrometer.
4. Single Slit Diffraction using Lasers- Determination of wavelength of a Monochromatic Source (LASER).
5. Energy gap of P-N junction diode: Determination of the energy gap of a semiconductor diode.
6. Photo diode: Study the V-I Characteristics of Photo diode.
7. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
8. Solar cell: Study the V-I Characteristics of Solar cell.
9. Stewart & Gee's experiment - Determination of magnetic Induction along the axis of current carrying coil.
10. LCR Circuit- Determination of the Resonance frequency of forced electrical oscillator.
11. RC- Circuit – Determination of the time constant of RC-circuit.
12. Optical fiber: Determination of the Numerical aperture of Optical fiber.

Note: Any 10 experiments are to be performed.

## BASIC ELECTRICAL ENGINEERING

L	T	P	C
3	0	0	3

### I Year I Semester

#### Course Outcomes:

1. Understand the fundamentals of basic circuit components and their characteristics.
2. Analyze basic electrical circuits with A.C excitation.
3. Understand the concepts of magnetic circuits and transformers.
4. Acquire the basic concepts of electrical motors.
5. Understand the concept of A.C generator and low voltage electrical installations.

#### UNIT- I:

##### Introduction to Electrical Engineering and DC Circuits:

Basic definitions, types of elements, types of sources, Kirchhoff's Laws, resistive networks, inductive networks, series, parallel circuits, Star- Delta and Delta- Star transformation, Network theorems- Superposition, Thevenin's - simple problems.

#### UNIT- II:

##### AC Circuits:

Representation of sinusoidal waveforms, peak, RMS and average values - Elementary treatment of single-phase AC circuits consisting of R, R-L, R-C, R-L-C combinations (series and parallel) - Phase representation, real power, reactive power, apparent power, resonance concept. Three phase balanced circuits, voltage and current relations in star and delta connections.

#### UNIT -III:

##### Magnetic Circuits &Transformers:

**Magnetic circuits:** Magnetic materials, Faraday's laws of Electromagnetic Induction, BH characteristics, Magnetic Circuits - concept of Self & Mutual Inductance.

**Transformers:** Ideal and practical single phase transformer, OC-SC tests, equivalent circuit, losses in transformer, regulation and efficiency - simple problems.

#### UNIT -IV:

##### DC Machines and Induction Motors:

**DC Machines:** Construction, Principle and Operation of DC Motor, Voltage- torque equations - simple problems.

**Three Phase Induction Motor:** Construction, Principle and working of three phase Induction Motor, torque slip characteristics, - simple problems.

**Single Phase Induction Motor:** Single phase Induction Motor construction and working principle, capacitor start – applications.

## **UNIT -V:**

### **AC Generator & Electrical Installation:**

**AC Generator:** Construction, Principle of operation of Synchronous Generator, Pitch Factor- Distribution Factor (or winding factor) - EMF equation – simple problems.

**Electrical Installation:** Fuse, Circuit breakers, difference between fuse and circuit breaker, Types of Batteries, battery backup.

### **Textbooks:**

1. Basic Electrical Engineering, D.P Kothari & I.J Nagrath, Tata McGraw Hill Publishing Company Limited, 2<sup>nd</sup> Edition.
2. Basic Electrical Engineering, T.K. Nagsarkar and M.S. Sukhija, Oxford University Press, 3<sup>rd</sup> Edition.

### **Reference Books:**

1. Circuits and Networks, A.Sudhakar & Shyam Mohan.S, Tata McGraw Hill Publishing Company limited, 5<sup>th</sup> Edition.
2. Basic Electrical Engineering, K.Uma Rao and A.Jayalakshmi, Pearson Publications.
3. Basic Electrical Engineering, D C Kulshreshtha, McGraw Hill Education Private limited, 1<sup>st</sup> Edition.

## BASIC ELECTRICAL ENGINEERING LAB

L	T	P	C
0	0	2	1

### I Year I Semester

#### Course Outcomes:

1. Get an exposure to basic electrical laws.
2. Understand the response of different types of electrical circuits to different excitations.
3. Understand the measurement, calculation and relation between the basic electrical parameters.
4. Understand the performance characteristics of D.C electrical machines.
5. Understand the performance characteristics of A.C electrical machines.

#### List of experiments/ demonstrations:

**Any 5 experiments from Part-A and Part-B should be conducted (Total 10 Experiments)**

#### Part A

1. Verification of Ohms law.
2. Verification of KVL and KCL.
3. Verification of Thevenin's Theorem.
4. Verification of Superposition Theorem.
5. Transient Response of Series R- L and R - C circuits using DC excitation.
6. Determination and Verification of Impedance and Current of RL and RC series circuits.

#### Part B

1. Transient Response of R-L-C Series circuit using DC excitation.
2. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
3. OC & SC Test on Single phase transformer.
4. Brake test on DC shunt motor.
5. Brake test on Three Phase Squirrel cage induction motor.
6. OCC of Three phase alternator.

#### Reference Books:

1. Circuits and Networks, A. Sudhakar & Shyam Mohan. S, Tata McGraw Hill Publishing Company Limited, 5<sup>th</sup> Edition.
2. Basic Electrical Engineering, T.K. Nagsarkar and M.S. Sukhija, Oxford University Press, 3<sup>rd</sup> Edition.
3. Basic Electrical Engineering, D.P Kothari & I.J Nagrath, Tata McGraw Hill Publishing Company Limited, 2<sup>nd</sup> Edition.

## ENGINEERING GRAPHICS & MODELING

I Year I Semester

L	T	P	C
1	0	3	2.5

### Course Outcomes:

1. Understand the concepts of engineering drawing of planes, solids and the CAD drawing software.
2. Applying the principles of engineering graphics while drawing the engineering components.
3. Analyze the sectional views for their configurations.
4. Evaluate the surfaces of solids developed for further processing in the engineering applications.

### UNIT- I:

**Introduction to Engineering Drawing:** Principles of engineering graphics and their significance, usage of drawing instruments, conic sections, including the rectangular hyperbola- General method only. Cycloid, Epicycloid, Hypocycloid. Scales – Plain & Diagonal only.

**Introduction to CAD:** Introduction to CAD software and its importance, standard toolbar/menus and navigation tools used in the software, using basic commands limits ,units, grid, test , move, offset ,mirror, rotate, trim, extend, fillet etc. drawing lines using line command. Drawing spline, ellipse, circle, rectangle etc.. Concept of layers and dimensioning.

### UNIT-II:

**Principles of Orthographic Projections:** Conventions, projections of points, projections of lines (first angle projection) inclined to both planes (traces and midpoint problem to be excluded).

**Implementation of CAD:** Drawing orthographic projections of points and lines using a CAD package.

### UNIT – III:

**Projections of the Planes:** Projections of regular planes inclined to both the planes.

**Projections of Solids:** Projections of regular solids inclined to both the planes (prisms, pyramids, cones and cylinders, change of position method only).

**Implementation in CAD:** Drawing orthographic projection of planes and regular solids using a CAD package.

### UNIT – IV:

**Sections and Sectional Views of Right Angular Solids:** Prism, Cylinder, Pyramid, Cone. Development of surfaces of right regular solids - Prism, Pyramid, Cylinder and Cone.

**Implementation in CAD:** Concept of hatching, drawing sectional views of solids and the development of right regular solids using a CAD package.

### UNIT-V:

**Principles of Isometric projection:** Isometric scale, isometric views, conventions, isometric views of lines, planes, simple solids, conversion of isometric views to orthographic views and vice-versa, conventions.

**Implementation in CAD:** Drawing isometric views of simple solids. Drawing isometric views from giving orthographic views and vice-versa using a CAD package.

**Note: Implementation in CAD (For Internal Evaluation Weightage Only)**

**Textbooks:**

1. Engineering Drawing, Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Charotar Publishing House.

**Reference Books:**

1. Engineering Graphics, Agrawal B. & Agrawal C. M. (2012), TMH Publication, Text book on Engineering Drawing, Narayana, K.L. & P Kannaiah (2008), Scitech Publishers.
2. Engineering Drawing and Computer Graphics, Shah, M.B. & Rana B.C. (2008), Pearson Education.
3. [http://docs.autodesk.com/ACDMAC/2013/ENU/PDFs/acdmac\\_2013\\_users\\_guide.pdf](http://docs.autodesk.com/ACDMAC/2013/ENU/PDFs/acdmac_2013_users_guide.pdf)

## ENGLISH LANGUAGE SKILLS LAB

### I Year I Semester

L	T	P	C
0	0	2	1

#### Course Outcomes:

1. Reproduce speech sounds and improve fluency in language.
2. Understand syllables and consonant clusters for appropriate pronunciation.
3. Exhibit effective professional skills with rhetoric eloquence.
4. Deliver enthusiastic and well-practiced presentation.
5. Learn Task-Based Language Learning (TBLL) through various language learning activities effectively.

#### Exercise- I:

##### CALL Lab:

Introduction to Pronunciation- Speech Sounds, Vowels and Consonants- Practice for Listening.

##### ICS Lab:

Ice-Breaking activity and JAM session.

#### Exercise-II:

##### CALL Lab:

Silent Letters, Consonant Clusters, Homographs.

##### ICS Lab:

Common Everyday Situations: Conversations and Dialogues.

#### Exercise-III:

##### CALL Lab:

Syllables.

##### ICS Lab:

Communication at Workplace, Social and Professional Etiquette.

#### Exercise-IV:

##### CALL Lab:

Word Accent and Stress Shifts.

##### ICS Lab:

Formal Presentations, Visual Aids in Presentations.

#### Exercise-V:

##### CALL Lab:

Intonation, Situational dialogues for practice.

##### ICS Lab:

Interviews, Types of Interviews.

#### Reference Books:

1. A textbook of English Phonetics for Indian Students, T. Balasubramanian, Macmillan Publishers, 2010.
2. Speaking English Effectively, Mohan, Macmillan Publishers, 2010.

## PROGRAMMING FOR PROBLEM SOLVING-I

I Year I Semester

L	T	P	C
2	0	0	2

### Course Outcomes:

1. Design Algorithms and Flowcharts for real world applications using 'C'.
2. Know the usage of various operators in Program development.
3. Design programs involving decision and iteration structures.
4. Apply the concepts code reusability using Functions.
5. Analyze various searching and sorting techniques using Arrays.

### UNIT-I:

**Problem Solving Using Computers:** Introduction, Algorithms, Flowcharts and Pseudo code, Applications of C language.

**Overview of C Language:** Introduction, Salient Features of C Language, Structure of a "C" Program.

**C Language Preliminaries:** Keywords and Identifiers, Constants, Variables, Data Types, and Input/ Output Statements with suitable illustrative "C" Programs.

### UNIT-II:

**Operators:** Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative "C" Programs.

### UNIT-III:

#### Statements in C:

**Conditional/Decision Statements:** if, if-else, Nested if-else, else-if ladder, and Switch-Statement with suitable illustrative "C" Programs.

**Loop Control Statements:** while, do-while and for with suitable illustrative "C" Programs.

### UNIT-IV:

**Functions:** Introduction to Functions, benefits of functions, types of functions, Function calls, return vs exit ( ), Parameter Passing mechanism: Call-by-Value, Recursion, Storage Classes.

### UNIT-V:

**Arrays:** Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Arrays and Functions.

**Searching and Sorting:** Linear Search, Binary Search, Bubble Sort, Insertion Sort.

### Textbooks:

1. COMPUTER SCIENCE: A Structured Programming Approach Using C, B.A.Forouzon and R.F. Gilberg, Third edition, 2016.
2. C and Data Structures, Ashok N. Kamthane, Pearson Education.

**Reference Books:**

1. Problem Solving Using C, M.T. Somashekara, PHI, 2<sup>nd</sup> Edition 2009.
2. Computer Fundamentals and Programming in C, A.K.Sharma, 2nd Edition, University Press.
3. Programming in C 2/e, PradipDey and Manas Ghosh, Oxford University Press, 2nd Edition 2011.
4. The Fundamentals of Computers, Rajaraman V., 4th Edition, Prentice Hall of India, 2006.
5. Programming in C, R S Bichker, University Press, 2012.

## PROGRAMMING FOR PROBLEM SOLVING LAB – I

### I Year I Semester

L	T	P	C
0	0	2	1

#### Course Outcomes:

1. Apply the specification of syntax rules for numerical constants and variables, data types.
2. Know the Usage of various operators and other C constructs.
3. Design programs on decision and control constructs.
4. Develop programs on code reusability using functions.
5. Implement various searching and sorting techniques using arrays.

#### Week 1

Ubuntu and Linux Commands.

#### Week 2

Designing of flowcharts and algorithms using raptor tool.

1. Areas of Polygons.
2. Calculation of Simple and Compound Interest.
3. Swapping of Two numbers with and without temporary variable.
4. Checking whether a number is even or odd.
5. Sum of first 'n' natural numbers.
6. Checking a number whether it is divisible by any given number.
7. Evaluation of mathematical expressions.
8. Programs using scanf ( ) and printf ( ) statements.

#### Week 3

Programs on operators. (Minimum 4 Programs)

#### Week 4, 5 & 6

Programs on Conditional Statements. (Minimum 12 Programs)

#### Week 7, 8 & 9

Programs on Control Statements. (Minimum 12 Programs)

#### Week 10 & 11

Programs on Functions. (Minimum 6 Programs)

#### Week 12

Programs on One Dimensional Arrays. (Minimum 3 Programs)

#### Week 13

Programs on Two Dimensional Arrays. (Minimum 2 Programs)

#### Week 14

Implementation of Linear Search and Binary Search.

#### Week 15

Implementation of Bubble Sort and Insertion Sort.

#### Week 16

Review

**MATHEMATICS - II**  
**(Ordinary Differential Equations and Vector Calculus)**

I Year II Semester

L	T	P	C
3	1	0	4

**Course Outcomes:**

1. Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real-world problems.
2. Solve higher order differential equations and apply the concepts of differential equations to the real-world problems.
3. Find the Laplace Transform of various functions and apply to find the solutions of differential equations.
4. Evaluate the multiple integrals and identify the vector differential operators physically in engineering problems.
5. Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

**UNIT-I:**

**First order Ordinary Differential Equations and their Applications:**

Formation of Differential equations, Differential equations of first order and first degree: exact, linear and Bernoulli, Applications of ODE: Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

**UNIT-II:**

**Higher Order Linear Differential Equations:**

Linear differential equations of second and higher order with constant coefficients, RHS term of the type  $f(x) = e^{ax}, \sin ax, \cos ax$  and  $x^k, e^{ax}V(x), x^kV(x)$ . Method of variation of parameters.

**UNIT-III:**

**Laplace Transforms:**

Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

**UNIT-IV:**

**Multiple Integrals & Vector Differentiation:**

Multiple integrals - double and triple integrals – change of order of integration (Only Cartesian form)- change of variables (Cartesian to Polar for double integral, Cartesian to Spherical for triple integral). Gradient- Divergence- Curl and their related properties - Potential function - Laplacian and second order operators.

**UNIT-V:****Vector Integration:**

Line integral, work done, Surface and Volume integrals. Vector integrals theorems: Green's, Stoke's and Gauss Divergence Theorems (Only Statements & their Verifications).

**Textbooks:**

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Advanced Engineering Mathematics, Jain & Iyengar, Narosa Publications.

**Reference Books:**

1. Calculus and Analytic Geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
3. Advanced Engineering Mathematics (2<sup>nd</sup> Edition), Michael D. Greenberg.

# CHEMISTRY

## I Year II Semester

L	T	P	C
3	1	0	4

### Course Outcomes:

1. Acquire knowledge of atomic, molecular and electronic changes related to conductivity.
2. Apply the various processes of treatment of water for both domestic and industrial purpose.
3. Apply the knowledge of electrode potentials for the protection of metals from corrosion.
4. Analyze the major chemical reactions that are used in the synthesis of compounds.
5. Apply the knowledge of polymers in every day's life.

### UNIT- I:

#### Atomic and Molecular Structure:

Introduction, Concept of atomic and molecular orbitals, LCAO, Molecular orbitals of di-atomic molecules, Molecular orbital energy level diagrams of diatomic molecules ( $N_2$ ,  $O_2$  &  $F_2$ ). Pi-molecular orbitals of butadiene and benzene.

Crystal field theory (CFT): Crystal field theory, Crystal field splitting patterns of transition metal ion d- orbital- tetrahedral, octahedral and square planar geometries.

### UNIT- II:

#### Water Technology:

Hardness of water, expression of hardness ( $CaCO_3$  equivalent), units and types of hardness. Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: characteristics, treatment of water for domestic supply. Desalination of brackish water: reverse osmosis. Alkalinity of water and its determination. Boiler feed water and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (ion –exchange process).

### UNIT- III:

#### Electrochemistry and Corrosion:

Electrode, electrode potential, galvanic cell, cell reactions and cell notation, cell EMF, types of electrodes (Calomel electrode and Quinhydrone electrode), Determination of  $P^H$  using quinhydrone electrode. Nernst equation, Numerical problems.

Batteries: Introduction to cell and battery, Primary (lithium cell) and secondary cells, (lead-Acid cell, and Lithium ion cells). Fuel cells Hydrogen Oxygen fuel cell, advantages and engineering applications of fuel cells. Corrosion: Introduction, types of corrosion: chemical and electrochemical corrosion, factors affecting the rate of corrosion: nature of the metal, position of metal in galvanic series, purity of metal, nature of corrosion product, nature of environment: effect of temperature, effect of pH, humidity. Corrosion control methods: Cathodic protection: sacrificial anode method and impressed current cathode method. Protective coatings: metallic coatings (anodic and cathodic), methods of application on metals, electroplating (of copper), electroless plating (of Ni), organic coatings- paints.

#### **UNIT-IV:**

##### **Stereochemistry:**

Structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity. Conformations of cyclic (cyclohexane) and acyclic systems (Ethane).

##### **Organic Reactions and Synthesis of a Drug Molecule:**

Introduction to reactions involving substitution (SN1 & SN2), addition (addition of HBr to propene, Markownikoff and Anti Markownikoff addition), elimination, oxidation (oxidation of alcohols using  $\text{KMnO}_4$  &  $\text{CrO}_3$ ), reduction (reduction of carbonyl compounds by  $\text{LiAlH}_4$  &  $\text{NaBH}_4$ ). Synthesis of a commonly used drug molecule- paracetamol and Aspirin.

#### **UNIT-V:**

##### **Polymer Chemistry:**

Introduction, classification of polymers, types of polymerization (addition and condensation, mechanisms not included). Plastics- types of plastics -thermoplastics and thermosetting plastics. Preparation, properties and engineering applications of PVC, Teflon and Bakelite. Fibers: Nylon 6, 6 and Terelene (Dacron). Elastomers: natural rubber, structure, vulcanization. Synthetic rubbers: Buna-S, Butyl rubber & Thikol rubber. Conducting polymers: classification and applications.

Biodegradable polymers: Types, examples: Polyhydroxy butyrate (PHB) ,Poly-Hydroxybutyrate-co-b-Hydroxy valerate (PHBV) ,Polyglycolic acid (PGA) , Polylactic acid (PLA) ,Poly ( $\epsilon$ -caprolactone) (PCL). Applications of biodegradable polymers.

##### **Textbooks:**

1. Engineering Chemistry, P.C Jain & Monica Jain, Dhanpat Rai Publications, 2017.
2. Engineering Chemistry, Bharathi Kumari. Y, VGS Publications, 2018.

##### **Reference Books:**

1. March's Advanced Organic Chemistry, Smith, Wiley publications, 2017.
2. Engineering Chemistry, Shiva Sankar, TMH Publications, 2010.

## CHEMISTRY LAB

### I Year II Semester

L	T	P	C
0	0	3	1.5

#### Course Outcomes:

1. Determination of parameters like hardness, alkalinity and chloride content in water.
2. Estimation of rate constant of a reaction from concentration-time relationships.
3. Determination of physical properties like adsorption, surface tension and viscosity.
4. Synthesize a small drug molecule and analyze a salt sample.
5. Calculation of strength of compound using instrumentation techniques.

#### Choice of 10-12 experiments from the following:

1. Estimation of total hardness of water by EDTA method.
2. Determination of alkalinity of water.
3. Determination of chloride content of water.
4. Estimation of HCl by conductometric titration.
5. Estimation of mixture of acids by conductometric titration.
6. Estimation of HCl by potentiometric titration.
7. Estimation of  $\text{Fe}^{2+}$  by potentiometry using  $\text{KMnO}_4$ .
8. Determination of the rate constant of a reaction.
9. Determination of surface tension.
10. Determination of viscosity of a lubricant.
11. Chemical analysis of a salt.
12. Synthesis of a polymer/drug.
13. Adsorption of acetic acid by charcoal.
14. Determination of Saponification /acid value of an oil.

#### Reference Books:

1. Practical Engineering Chemistry, Mukkanti, B.S. Publications, 2010.
2. Volga's Qualitative Inorganic Chemistry, PEAR Publications 2010.

## ENGLISH

### I Year II Semester

L	T	P	C
2	0	0	2

#### Course Outcomes:

1. Infer the importance of scientific discoveries in promoting social responsibilities.
2. Comprehend the given texts and respond appropriately for technical and professional purposes.
3. Communicate confidently and transfer information into various forms of writing.
4. Understand the importance of health and nutrition for a better society.
5. Present various forms of business writing skills for successful careers.

#### UNIT-I:

**'The Raman Effect'** from the prescribed textbook **'English for Engineers'**

**Grammar** : Articles & Prepositions

**Reading** : Reading and Its Importance- Techniques for Effective Reading.

**Writing** : Organizing principles of paragraphs in documents.

**Vocabulary**: The concept of word Formation, synonyms, antonyms, and standard abbreviations.

#### UNIT-II:

**'Ancient Architecture in India'** from the prescribed textbook **'English for Engineers'**

**Reading** : Improving Comprehension Skills – Techniques for good comprehension

**Writing** : Sentence Structures, Use of phrases and clauses in sentences  
Writing Formal Letters - Eg. Letter of Complaint, Letter of Requisition,  
Job Application with Resume.

**Vocabulary**: Root words and acquaintance with prefixes and suffixes from foreign languages in English, to form derivatives

#### UNIT-III:

**'Blue Jeans'** from the prescribed textbook **'English for Engineers'**

**Grammar**: Tenses: Types and uses.

**Reading** : Sub-skills of Reading- Skimming and Scanning

**Writing** : Identifying Common Errors in Writing  
Subject-Verb agreement in number, gender and person  
Information Transfer-Process writing

#### UNIT-IV:

**'What Should You Be Eating'** from the prescribed textbook **'English for Engineers'**

**Reading** : Intensive Reading and Extensive Reading

**Writing** : Nature and Style of Sensible Writing  
Describing & Defining  
Identifying common errors in writing

**UNIT-V:**

**'How a Chinese Billionaire Built Her Fortune'** from the prescribed textbook **'English for Engineers'**

**Vocabulary** : Technical Vocabulary and their usage

**Reading** : Reading Comprehension-Exercises for Practice

**Writing** : Cohesive Devices

Précis Writing

Technical Reports-Introduction, Characteristics of a Report –

Categories of Reports, Formats- Structure of Reports (Manuscript Format) –Types of Reports - Writing a Report.

**Textbooks:**

1. English for Engineers, Sudarshana, N.P. and Savitha, C. Cambridge University Press, 2018.

**Reference Books:**

1. Effective Technical communication, Muhammed Rizvi, TMH, 2008.
2. Advanced English Grammar, Hewings, Cambridge University Press, 2010.

## ENGLISH COMMUNICATION SKILLS LAB

L	T	P	C
0	0	2	1

### I Year II Semester

#### Course Outcomes:

1. Understand the variants in pronunciation.
2. Identify the diverse purposes of listening and speaking.
3. Discuss ideas in diverse communicative settings.
4. Exhibit increased confidence in public speaking.
5. Display critical thinking, problem solving and decision making skills through GD's.

#### Exercise-I:

##### CALL Lab:

Common Indian Variants in Pronunciation – Differences between British and American Pronunciation.

##### ICS Lab:

Spoken vs. Written language-Formal and Informal English- Introducing Oneself and Others.

#### Exercise-II:

##### CALL Lab:

Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.

##### ICS Lab:

Features of Good Conversation – Strategies for Effective Communication Role-Play- Making Requests and Seeking Permissions - Telephone Etiquette.

#### Exercise-III:

##### CALL Lab:

Information Transfer.

##### ICS Lab:

Descriptions-Narrations-Giving Directions and Guidelines-Giving Instructions-Seeking Clarifications-Asking for and Giving Directions-Thanking and Responding-Agreeing and Disagreeing-Seeking and Giving Advice-Making Suggestions.

#### Exercise-IV:

##### CALL Lab:

Past Tense Marker and Plural Marker.

##### ICS Lab:

Public Speaking- Exposure to Structured Talks - Non-verbal Communication- Making a Short Speech – Extempore.

#### Exercise-V:

##### CALL Lab:

Intonation- Sentence Stress -Weak Forms and Strong Forms.

##### ICS Lab:

Group Discussion, Mock Group Discussion sessions

#### Reference Books:

1. A Textbook of English Phonetics for Indian Students, T. Balasubramanian, Macmillan Publishers, 2010.
2. Speaking English Effectively, Mohan, Macmillan Publishers, 2010.

## PROGRAMMING FOR PROBLEM SOLVING-II

L	T	P	C
2	0	0	2

### I Year II Semester

#### Course Outcomes:

1. Identify various string handling functions in 'C'.
2. Develop programs with user defined data types.
3. Use Dynamic memory allocation functions with pointers.
4. Distinguish between Stacks and Queues.
5. Analyze various Dynamic Data Structures.

#### UNIT – I:

Overview of Arrays and Functions.

**Strings:** Introduction to Strings, String I/O, String Operations with and without built-in functions (strlen( ), strcmp( ), strcat( ),strcpy( ) and strrev( )).

#### UNIT -II:

**Structures:** Definition and Initialization of Structures, Accessing structure members, Nested Structures, Array of Structures, Structures and Functions, Unions, typedef, Enumerated Data types.

#### UNIT-III:

**Pointers:** Introduction to Pointers, Pointer Arithmetic, Pointers and Arrays, Pointer to Structure, Pointers and Strings, Parameter passing mechanism: Call by Reference, Pointer to Pointer, Dynamic Memory Allocation.

#### UNIT-IV:

**Introduction to Data Structures:** Lists and Operations, Linear and Nonlinear Data structures.

**Stacks-** Introduction to Stacks, Operations, Implementation of Stack using Arrays.

**Queues-** Introduction to Queues, Operations, Implementation of Queue using Arrays.

#### UNIT-V:

**Linked Lists:** Introduction to Linked List, Operations on Single Linked List (search, Insertion & Deletion).

**Files:** Introduction to Files, File Operations (Open, Close, read & Write).

#### Textbooks:

1. COMPUTER SCIENCE: A Structured Programming Approach Using C, B.A.Forouzon and R.F. Gilberg, Third edition, 2016.
2. C and Data Structures, Ashok N. Kamthane, Pearson Education.

**Reference Books:**

1. Problem Solving Using C, M.T. Somashekara, PHI, 2<sup>nd</sup> Edition 2009.
2. Computer Fundamentals and Programming in C, A.K.Sharma, 2nd Edition, University Press.
3. Programming in C 2/e, PradipDey and Manas Ghosh, Oxford University Press, 2nd Edition 2011.
4. The Fundamentals of Computers, Rajaraman V., 4th Edition, Prentice Hall of India, 2006.
5. Programming in C, R S Bichker, University Press, 2012.

## PROGRAMMING FOR PROBLEM SOLVING LAB – II

L	T	P	C
0	0	2	1

### I Year II Semester

#### Course Outcomes:

1. Build programs on various string handling functions.
2. Develop applications on user defined data types.
3. Apply dynamic memory allocation through pointers.
4. Implement linear data structures through stacks and queues.
5. Create linked list dynamically through stacks and queues.

#### Week 1:

Programs on Arrays and Functions. (Minimum 3 Programs)

#### Week 2 & 3:

Programs on Strings with and without string built-in Functions. (Minimum 6 Programs)

#### Week 4:

Programs on Accessing Structures and Nested Structures. (Minimum 3 Programs)

#### Week 5 & 6 :

Programs on Array of Structures, Structures and Functions. (Minimum 5 Programs)

#### Week 7:

Programs on Unions, typedef and enum. (Minimum 4 Programs)

#### Week 8:

Programs on Pointers, pointer arithmetic, pointer expression, One Dimensional and Two dimensional arrays. (Minimum 4 Programs)

#### Week 9:

Programs on Pointer to structure, Call by Reference, Pointer to Pointer. (Minimum 3 Programs)

#### Week 10:

Programs on Dynamic Memory Allocation Functions. (Minimum 3 Programs)

#### Week 11:

Programs on Stacks and Queues using Arrays.

#### Week 12 & 13:

Programs on Single Linked List.

#### Week 14 & 15:

Programs on File Operations. (Minimum 6 Programs)

#### Week 16:

Review.

## ENGINEERING WORKSHOP

### I Year II Semester

L	T	P	C
0	1	3	2.5

#### Course Outcomes:

1. Understanding the tools and methods of using to fabricate engineering components
2. Applying the measuring techniques to verify the dimensional accuracy
3. Evaluating various methods and trades of workshop in the component building

#### (i) Lectures & videos:

##### Detailed contents

1. Manufacturing Methods- Metal Forming, Machining, Advanced manufacturing methods (2 lectures)
2. CNC machining, Additive manufacturing (2 lectures)
3. Fitting operations & power tools (1 lecture)
4. House wiring (1 lecture)
5. Carpentry (1 lecture)
6. Plastic moulding (1 lecture)
7. Metal casting (1 lecture)
8. Welding (1 Lecture)

#### (ii) Workshop Practice:

##### Detailed contents:

1. Machine shop (Lathe machine)
2. Fitting shop
3. Carpentry
4. House Wiring
5. Welding shop (Arc welding )
6. Tin Smithy

#### Reference Books:

1. Elements of Workshop Technology, Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Manufacturing Engineering and Technology, Kalpakjian S. and Steven S. Schmid, 4th edition, Pearson Education India Edition, 2002.

## COURSE STRUCTURE FOR B.TECH II YEAR

### B. Tech. II Year I Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	BS	Probability and Statistics	3	0	0	3
2	ES	Digital Logic Design	3	0	0	3
3	ES	Electronic Devices Circuits	3	0	0	3
4	PC-1	Data Structures	3	0	0	3
5	PC-2	Mathematical Foundations of Computer Science	3	0	0	3
6	PC-3	Python Programming	3	0	0	3
7	PC Lab	Data Structures & Python Programming Lab	0	0	2	1
8	ES Lab	Digital Logic Design & Electronic Devices Circuits Lab	0	0	2	1
9	MC-1	Gender Sensitization/ Environmental Science	2	0	0	0
<b>Total</b>			<b>20</b>	<b>0</b>	<b>4</b>	<b>20</b>

### B. Tech. II Year II Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-4	Design & Analysis of Algorithms	3	1	0	4
2	PC-5	Computer Organization	3	0	0	3
3	PC-6	Java Programming	3	0	0	3
4	PC-7	Software Engineering	3	0	0	3
5	PC-8	Database Management Systems	3	0	0	3
6	H&S	Professional Communication	1	0	2	2
7	PC Lab	Java Programming Lab	0	0	2	1
8	PC Lab	Database Management Systems Lab	0	0	2	1
9	MC-2	Gender Sensitization/ Environmental Science	2	0	0	0
<b>Total</b>			<b>18</b>	<b>1</b>	<b>6</b>	<b>20</b>

## PROBABILITY AND STATISTICS

II Year I Semester

L	T	P	C
3	0	0	3

### Course Outcomes:

1. To differentiate among random variables involved in the probability models which are useful for all branches of engineering.
2. Derive relationship among variety of performance measures using probability distributions.
3. Acquire elementary knowledge of parametric and non-parametric tests and understand the use of observing state analysis for predicting future conditions.
4. Identify and examine situations that generate using problems and able to solve the tests of ANOVA for classified data.
5. Apply proper measurements, Indicators and techniques of Correlation and regression analysis.

### UNIT-I:

#### Probability and Random Variables:

Introduction to Probability, Random variables- Discrete and Continuous, Expectation, Probability Distribution Function, Mass Function/ Density Function of a Probability Distribution.

### UNIT-II:

#### Probability Distributions:

Fitting of Binomial, Poisson & Normal distributions and their properties (only Statements) Moment Generating Functions of the above three distributions and hence finding the mean and variance.

### UNIT-III:

#### Sampling Theory & Testing of Hypothesis I:

Sampling Distribution-Definition of Sample, Population, and Types of Sampling. Estimation- Point estimation, Interval estimation, Testing of Hypothesis- Null hypothesis Alternative hypothesis, Type I, & Type II errors – critical region confidence interval for mean, testing of hypothesis for single mean and difference between the means for large samples.

Confidence interval for the proportions, Tests of hypothesis for the proportions- single and difference between the proportions for large samples.

### UNIT-IV:

#### Testing of Hypothesis II:

Small Samples - t-distribution, F-Distribution,  $\chi^2$  distribution, ANOVA for one-way classified data.

### UNIT-V:

#### Correlation, Regression & Curve Fitting:

Coefficient of Correlation-Regression coefficients- The lines of Regression the Coefficient of Rank Correlation.

**Curve Fitting-** Fitting a Straight line Second Degree Polynomial- Exponential, Power Curve by Method of Least Squares.

**Text Books:**

1. Probability and Statistics for Engineers, by Richard Arnold Johnson, Irvin Miller and John E Freund, New Delhi Prentice Hall.
2. Introduction to Probability & Statistics for Engineers and Scientists by Sheldon M. Ross

**References Books:**

1. An Introduction to Probability and Statistics, 2ed by Vijay K. Rohatgi, A.K. Md. Ehsanes Saleh, Weley.
2. Probability & Statistics for Engineers & Scientists, Walpole, Myers.et.al, Prentice Hall.
3. Fundamentals of probability and statistics for engineers, T T Soong, Weley.

## DIGITAL LOGIC DESIGN

B.Tech II Year I Semester

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Understand various number systems, conversions, range and error detecting and correcting codes and their significance.
2. Evaluate the minimization of logic gates using Boolean algebraic principles and k-maps.
3. Design various simple and complex combinational circuits with real time applications.
4. Analyze the basic principles behind Flip flops & the design of sequential circuits with real time applications.
5. Illustrate various types of memory devices and their design.

### UNIT -- I:

**Number Systems:** Binary, Octal, Hex Decimal, and Conversions, range; Binary additions and subtractions (using 1c, and 2c), concept of overflow; representations of negative numbers using 1's and 2's complement and range; BCD numbers: Representation of 8421, 2421, Ex-3, Gray and self complementary codes; additions and subtractions on 8421 codes; Error detecting **codes:** even, odd parity, hamming codes; Error correcting codes: hamming codes, block parity codes; Floating point representation.

### UNIT --II:

Boolean Algebra and Digital Logic GATES, Basic Boolean laws and properties; Boolean functions; canonical and standard forms (SOP, POS); Gate minimization using three and four variable K-Map's with and without don't cares. Encoders, Decoders, Multiplexers, D Multiplexers;

### UNIT -- III:

Definition of combinational circuits, design procedure for half, full, decimal (8421) adders and subtractors; Combinational Circuit Design for BCD code converters;

### UNIT -- IV:

Sequential circuits, latches, Flip Flops; Analysis of clocked sequential circuits, State Reduction and Assignment, Register, Ripple Counters, Synchronous Counters, Other Counters.

### UNIT -- V:

Types of Memory – Main memory – random access memory, ROM, Types of ROM; Decoder and RAM interface: Address lines, data lines, chip select signal; Design of large memories using small memories, using decoders; problems in memory design; Cache Memory- design issues, hit and miss ratio related problems; Associative and Auxiliary memory;

### TEXT BOOKS:

1. M. Morris Mano, Digital Design, Third Edition, Pearson Education/PHI, 2001.
2. Roth, Fundamentals of Logic Design, Fifth Edition, Thomson, 2004.

**REFERENCE BOOKS:**

1. John F. Wakerly, Digital Design: Principles and Practices, 4th Edition, Pearson/ Prentice Hall, 2005.
2. Malvino& Leach, Digital Principles and Applications, Seventh Edition, Tata McGraw-Hill Edu, 2010.
3. A.K. Maini, Digital Electronics, Principles and Integrated Circuits, 1st Edition, Wiley India Publ., 2007.
4. M. Morris Mano and Michael D. Ciletti, Digital Design, 5th Edition, Pearson Education, 2012.

## ELECTRONIC DEVICES AND CIRCUITS

B.Tech II Year I Semester

L	T	P	C
3	0	0	3

### Course Outcomes:

Demonstrate the concepts of semiconductor theory.

1. Interpret the characteristics of different semiconductor devices with its applications.
2. Apply different biasing techniques of transistors for amplification.
3. Analyze transistor amplifiers using small signal model.

### UNIT - I

**Diode:** PN junction Diode – Characteristics, Current equation, Temperature dependence, Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances,

**Diode Applications:** Rectifier Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive Filter, Clippers, Clampers.

### UNIT - II

**Bipolar Junction Transistor (BJT):** Principle of Operation and characteristics Common Emitter, Common Base, Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybrid parameter model, Determination of h-parameters from transistor characteristics, Conversion of h-parameters.

### UNIT - III

**Transistor Biasing and Stabilization:** Bias Stability, Fixed Bias, Collector to Base bias, Self Bias, Bias compensation using Diodes and Transistors.

**Analysis and Design of Small Signal Low Frequency BJT Amplifiers:** Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

### UNIT - IV

**Junction Field Effect Transistor:** Construction, Principle of Operation, Pinch-Off voltage, Volt-Ampere characteristic, comparison of BJT and FET, Biasing of FET, FET as voltage variable resistor, MOSFET construction and its characteristics in enhancement and depletion modes.

### UNIT - V

**FET Amplifiers:** Small Signal Model, Analysis of CS, CD, CG JFET Amplifiers. Basic Concepts of MOSFET Amplifiers.

**Special Purpose Devices:** Zener Diode - Characteristics, Voltage Regulator; Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.

### TEXT BOOKS:

1. Millman and Halkias, " Electronic devices and circuits", 2nd Edition, McGraw Hill Publication, 2007
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI.
3. Jacob Millman, Herbert Taub and Mothiki S. Prakash Rao, Millman's Pulse, Digital and Switching Waveforms, Tata McGraw-Hill, 3rd Edition, 2008.

**REFERENCES:**

1. Electronic Devices and Circuits – S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, 2 Ed., 2008, TMH.
2. Integrated Electronics – J. Millman and Christos C. Halkias, 1991 Ed., 2008, TMH.
3. Electronic Devices and Circuits-J.B Gupta
4. Electronic Devices and Circuits - K. Lal Kishore, 2 Ed., 2005, BSP
5. A. Anand Kumar, Pulse and Digital Circuits, 2005, PHI.

## DATA STRUCTURES

B.Tech II Year I Semester

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Understand the concepts of Stacks and Queues with their applications.
2. Analyze various operations on Binary trees.
3. Examine of various concepts of binary trees with real time applications.
4. Analyze the shortest path algorithm on graph data structures.
5. Outline the concepts of hashing, collision and its resolution methods using hash functions.

### UNIT -I

**Data Structures:** Introduction, Types of data structures, Static and Dynamic representation of data structure and comparison. **Stacks:** Stacks definition, operations on stacks, Representation and evaluation of expressions using Infix, Prefix and Postfix, Algorithms for conversions and evaluations of expressions from infix to prefix and postfix using stack.

**Queues:** types of Queues- Circular Queue, Deque and operations.

### UNIT - II

**Trees:** Basic terminologies, Types of Binary Tree: Complete and Full Binary Tree, Extended Binary Trees, Representation of Trees using Arrays and Linked lists (advantages and disadvantages), Tree Traversal, Representation of Algebraic expressions, Threaded Binary Trees.

### UNIT - III

**Advanced concepts on trees:** Representation and Creation of Binary Search Trees (BST), Operations on BST, Representation and advantages of AVL Trees, algorithms & operations on AVL Trees, Multi-way trees, Definition and advantages of B-trees, B+ Trees, Red-Black Trees.

### UNIT - IV

**Graphs-**Basic terminology, Representation of graphs: sequential representation, Adjacency, Path Matrix) Linked representation. Graph Traversals-Breadth First Search, Depth First Search algorithms. Spanning Tree, Minimum Spanning Trees- Prim's Algorithm, Kruskals Algorithm, Dijkstra Algorithm.

### UNIT -V

**Hashing:** General Idea, Hash Functions, collisions, Collision avoidance techniques, Separate Chaining, Open Addressing-Linear probing, Quadratic Probing, Double Hashing, Rehashing, Extensible Hashing, Implementation of Dictionaries

**Text Books:**

1. Data Structures Using C, Second Edition Reema Thereja OXFORD higher Education
2. Data Structures, A Pseudo code Approach with C, Richard F.Gillberg&Behrouz A. Forouzan, Cengage Learning, India Edition, Second Edition, 2005.

**Reference Books:**

1. Data Structures, Seymour Lipschutz, Schaum's Outlines, Tata McGraw-Hill, Special Second Edition.
2. Data Structures Using C and C++||, Aaron M. Tenenbaum, YedidyahLangsam and Moshe J. Augenstein PHI Learning Private Limited, DelhiIndia.
3. Fundamentals of Data Structures||, Horowitz and Sahani, *Galgotia Publications* Pvt Ltd Delhi India.
4. Data Structure Using C, A.K. Sharma, Pearson EducationIndia.

# MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

## II Year - I Semester

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Analyze elementary mathematical arguments.
2. Apply discrete mathematics problems that involve computing permutations and combinations of a set.
3. Analyze problems involving recurrence relations & generating functions.
4. Demonstrate various operations on discrete structures.
5. Apply graph theory models to solve the problems of networks.

### UNIT - I

**Foundations:** Basics, Sets, Statements, Connectives, Normal Forms, Fundamentals of Logic, Logical Inferences, First order logic and other methods of Proof, Rules of Inference for Quantified Propositions, Automatic Theorem Proving.

### UNIT - II

**Elementary Combinatorics:** Basics of Counting, Combinations and Permutations, Enumerating Combinations and Permutations with & without repetitions, constrained repetitions, Pigeon hole principle, Inclusion-Exclusion principle.

### UNIT - III

**Recurrence Relations:** Generating Functions, Calculating coefficient of Generating Function, Solving Recurrence relations by substitution method and Generating Functions, The Method of Characteristic Roots, Solutions to inhomogeneous recurrence relations, Binomial Theorem.

### UNIT - IV

**Relations and Digraphs:** Relations and Directed Graphs, Special Properties of Binary Relations, Equivalence Relations, Ordering Relations, Lattice, Paths and Closures, Directed Graphs and adjacency matrices.

### UNIT - V

**Graphs** - Basic Concepts, Isomorphism and Sub-graphs, Trees and Their Properties, Spanning Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

### Text Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians by Joel L. Mott, Abraham Kandel, Theodore P. Baker, Second Edition, PHI, 2009.
2. Discrete Mathematical Structures with Applications to Computer Science, Tremblay J P and Manohar R, Tata McGraw Hill Publishing Company Limited, New Delhi, 2007.

**Reference Books:**

1. Discrete Mathematics R.K.Bisht, H.S.Dhami, OXFORD Higher Education.
2. Discrete Mathematics and its Applicationsll, Kenneth H Rosen, Tata McGraw Hill Publishing Company Limited, New Delhi, Sixth Edition, 2007.

# PYTHON PROGRAMMING

**B.Tech II Year I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

## **Course Outcomes:**

1. Identify the differences between scripts and programs
2. Solve the problems based on decision control statements
3. Develop programs on functions and data structures.
4. Demonstrate the programs on string operations
5. Analyze the object oriented techniques for solving real time problems

## **Unit – I**

### **Introduction to Python:**

Features of Python Language, Data Types, Operators, Expressions, Control Statement, Standard I/O Operations.

### **Functions and Modules:**

Declaration and Definition Function Calling, More on Defining Functions, Recursive Functions, Modules, Packages in Python, Doc Strings, Built-in Functions.

## **Unit – II**

### **Strings and Regular Expressions:**

String Operations, Built-in String Methods and Functions, Comparing Strings, function in Regular Expression.

**Sequence:** List, Tuples, Dictionaries.

## **Unit – III**

### **Introduction to Object Oriented Programming:**

Features of Object Oriented Programming, Classes and Objects, Class Method and Self Argument. The `__Init__` Method, Class Variables and Object Variables, The `_Del__` Method, Public and Private Data Members, Private Methods, Built-in Functions to Check, Get, Set and Delete Class Attributes, Garbage Collection (Destroying Objects).

## **Unit – IV**

### **Inheritance:**

Inheriting Classes in Python: Types of Inheritance; Composition/Containership, Abstract Classes, Meta class.

### **Operator Overloading:**

Introduction, Implementing Operator Overloading, Overriding Methods.

## **Unit – V**

### **File Handling**

Introduction, Types of Files, Reading and Writing Files, File Positions, Renaming and Deleting Files, Listing files of directory.

### **Exception Handling:**

Introduction, Handling Exception, Multiple Except Blocks and Multiple Exceptions, Finally Block. Case Study: Data Science.

**Text Books**

1. "ReemaThareja", Python Programming using Problem Solving Approach, First Edition, Oxford Higher Education.
2. James Payne, Beginning Python using Python 2.6 and Python 3

**Reference Books**

1. Kenneth A.Lambert, Fundamentals of Python
2. Charles Dierach, Introduction to Computer Science using Python

## DATA STRUCTURES & PYTHON PROGRAMMING LAB

II Year - I Sem

L	T	P	C
0	0	2	1

### Course Outcomes:

1. Develop the programs on stacks, trees and its applications.
2. Design and implementation of programs on BST and Graph Traversals.
3. Apply Hashing techniques in real world applications
4. Implement oops concepts in Python
5. Develop Programs on modules and Packages
6. Design Programs that handle errors

### Part-A

1. C Programs to illustrate concepts of arrays, structures, unions and enumerated data types.
2. Program to convert infix to postfix notation
3. Program to evaluate postfix notations
4. Program to illustrate tree traversals
  - a) In order
  - b) Pre order
  - c) Postorder
5. Program to illustrate insertion, deletion and searching in Binary Search Tree.
6. Program to illustrate Insertion, deletion and Rotation on AVL Trees.
7. Program to illustrate Graph traversals
  - a) Breadth First Search
  - b) Depth First Search
8. Program to implement hash table using linear and quadratic probing.

### Part- B

#### Exercise 1

- a) Installation and Environment setup of python.
- b) Write a program to demonstrate the use of basic Data Types
- c) Write a program to demonstrate the Operators and Expressions
- d) Write a program to demonstrate the Functions and parameter passing Techniques.

#### Exercise 2

- a) Write a program to compute distance between two points taking input from the user (Pythagorean theorem)
- b) Write a program to convert a given decimal number to other base systems

#### Exercise 3

- a) Write a Program to implement
  - i. Packages
  - ii. Modules
  - iii. Built-in Functions
- b) Write a Program to implement
  - i. List
  - ii. Tuple
  - iii. Dictionaries
- c) Programs on Stings, String Operations and Regular Expressions

**Exercise 4**

- a) Write a Program to implement Class and Object
- b) Write a Program to implement Static and Instance methods, and Abstract Classes.

**Exercise 5**

- a) Write a program to implement Inheritance
- b) Write a program to implement Polymorphism

**Exercise 6**

- a) Write a program to implement Files
- b) Write a program to Implement Exception Handling.

## DIGITAL LOGIC DESIGN & ELECTRONIC DEVICES & CIRCUITS LABORATORY

L	T	P	C
0	0	2	1

II Year - I Sem

### Course Outcomes:

1. Identify and use the basic components and instruments in electronics laboratory
2. Outline the characteristics of different semiconductor devices.
3. Design and construct the combinational and sequential circuits using digital IC's

### Minimum 6 experiments from each part:

#### List of Experiments (DLD)

1. Verify the functionality of logic gates & Flip-flops
2. Verification of De-Morgan's laws
3. Implementation and verification of full adder and full subtractor using logic gates.
4. Implementation and verification of 4X1 multiplexer & Demultiplexer using logic gates.
5. Implementation and verification of 2X4 Decoder and 1X4 De-multiplexer using logic gates.
6. Implementation of given function and verification using IC 74LS151 (8X1 multiplexer).
7. To design and verify the 4-bit ripple counter & decade counter
8. Verify the functionality of 4-bit magnitude comparator using IC 74LS85.
9. Verify the functionality of Universal Shift Register IC 74LS194/195

#### List of Experiments (EDC)

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Half Wave Rectifier with & without filters.
4. Full Wave Rectifier with & without filters.
5. Input & Output Characteristics of Transistor in CB Configuration and h-parameter calculations.
6. Input & Output Characteristics of Transistor in CE Configuration and h-parameter calculations.
7. FET characteristics.
8. UJT Characteristics

## DESIGN AND ANALYSIS OF ALGORITHMS

II Year - II Sem

L	T	P	C
3	1	0	4

### Course Outcomes:

1. Analyze the efficiency of algorithms
2. Develop algorithms divide & conquer, greedy and related problems
3. Examine the performance of Dynamic programming
4. Explain performance of algorithm using Backtracking
5. Analyze NP-Hard and NP-Complete problems

### UNIT I

**Introduction:** Algorithm, Pseudo code for expressing algorithms, Performance Analysis- Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Disjoint Sets- disjoint set operations, union and find operations.

**Divide and conquer:** General method, applications - Binary search, Quick sort, Merge sort, Stassen's matrix multiplication.

### UNIT II

**Graphs:** Breadth First Search, Depth First Search, spanning trees, connected and bi-connected components

**Greedy method:** General method, Applications- Optimal storage on Tapes, Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

### UNIT III

**Dynamic Programming:** General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

### UNIT IV

**Backtracking:** General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

**Branch and Bound:** General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

## **UNIT-V**

**Lower Bound Theory: Comparison Trees, NP-Hard and NP-Complete problems:** Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Satisfiability problem, Clique Decision Problem (CDP), Node cover decision problem.

### **Text Books:**

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharan, Galgotia publications Pvt. Ltd.
2. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearsoneducation.

### **References:**

1. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, McGrawHill.
2. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearsoneducation.

# COMPUTER ORGANIZATION

L	T	P	C
3	0	0	3

II Year - II Sem

## Course outcomes:

1. Understand the basic organization of computer and different instruction formats and addressing modes.
2. Outline the concepts of 8086 microprocessor and arithmetic operations.
3. Make use of micro processor instructions to write simple programs in assembly language.
4. Classify various modes of data transfers.
5. Outline various inter connection structures of multiprocessors.

## UNIT - I

**Introduction to computer organization-** Digital Computers, Instruction codes, stored program organization, computer registers, computer instructions, instruction cycle, types of instruction formats (Zero, one, two and three address), RISC instructions.

**Addressing modes:** mode field, implied, immediate register, register direct, register indirect, auto increment, decrement, indexed, relative, base address mode, Numerical examples and problems.

## UNIT - II

**CPU-Organization:** 8086 – CPU – Block diagram and pin diagram, concept of pipelining, minimum and maximum mode, segment register and generation of 20 bit address, concept of address, data, control and systems bus, Types of flags.

## UNIT - III

**CPU and Main Memory interface-** Programming the basic computer – Machine Assembly Languages.  
**Assembler:** basic assembly language instructions (ADD, SUB, LOAD, STORE, MOV, CMP, JUMP).

**Micro-programmed control:** control memory, address sequencing, micro program example and design of control unit.

## UNIT - IV

**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

**I/O interface:** I/O Bus and Interface modules, I/O versus Memory Bus.

**Modes of Transfer:** Example of programmed I/O, interrupt-initiated I/O, software considerations. Daisy-Chaining priority.

**DMA:** DMA Controller, DMA Transfer, Intel 8089 IOP.

## UNIT -V

**Multi Processors:** Characteristics of Multi Processor; **Interconnection structures:** Time shared common bus, multipoint memory, crossbar switch, multi-stage switching network;

**Introduction to Flynn's classification:** SISD, SIMD, MISD, MIMD (Introduction).

**Text Books:**

1. Computer System Architecture – M.Morris Mano, Third Edition, Pearson/PHI, 2011.
2. Microprocessor and Interfacing – Douglas V Hall, Second Edition, TATA McGraw Hill, 2006.

**Reference Books:**

1. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, V Edition,McGraw Hill.
2. Computer Organization and Architecture – William Stallings, 6th Edn.Pearson/PHI.

# JAVA PROGRAMMING

II Year - II Sem

L	T	P	C
3	0	0	3

## Course Outcomes:

1. Understand OOP concepts to apply basic Java constructs.
2. Analyze different forms of inheritance and usage of Exception Handling
3. Understand the different kinds of file I/O/Multithreading in complex Java programs, and usage of Container classes
4. Contrast different GUI layouts and design GUI applications
5. Construct a full-fledged Java GUI application, and Applet with database connectivity

## UNIT - I

**Java Basics** History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program

**Fundamentals of Object Oriented Programming:** Object-Oriented Paradigm, Basic Concepts of Object Oriented Programming, Applications of OOP. Concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, static keyword, nested and inner classes, Strings, Object class.

## UNIT- II

**Inheritance & Polymorphism:** Introduction, Forms of Inheritance - specialization, specification, construction, extension, limitation, combination, Member access rules, super keyword, polymorphism-method overriding, abstract classes, final keyword.

**Interfaces and Packages:** Introduction to Interfaces, differences between abstract classes and interfaces, multiple inheritance through interfaces, Creating and accessing a package, Understanding CLASSPATH, importing packages.

**Exception handling** - Concepts of exception handling, exception hierarchy, built in exceptions, usage of try, catch, finally, throw, and throws, creating own exception sub classes.

## UNIT - III

**Files:** Introduction to I/O Streams: Byte Streams, Character Streams. File I/O.

**Multi threading:** Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication.

**Java.util package-** Collection Interfaces: List, Map, Set. The Collection classes: LinkedList, HashMap, TreeSet, StringTokenizer, Date, Random, Scanner.

## **UNIT - IV**

**AWT:** Class hierarchy, Component, Container, Panel, Window, Frame, Graphics.

**AWT controls:** Labels, Button, Scrollbar, Text Components, Checkbox, CheckboxGroup, Choice, List, Panes  
ScrollPane, Dialog and MenuBar.

**Event Handling:** Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapterclasses.

## **UNIT - V**

**Layout Manager** – Border, Grid, Flow, Card and Gridbag.

**Applets** – Concepts of Applets, life cycle of an applet, creating applets, passing parameters to applets.

**JDBC Connectivity:** JDBC Type 1 to 4 Drivers, connection establishment, Query Execution.

### **Text Books:**

1. Java- the complete reference, Seventh edition, Herbert Schildt, Tata McGraw Hill.
2. Database Programming with JDBC & JAVA, Second Edition, George Reese, O'Reilly Media.

### **Reference Books:**

1. Programming in JAVA, Second Edition, OXFORD Higher Education.
2. Thinking in Java Fourth Edition, Bruce Eckel
3. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
4. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

# SOFTWARE ENGINEERING

II Year - II Sem

L	T	P	C
3	0	0	3

## Course Outcomes:

1. Outline the framework activities for a given project.
2. Examine Right process model for a given project.
3. Analyze various system models for a given Context.
4. Understand various testing techniques for a given project.
5. Identify various risks in project development.

## UNIT - I

**Introduction to Software Engineering:** The evolving role of software, Changing Nature of Software, Software myths.

**A Generic view of process:** Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), personal and team process models.

## UNIT - II

**Process Models:** The waterfall model, Incremental process models, Evolutionary process model, Unified process model, agile process model.

**Software Requirements:** Functional and non-functional requirements, the software requirements document.

**Requirements engineering process:** Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

## UNIT - III

**System models:** Context Models, Behavioral models, Data models, Object models, structured methods.

**Design Engineering:** Design process and Design quality, Design concepts, the design model, Modeling component level design: design class based components, conducting component level design.

**User interface design:** Golden rules.

## UNIT - IV

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing techniques, Validation testing, System testing.

**Product Metrics:** Software Quality, Metrics for Analysis Model- function based metrics, Metrics for Design Model-object oriented metrics, class oriented metrics, component design metrics, Metrics for source code, Metrics for Testing, Metrics for maintenance.

## UNIT - V

**Risk Management:** Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

**Quality Management:** Quality concepts, Software Reviews, Formal technical reviews, Software reliability, The ISO 9000 quality standards.

## Text Books:

1. Software Engineering, A practitioner's Approach-Roger S. Pressman, 6<sup>th</sup> edition McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.

## References Books:

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
4. Software Engineering principles and practice Waman S Jawadkar, the McGraw Hill Companies.

# DATABASE MANGEMENT SYSTEMS

II Year - II Sem

L	T	P	C
3	0	0	3

## Course Outcomes:

1. Understand the concepts of Entity-Relationship Model for enterprise level databases.
2. Analyze the database and provide restricted access to different users of database.
3. Understand various Normal forms to carry out schema refinement.
4. Analyze various Concurrency control protocols.
5. Examine working principles of Recovery algorithms

## UNIT-I

**Introduction to Database System Concepts:** Database-System Applications, Purpose of Database Systems, View, Database Language, Database Architecture, Database Users and Administrators.

**Introduction to the Relation Models and Database Design using ER Model:** Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Feature, Structure of relational databases , database schema , keys, schema diagrams.

## UNIT-II

**Introduction to SQL:** Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions Nested Sub queries, Modification of the Database.

**Intermediate and Advanced SQL:** Join Expressions, Views, Integrity Constraints, SQL Data Types, Authorization. Functions and Procedures, Triggers.

## UNIT-III

**Formal Relational Query Languages:** The Relational operations, The Tuple Relational Calculus, The Domain Relational Calculus.

**Relational Database Design:** Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Decomposition Using Multi valued Dependencies, BCNF.

## UNIT-IV

**Transactions:** Transaction Concept, a Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity.

**Concurrency Control:** Lock-Based Protocols, Deadlock Handling, Timestamp- Based Protocols.

## UNIT-V

**Recovery System:** Failure Classification, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, ARIES, Remote Backup Systems.

## Text Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6<sup>th</sup> Edition, Tata McGraw-Hill.
2. Raghu Rama Kirshna, Johannes Gehrke, Database Management System, 3<sup>rd</sup> Edition, Tata McGraw Hill.

**Reference Books:**

1. PeterRob&CarlosCoronel DatabaseSystemConceptsCengageLearning.
2. RamezElmasri, ShamkanthB. Navrate–Fundamentalsof Database Systems –7<sup>th</sup>Edition, Pearson Education.
3. C.J. Date Introduction to Database Systems PearsonEducation

# PROFESSIONAL COMMUNICATION

L	T	P	C
2	0	0	2

II Year - I Sem

## Course Outcomes

1. Acquire enhanced personality
2. Exhibit appropriate professional etiquette
3. Practice team building with strong communication skills
4. Develop problem solving skills and decision-making
5. Demonstrate effective presentation skills

### UNIT-I:

#### Self-Appraisal

Self Introspection/ Self Retrospection  
Introducing self & others  
Goal setting  
SWOT Analysis,

### UNIT- II:

#### Professional Etiquette

Etiquette-Telephone Etiquette- Netiquette  
Email, Social Network  
Behavioural Traits  
Case study

### UNIT-III:

#### Team Building

Leadership skills-Case Studies  
Team Essentials  
Negotiation Skills  
Group Discussion-Functional Aspects

### UNIT-IV:

#### Logical Thinking and Analytical Reasoning

Decision Making  
Problem Solving  
Conflict management  
Case Study

### UNIT-V:

#### Presentation Skills

Poster Presentation  
Oral Presentation-Individual Presentation, Team Presentation, Thematic Presentation

## Text Book

1. Ashrif Rizvi. Effective Technical Communication, Tata Mc Gahill, 2011.

## Reference Books

1. Speaking and Writing for Effective Business, Soundaraja, MACMILLAN, 2010.
2. English for Professional Success, Hector Sanchez, THOMSON, 2010.

## JAVA PROGRAMMING LAB

II Year - II Sem

L	T	P	C
0	0	2	1

### Course Outcomes:

1. Apply basic Java constructs and OOP to solve mathematical problems.
2. Apply Inheritance in Java programs and Analyze Exception Handling code
3. Implement File input/output and multithreading concepts in advanced Java programs.
4. Design different GUI applications using GUI layouts.
5. Apply Applet development and Database connectivity to build GUI applications

### Week 1 & 2

1. Write a program to find total, average of given two numbers by using function with command-line arguments, static datamembers.
2. Write a program to illustrate class and objects.
3. Write a program to illustrate method & constructor overloading.
4. Write a program to illustrate parameter passing using objects.
5. Write a program to illustrate ArrayManipulation.

### Week 3

6. Write a program to illustrate different types of inheritances.
7. Write a java program to illustrate Methodoverriding.
8. Write a java program to demonstrate the concept ofpolymorphism (Dynamic Method Dispatch).
9. Write a program to demonstrate finalkeyword.

### Week 4 & 5

10. Write a program to illustrate the use of creation ofpackages.
11. Write a java program to handle the situation of exceptionhandling using multiple catch blocks.
12. Write a program to implement the concept of User definedExceptions.

### Week 6 & 7

13. Write a program to illustrate Multithreading andMultitasking.
14. Write a program to illustrate threadpriorities.
15. Write a program to illustrateSynchronization

### Week 8 & 9:

16. Write a program to implement StringTokenizer.
17. Write a program to read one line at a time, and write it to another file.

### Week 10 & 11

18. Write a program to illustrate Event Handling (keyboard, Mouse events)
19. Write a program to illustrate applet life cycle and parameter passing.

### Week 12:

20. Write a program to develop a calculator application using AWT.

### Week 13

21. Write a program to illustrateJDBC.

## DATABASE MANAGEMENT SYSTEMS LAB

II Year - II Sem

L	T	P	C
0	0	2	1

### Course Outcomes:

1. Use the SQL commands such as DDL, DML and DCL statements to perform different operations.
2. Apply various Integrity constraints on the database tables.
3. Apply Joins to retrieve the information from multiple tables.
4. Design different Views of tables for different users.
5. Design and implement a PL/SQL program which includes procedures, functions, cursors and triggers.

### 1. Database Schema for a customer-sale scenario

Customer (Cust id : integer, cust\_name: string)

Item (item id: integer, item\_name: string, price: integer)

Sale (bill no: integer, bill\_date: date, cust\_id: integer, item\_id: integer, qty sold: integer)

For the above schema, perform the following—

- a. Create the tables with the appropriate integrity constraints
- b. Insert around 10 records in each of the tables
- c. List all the bills for the current date with the customer names and item numbers
- d. List the total Bill details with the quantity sold, price of the item and the final amount
- e. List the details of the customer who have bought a product which has a price > 200
- f. Give a count of how many products have been bought by each customer
- g. Give a list of products bought by a customer having cust\_id as 5
- h. List the item details which are sold as of today
- i. Create a view which lists out the bill\_no, bill\_date, cust\_id, item\_id, price, qty\_sold, amount. Create a view which lists the daily sales date wise for the last one week

### 2. Database Schema for a Student Library scenario

Student (Stud no : integer, Stud\_name: string)

Membership (Mem no: integer, Stud no: integer)

Book (book no: integer, book\_name: string, author: string)

Iss\_rec (iss no: integer, iss\_date: date, Mem no: integer, book no: integer)

For the above schema, perform the following

- a. Create the tables with the appropriate integrity constraints
- b. Insert around 10 records in each of the tables
- c. List all the student names with their membership numbers
- d. List all the issues for the current date with student and Book names
- e. List the details of students who borrowed book whose author is CJD DATE
- f. Give a count of how many books have been bought by each student
- g. Give a list of books taken by student with stud\_no as 5
- h. List the book details which are issued as of today
- i. Create a view which lists out the iss\_no, iss\_date, stud\_name, bookname
- j. Create a view which lists the daily issues-date wise for the last one week

### 3. Database Schema for an Employee-payscenario

employee (**emp\_id**:integer,emp\_name:string)

department (**dept\_id**:integer,dept\_name:string)

paydetails(**emp\_id** : integer,**dept\_id**: integer, basic: integer, deductions: integer, additions: integer, DOJ: date)

payroll (**emp\_id** : integer, pay\_date: date)

For the above schema, perform the following

- a. Create the tables with the appropriate integrityconstraints
- b. Insert around 10 records in each of the tables
- c. List the employee details departmentwise
- d. List all the employee names who joined after particular date
- e. List the details of employees whose basic salary is between 10,000 and 20,000
- f. Give a count of how many employees are working in each department
- g. Give a names of the employees whose net salary > 10,000
- h. List the details for an employee\_id=5
- i. Create a view which lists out the emp\_name, department, basic, deductions, net salary
- j. Create a view which lists the emp\_name and his net salary

### 4. Database Schema for a Video Library scenario

Customer(**cust\_no**: integer,cust\_name: string)

Membership(**Mem\_no**: integer, cust\_no: integer)

Cassette(**cass\_no**:integer, cass\_name:string, Language:String)

Iss\_rec(**iss\_no**: integer, iss\_date: date, **mem\_no**: integer, **cass\_no**: integer)

For the above schema, perform the following

- a. Create the tables with the appropriate integrityconstraints
- b. Insert around 10 records in each of the tables
- c. List all the customer names with their membership numbers
- d. List all the issues for the current date with the customer names and cassette names
- e. List the details of the customer who has borrowed the cassette whose title is The Legend II
- f. Give a count of how many cassettes have been borrowed by each customer
- g. Give a list of book which has been taken by the student with mem\_no as 5
- h. List the cassettes issues for today
- i. Create a view which lists out the iss\_no, iss\_date, cust\_name, cass\_name
- j. Create a view which lists issues-date wise for the last one week.

## 5. Database Schema for a student-Lab scenario

Student(**stud\_no: integer**, stud\_name: string, **class: string**)

Class(**class: string, descrip:string**)

Lab(**mach\_no: integer**, Lab no: integer, description: String)

Allotment(**Stud\_no: Integer, mach\_no: integer, day of week: string**)

For the above schema, perform the following

- a. Create the tables with the appropriate integrity constraints
  - b. Insert around 10 records in each of the tables
  - c. List all the machine allotments with the student names, lab and machine numbers
  - d. List the total number of lab allotments daywise
  - e. Give a count of how many machines have been allocated to the 'IT' class
  - f. Give a machine allotment details of the stud\_no 5 with his personal and class details
  - g. Count for how many machines have been allocated in **Lab\_no 1** for the day of the week as -Monday
  - h. How many students class wise have allocated machines in the labs
  - i. Create a view which lists out the stud\_no, stud\_name, mach\_no, lab\_no, day of week
  - j. Create a view which lists the machine allotment details for -Thursday.
6. Create a cursor, which displays all employee numbers and names from the EMP table.
  7. Create a cursor, which updates the salaries of all employees as per the given data.
  8. Create a cursor, which displays names of employees having salary > 50000.
  9. Create a procedure to find the reverse of a given number
  10. Create a procedure to update the salaries of all employees as per the given data
  11. Create a procedure to demonstrate IN, OUT and INOUT parameters
  12. Create a function to check whether a given string is a palindrome or not.
  13. Create a function to find the sum of salaries of all employees working in department number 10.
  14. Create a trigger before/after update on employee table for each row/statement.
  15. Create a trigger before/after delete on employee table for each row/statement.
  16. Create a trigger before/after insert on employee table for each row/statement.

## **GENDER SENSITIZATION**

**II Year - I Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Course Outcomes:**

1. To develop awareness about gender discrimination and take measurable steps to counter it.
2. To identify the basic dimensions of biological, sociological, psychological and legal aspects of gender.
3. To acquire knowledge about gendered division of labour in relation to politics and economics.
4. To prepare the students against gender violence.
5. To prepare the students to work and live together as equals.

### **UNIT-I:**

#### **UNDERSTANDING GENDER**

Gender: Why Should We Study It?

Socialization: Making Women, Making Men

Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

### **UNIT-II:**

#### **GENDER AND BIOLOGY**

Missing Women: Sex Selection and Its Consequences

Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary

Two or Many? Struggles with Discrimination.

### **UNIT-III:**

#### **GENDER AND LABOUR**

Housework: the Invisible Labour

“My Mother doesn’t Work.” “Share the Load.”

Women’s Work: Its Politics and Economics Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

### **UNIT-IV:**

#### **ISSUES OF VIOLENCE**

Sexual Harassment: Say No!

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: “Chupulu”.

Domestic Violence: Speaking Out

Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.

Thinking about Sexual Violence

Blaming the Victim-“I Fought for my Life....” - Additional Reading: The Caste Face of Violence.

**UNIT-V:****GENDER: CO - EXISTENCE**

Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers.

Additional Reading: Rosa Parks-The Brave Heart.

**TEXTBOOK**

1. "Towards a World of Equals: A Bilingual Textbook on Gender"

Written by A. Suneetha, Uma Bhugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu Published by Telugu Akademi, Hyderabad, Telangana State, 2015.

**REFERENCE BOOKS:**

1. Menon, Nivedita, Seeing like a Feminist, New Delhi, Zubaan, Penguin Books, 2012.
2. Abdulali Sohaila, "I Fought For My Life...and Won."

## ENVIRONMENTAL SCIENCE

II Year I/II Semester

L	T	P	C
2	0	0	0

### Course Outcomes

1. Define and explain the structure and functions of ecosystem, value of biodiversity, threats and conservation of biodiversity.
2. Explain the limitations of the resources and impacts of over utilization of all natural resources.
3. Explain the sources and effects of environmental pollutions and list the available techniques to control the pollution.
4. Explain the global environmental issues like climate change, ozone hole and can explain the scope of EIA, Environmental Management Plan environmental audit and list the EIA methods.
5. Mention the salient features of environmental acts and rules, define the sustainable goals along with measures required for the sustainability.

### UNIT- I

**Ecosystem:** Definition, Scope and Importance of ecosystem, Structure and Functions of ecosystem: Food chains, Food Web and Ecological Pyramids, Flow of energy; Bio-magnification.

**Biodiversity and Biotic Resources:** Introduction, Definition, levels of Biodiversity, Value of biodiversity, Hot spots of biodiversity, Threats to biodiversity, conservation of biodiversity: In-Situ and Ex-situ conservation.

### UNIT- II

**Natural Resources:** Classification of Resources, **Water resources:** use and over utilization of surface and ground water, Dams: benefits and problems, Rain water harvesting; **Energy resources:** growing energy needs, Renewable and Non Renewable Energy resources. **Land resources:** land degradation – Landslide and Soil Erosion; **Forest Resources –** Uses and Exploitation.

### UNIT- III

**Environmental Pollution And Control:** Types of Pollution, Sources, Effects and Control measures of Air Pollution, Water Pollution, Soil Pollution and Noise Pollution.

### UNIT- IV

**Global Environmental Problems and Global Efforts:** Green house effect, Global Warming, climate change and their impacts on human environment; Ozone depletion and Ozone depleting substances (ODS); Acid Rains.

**Environmental Impact Assessment (EIA):** Scope of EIA and EIA methods, scope of Environmental audit and Environmental Management Plan.

## **UNIT- V**

**Environmental Policy, Legislation, Rules And Regulations:** Salient features of Environmental Protection act, Air (Prevention and Control of pollution) Act- 1981, Water (Prevention and Control of pollution) Act-1974, Forest Conservation Act, Municipal solid waste, Hazardous waste, E-waste, Bio-medical waste, Radioactive waste Rules.

**Towards Sustainable Future:** Concept of Sustainable Development, Sustainable goals defined by UN, Threats to Sustainability, Environmental Education, Role of IT in Environment, Smart Cities, Concept of Green Building, Low Carbon Lifestyle, Life cycle assessment and Ecological Foot Print.

### **Textbooks**

1. Text Book of Environmental Studies by Anubha Kaushik (4<sup>th</sup> Edition), New age International Publishers.
2. Environmental studies by Erach Bharucha 2005, University Grants Commission, University Press.

### **References**

1. Text book of Environmental Science and Technology by M.Anji Reddy 2007
2. Environmental Science: Towards a Sustainable Future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.

### COURSE STRUCTURE FOR B.TECH III YEAR

#### B. Tech. III Year I Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-9	Formal Languages and Automata Theory	3	0	0	3
2	PC-10	Computer Networks	3	0	0	3
3	PC-11	Operating Systems	3	0	0	3
4	H&S	Managerial Economics and Financial Analysis	3	0	0	3
5	PE-1	Cloud Computing Linux Programming Software Project Management Computer Graphics	3	0	0	3
6	OE - 1	Open Elective – 1	3	0	0	3
7	PC Lab-4	Computer Networks & Operating Systems Lab	0	0	2	1
8	H & S	Advanced Communication Skills Lab	0	0	2	1
9	Value added course -1	Personality Development & Behavioural Skills/ Quantitative Methods & Logical Reasoning	2	0	0	1
<b>Total</b>			<b>20</b>	<b>0</b>	<b>4</b>	<b>21</b>

#### B. Tech. III Year II Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-12	Web Technologies	3	0	0	3
2	PC-13	Compiler Design	3	0	0	3
3	PC-14	Data Warehousing & Data Mining	3	0	0	3
4	PC-15	Object Oriented Analysis & Design	3	0	0	3
5	PE -2	Artificial Intelligence Information Security Software Testing Methodologies Principles of Programming Languages	3	0	0	3
6	OE - 2	Open Elective – 2	3	0	0	3
7	PC Lab -6	Data Mining & Case Tools Lab	0	0	2	1
8	PC Lab-5	Web Technologies Lab	0	0	2	1
9	Value added course -2	Quantitative Methods & Logical Reasoning/ Personality Development & Behavioural Skills	2	0	0	1
<b>Total</b>			<b>20</b>	<b>0</b>	<b>4</b>	<b>21</b>

## FORMAL LANGUAGES AND AUTOMATA THEORY

B.Tech III Year I Semester

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Appreciate the role and structure of Language theory.
2. Design of regular expressions for language constructs and conversions of NFA and DFA.
3. Demonstrate the derivations and properties of various CFG and Regular grammars.
4. Design of PDA for the given CFG.
5. Appreciate the role of the Turing machine as computational and universal machine.

### Unit - I

Fundamental concepts: Strings, Alphabets, Language operations, Regular Expressions, Regular Languages: Finite automata, Types of finite automata (FA)-Non deterministic Finite Automata (NFA), Deterministic Finite Automata(DFA), NFA with  $\epsilon$ -Moves, regular expression representation; Regular expressions to NFA; NFA with  $\epsilon$ -Moves to NFA without  $\epsilon$ -Moves; NFA to DFA Conversions; Minimization of DFA (Proofs Not Required)

### Unit - II

DFA with outputs: Moore and Melay machines, Pumping Lemma for Regular Sets: Closure properties of Regular Sets (Proofs Not Required): Context Free Grammars (CFG), Right most, Left most –derivations, Parse Trees; Operator Grammar: Unit productions; Chomsky normal forms; (Proofs Not Required)

### Unit - III

Left recursion and Elimination of left recursion in CFG: Elimination of useless symbols and unit productions; Greibach Normal Form, Push Down automata (PDA): Types of PDA: Design of a PDA for a given CFG. (Proofs Not Required)

### Unit - IV

Regular Grammars (RG), Design of DFA for a given RG: Right linear and left linear Grammars and conversions: Definition of Context Sensitive Grammar (CFG) and Linear bounded automata (LBA) (Proofs Not Required).

### Unit - V

Definition of unrestricted Grammar and Turing Machine (TM): Chomsky hierarchy on Languages, Grammars and recognizers; Design of TM as recognizer; Types of TM: Computational problems of TM with multiple tracks; Decidability Problem; Churches hypothesis (Proofs Not Required)

### Text Book:

1. John E.Hopcroft, Rajeev Motwani, Jeffrey D.Ullman, Introduction to Automata Theory, Languages and Computation, Third Edition, Pearson, 2013.

### Reference Books:

1. Daniel I.A.Cohen, Introduction to Computer Theory, Second Edition, John Wiley.
2. John C Martin, Introduction to languages and the theory of Computation, Third Edition, TATA McGraw Hill, 2014.
3. VivekKulakarni, Theory of Computation, Oxford University press 2013, Second Edition, 2014.

# COMPUTER NETWORKS

L	T	P	C
3	0	0	3

III Year – I Sem

## Course Outcomes:

1. Understand the overview of reference models.
2. Classify and illustrate various sub protocols in multi access protocols.
3. Understand various routing algorithms and their operations.
4. Recommend transport protocol for the given scenarios.
5. Identify the protocols and functionalities in application layer.

## UNIT - I

**Overview of the Internet:** Definition of networks, Topology, Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

**Physical Layer:** Guided transmission media, wireless transmission media.

**Data Link Layer:** Design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol.

## UNIT - II

**Multiple Access Protocols:** ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer – CSMA/CD with Binary Exponential Backoff, Ethernet Performance, Switched, Fast, Gigabit, 10-Gigabit Ethernets, Data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

## UNIT - III

**Network Layer:** Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Control to Infinity Problem, Hierarchical Routing, Congestion control algorithms, admission control

## UNIT - IV

**Internetworking:** Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses, CIDR, ICMP, ARP, RARP, DHCP.

**Transport Layer:** Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Connection Release, Crash Recovery.

## UNIT - V

**The Internet Transport Protocols:** UDP-RPC, Real Time Transport Protocols, The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The future of TCP.

**Application Layer-** Introduction, providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS.

## Text Books:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

**Reference Books:**

1. An Engineering Approach to Computer Networks-S.Keshav, 2<sup>nd</sup> Edition, Pearson Education.
2. Understanding Communications And Networks, 3rd Edition, W.A.Shay,Cengage Learning.
3. Introduction To Computer Networks And Cyber Security, Chwan-Hwa(John)Wu, J.DavidIrwin,CRC Press.
4. Computer Networking: A top Down Approach Featuring The Internet, James F.Kurose,K.W.Ross,3<sup>rd</sup> Edition, Pearson Education.

# OPERATING SYSTEMS

III Year – I Sem

L	T	P	C
3	0	0	3

## Course Outcomes:

1. Understand the basic functions of Operating systems and system calls.
2. Analyze process scheduling and synchronization.
3. Understand the concepts of memory management.
4. Examine the concepts of MASS storage structure
5. Compare different protection methods of OS and understand the deadlock concepts.

## UNIT - I

**Operating System Introduction:** Operating Systems Objectives and functions, OS Structure, OS Operations, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special - Purpose Systems, Operating System services, user OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, Virtual Machines.

## UNIT - II

**Process and CPU Scheduling:** Process concepts - The Process, Process State, Process Control Block, Threads, Process Scheduling - Scheduling Queues, Schedulers, Context Switching, Preemptive Scheduling, Scheduling Criteria, Scheduling algorithms, thread scheduling, Case studies: Linux, Windows.

**Process Coordination:** Process Synchronization, The Critical section Problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Windows.

## UNIT - III

**Memory Management and Virtual Memory:** Logical & physical Address Space, Swapping, Contiguous Allocation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms, Thrashing.

## UNIT - IV

**File System Interface:** The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation - File System Structure, File System Implementation, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance.

**Mass Storage Structure:** Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management.

## UNIT - V

**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.

**Protection:** System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

**Text Books:**

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
2. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

**References Books:**

1. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
2. Operating Systems A concept - based Approach, 2nd Edition, D. M. Dhamdhere, TMH.
3. Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
4. Operating Systems, A. S. Godbole, 2nd Edition, TMH

## MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

III Year – I Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

At the end of the course the students are expected to

1. Understand the importance of certain basic issues governing the business operations namely demand and supply, production function, cost analysis.
2. Apply managerial tools and techniques in obtaining optimal solutions for business problems.
3. Differentiate the various forms of business organizations.
4. Evaluate and interpret the financial statements of companies using ratios.
5. CO 5: Apply the methods of capital budgeting in effective investment decision making.

### UNIT –I:

#### Introduction to Managerial Economics & Demand Analysis:

Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

### UNIT –II:

#### Production & Cost Analysis:

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts (Opportunity cost vs outlay costs, Fixed, variable and semi variable costs, marginal cost vs average cost, out of pocket vs book cost, imputed cost, implicit & explicit cost, incremental and decremental cost, sunk vs future cost, separable and joint costs) Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

### UNIT –III:

#### Markets & New Economic Environment:

Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business Organization: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.

### UNIT –IV:

#### Introduction to Financial Accounting & Financial Analysis:

Accounting concepts and Conventions - Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios (current ratio, quick ratio), Activity Ratios (inventory turnover ratio, debtors turnover ratio), and Capital structure Ratios (debt equity ratio, interest coverage ratio) and Profitability ratios (gross profit ratio, net profit ratio, operating profit ratio, P/E ratio, EPS). Du Pont Chart.

**UNIT –V:****Capital Budgeting:**

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital, Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), Net Present Value Method (simple problems), IRR and PI method.

**TEXT BOOKS:**

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
2. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.

**REFERENCE BOOKS:**

1. Domnick Salvatore: Managerial Economics in a Global Economy, Thomson, 2012.
2. Narayanaswamy: Financial Accounting—A Managerial Perspective, Pearson, 2012.
3. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
4. Dwivedi: Managerial Economics, Vikas, 2012.
5. Kasi Reddy, Saraswathi, MEFA, PHI Learning, 2012.

**CLOUD COMPUTING**  
**(Professional Elective-1)**

III Year – I Sem

L	T	P	C
3	0	0	3

**Course Outcomes:**

1. Understand different Cloud Services
2. Analyze different cloud deploy and service models.
3. Understand various enterprise applications in cloud computing
4. Understand and apply the virtualization concepts
5. Understand the data security mechanism and SLA management in cloud.

**UNIT -1**

**Introduction to cloud computing:** Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired Features of Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenge and Risks.

**UNIT II**

**Migration into a Cloud:** Introduction, Broad Approaches to Migrating into the Cloud, the Seven-Step Model of Migration in to a Cloud.

**Enriching the 'Integration as a Service' Paradigm for the Cloud Era:** An Introduction, The Onset of Knowledge Era, The Evolution of SaaS, The challenges of SaaS Paradigm, Approaching the SaaS integration enigma, new integration scenarios, the integration. Methodologies, SaaS integration products and platforms, SaaS Integration Services, Business to Business Integration (B2Bi) Services.

**UNIT III**

**The Enterprise Cloud Computing Paradigm:** Introduction, Background, Issues for Enterprise Applications on the Cloud, Transition Challenges, Enterprise Cloud Technology and Market Evolution, Business Drivers toward a Marketplace for Enterprise Cloud Computing, the Cloud Supply Chain.

**UNIT IV**

**Virtual Machines Provisioning and Migration Services:** Introduction and Inspiration, Background and Related Work, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action, Provisioning in the Cloud Context, Future Research Directions.

**Secure Distributed Data Storage in Cloud Computing:** Introduction, Cloud Storage: from LANs TO WANs, Technologies for Data Security in Cloud Computing, Open Questions and Challenges.

**UNIT V**

**SLA Management in Cloud Computing:** A Service Provider's Perspective: Inspiration, Traditional Approaches to SLO Management, Types of SLA, Life Cycle of SLA, SLA Management in Cloud, Automated Policy based Management.

**Data Security in the Cloud:** An Introduction to the idea of Data Security, The Current State of Data Security in the Cloud, Homo Sapiens and Digital Information, Cloud Computing and Data Security Risk, Cloud Computing and Identity, Digital Identity and Data Security, Content Level Security-Pros and Cons.

**Text Book:**

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing Principles and Paradigms, Wiley Publications.

**Reference Books:**

1. Michael Miller, Cloud Computing – Web-Based Application That Change the Way You Work and Collaborate Online, Pearson Publications.
2. Thomas Erl, Zaigham Mahmood, & Ricardo Puttini, Cloud Computing- Concepts, Technology & Architecture Pearson Publications.
3. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Distributed and Cloud Computing – From Parallel Processing to the Internet of Things, ELSEVIER Publications.

## **LINUX PROGRAMMING** **(Professional Elective-1)**

III Year – I Sem

L	T	P	C
3	0	0	3

### **Course Outcomes:**

1. Understand and make effective use of Linux file handling utilities.
2. Solve problems using shell scripting language (bash).
3. Develop the skills necessary for systems programming.
4. Examine various operations involved in process and signal management.
5. Distinguish intra and inter process communication.

### **UNIT - I**

**Linux Utilities** - File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.  
Sed-Scripts, Operation, Addresses, Commands, Applications, awk-Execution, Fields and Records, Scripts, Operation, Patterns, Actions, functions.

### **UNIT - II**

**Shell programming with Bourn again shell(bash)** - Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

### **UNIT - III**

**Files and Directories**- File Concept, File types, File System Structure, Inodes, library functions kernel support for files, system calls for file I/O operations- open, create, read, write, close.  
**Directories** - Creating, removing and changing Directories-mkdir, rmdir, chdir.

### **UNIT - IV**

**Process** - Process concept, process identification, process control process- creation, waiting for a process, process termination, Kernel support for process, zombie process, orphan process.  
**Signals** - Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

### **UNIT - V**

**Inter Process Communication** - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes-creation, IPC between related processes using unnamed pipes, FIFOs- creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions. Message Queues- APIs for message queues Semaphores- APIs for semaphores Shared Memory- APIs for shared memory.  
Sockets- Introduction to Sockets, basic functions of Socket.

**Text Books:**

1. UNIX Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
2. UNIX and Shell Programming, B. A. Forouzan and R. F. Gilberg, Cengage Learning.

**Reference Books:**

1. Unix System Programming using C++, T. Chan, PHI.
2. Beginning Linux Programming, 4th Edition, N. Mathew, R. Stones, Wrox, Wiley India Edition.
3. UNIX for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson.
4. UNIX shell Programming, S. G. Kochan and P. Wood, 3rd edition, Pearson Education.
5. Shell Scripting, S. Parker, Wiley India Pvt. Ltd.
6. C Programming Language, Kernighan and Ritchie, PHI

## SOFTWARE PROJECT MANAGEMENT (Professional Elective-1)

III Year – I Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Compare and contrast the various CSM models.
2. Understand the principle of software engineering.
3. Examine the lifecycle phases, artifacts of the process and model based software architectures.
4. Compare various work flow process models.
5. Evaluate different software product metrics.

### UNIT I

**Conventional Software Management:** The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

### UNIT II

**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

**The old way and the new:** The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process.

### UNIT III

**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.

**Artifacts of the process:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

**Model based software architectures:** A Management perspective and technical perspective.

### UNIT IV

**Work Flows of the process:** Software process workflows, Inter trans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning. Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

**Process Automation:** Automation Building Blocks, the Project Environment.

### UNIT V

**Project Control and Process instrumentation:** The seven core Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Example: Future Software Project Management: Modern Project Profiles Next generation Software economics, modern Process transitions.

**Case Study:** The Command Center Processing and Display System-Replacement (CCPDS-R)

**Text Books:**

1. Software Project Management, Walker Royce, Pearson Education, 1998

**Reference Books:**

1. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, Tata McGraw Hill, 2006
2. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
3. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.

**COMPUTER GRAPHICS  
(Professional Elective-1)**

III Year – I Sem

L	T	P	C
3	0	0	3

**Course Outcomes:**

1. Outline the areas of Computer Graphics.
2. Examine various 2D Geometrical transforms.
3. Understand 3D Geometrical transforms.
4. Apply different visible surface detection methods.
5. Plan the sequence of an animation for a given scenario.

**UNIT-I**

**Introduction**

Application areas of Computer Graphics, overview of graphics systems, video-display devices and raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

**Output Primitives**

Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

**UNIT-II**

**2D Geometrical Transformations**

Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms transformations between coordinate systems.

**2D Viewing**

The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen- Sutherland and Cyrus-beck line clipping algorithms, Sutherland -Hodgeman polygon clipping algorithm.

**UNIT-III**

**3D Object Representation**

Polygon surfaces, quadric surfaces. Spline representation, Hermite curve, Bezier curve and B-spline curves. Bezier and B-spline surfaces, sweep representations, octrees BSP Trees.

**3D Geometric transformations**

Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and Clipping.

**UNIT-IV**

**Visible Surface Detection Methods:**

Classification, back face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, and area sub division and octree methods.

**Illumination Models and Surface Rendering Methods** Basic illumination models, polygon rendering method.

**UNIT-V**

**Computer Animation:** Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame system, Motion specification.

**Text Book:**

- 1 "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.

**Reference Books:**

- 1 Computer Graphics Principles & practice, second edition In C, Foley, VanDam, Feiner and Hugues, Pearson Education.
- 2 “Computer Graphics Second edition”, Zhigandxiang. Roy Plastock, Schaum’s outlines. rats Mc Graw 19 edition.
- 3 Procedural elements lot Computer Graphics, David F Rogers. Tata Mc Graw hill, 2nd edition.
- 4 Principles of interactive Computer Graphics. Neuman and Sprout TMH.
- 5 Principles of Computer Graphics. Shalni, Govil-Pal, Springer.
- 6 Computer Graphics F.S.H. S.M.Kelley. PHI.

## COMPUTER NETWORKS & OPERATING SYSTEMS LAB

III Year – I Sem

L	T	P	C
0	0	2	1

### Course Outcomes:

1. Implement various CPU scheduling algorithms
2. Apply the memory management techniques
3. Write Programs on File allocation strategies
4. Implement various algorithms for error detection and correction
5. Implement Algorithms on Shortest path routing
6. Write a program for congestion control

**Week 1:** Simulate the following CPU Scheduling Algorithms using C program:

- a) FCFS b) SJF

**Week 2:** Simulate the following CPU Scheduling Algorithms using C program:

- a) Priority b) Round Robin

**Week 3:** Simulate Paging Technique of Memory Management using C program.

**Week 4:** Write a program to implement page replacement algorithms (FCFS, Optimal, and LRU).

**Week 5:** Write a C program to simulate the following file allocation strategies.

- a) Sequential b) Indexed c) Linked

**Week 6:** Write a program to implement Banker's algorithm for deadlock avoidance.

**Week 7:** Implement the data link layer framing methods such as character stuffing and bit stuffing.

**Week 8:** Implementation of hamming code algorithm

**Week 9:** Implement on a data set of characters the three CRC polynomials – CRC 12, CRC and CCIP.

**Week 10:** Implement Dijkstra's algorithm to compute the Shortest path through a graph.

**Week 11:** Take an example subnet of hosts. Obtain broadcast tree for it.

**Week 12:** Write a program for congestion control using leaky bucket algorithm.

## ADVANCED COMMUNICATION SKILLS (ACS) LAB

III Year - I Sem

L	T	P	C
0	0	2	1

### Course Outcomes

1. Develop sound communication skills in various situations with the help of enriched vocabulary.
2. Practice reading techniques for a faster and better comprehension.
3. Exhibit strong writing skills to express ideas effectively.
4. Demonstrate effective presentation skills.
5. Use appropriate verbal and non-verbal skills for a successful career.

### UNIT-I:

**Activities on Fundamentals of inter-personal Communication and Building Vocabulary –** Starting a conversation – responding appropriately and relevantly – using the right body language - Role Play in different situations & Discourse Skills – using visuals – Synonyms and antonyms, word roots, one word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

### UNIT-II:

**Activities on Reading Comprehension –** General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

### UNIT-III:

**Activities on Writing Skills –** Structure and presentation of different types of writing – letter writing/ Resume writing/ Statement of purpose - E-correspondence/ Technical report writing / Portfolio writing – planning for writing – improving one's writing.

### UNIT-IV:

**Activities on Presentation Skills –** Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/e-mails/assignments etc.

### UNIT-V:

**Activities on Group Discussion and interview Skills –** Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation. Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video – conference and Mock Interviews.

### Reference Books

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University, 2<sup>nd</sup> Edition, 2011.
2. Functional English for Success, Orient Longman, 2014.

## WEB TECHNOLOGIES

III Year – II Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

Develop static and dynamic web pages using HTML and javascript.

1. Understand the XML tags and to parse XML data with java.
2. Develop web applications using server side programming with PHP.
3. Implement web applications using JDBC and Servlets.
4. Apply web applications with JSP.

### UNIT – I

**Introduction to HTML:** HTML tags, Lists, Tables, Images, Forms, Frames, Cascading Style Sheets

**Client Side Scripting:** Java Script Language – Declaring variables, Scope of variables, Functions, Objects in java scripts, Dynamic HTML with java scripts, Form Validation.

### UNIT – II

**XML:** Introduction to XML, Defining XML tags their attributes and values, Document Type Definition, XML Schema, Document Object Model, and XHTML.

**Parsing XML Data:** DOM and SAX Parsers in java.

### UNIT – III

#### Introduction to PHP:

Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc. Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

**File Handling in PHP:** File operations like opening, closing, reading, writing, appending, deleting etc. binary files listing directories.

### UNIT – IV

**Introduction to Servlets:** Common Gateway Interface (CGI), The Servlet API, Life cycle of a Servlet, Deploying a Servlet, Reading Servlet parameters, Reading Initialization parameters, Handling HTTP Request & Responses, Using Cookies and Sessions,

**Introduction to JDBC:** JDBC Drivers, JDBC Process, Connecting to a Database using JDBC

### UNIT – V

**Introduction to JSP:** The Anatomy of a JSP Page, Introduction to MVC Architecture, JSP Processing, Declarations, Directives, Expressions, Code Snippets, Implicit Objects, Using Beans in JSP Pages, Using Cookies and Session for Session Tracking, Connecting to Database using JSP.

### Text Books:

1. Programming the World Wide **Web 7th Edition** by Robert W. Sebesta
2. Web Technologies Uttam K Roy, Oxford University Press

### Reference Books:

1. The Complete Reference PHP – **Steven Holzner** , Tata McGraw-Hill
2. Web Programming, Building Internet Applications , Chris Bates 2<sup>nd</sup> edition , Wiley Dreamtech
3. Java Script , D Flanagan, O'Reilly,SPD
4. Java Server Pages- Hans Bergsten , SPD O'Reilly

# COMPILER DESIGN

III Year – II Sem

L	T	P	C
3	0	0	3

## Course Outcomes:

1. Formulate tokens for various programming languages.
2. Apply principles of parsing techniques to do syntax analysis.
3. Formulate semantic rules to do semantic analysis.
4. Apply optimization techniques on the intermediate code.
5. Generate the target code.

## Unit - I

**Introduction to Compilers:** Structure of Compiler-Phases of Compiler, Symbol Table Management, Grouping of Phases into Passes, Compiler Vs Interpreter.

**Lexical Analysis:** Role and need of Lexical Analyzer, Input Buffering, Regular expressions for identifiers, Signed numbers etc., A Language for specifying Lexical Analyzer, Lexical phase errors.

## Unit - II

**Syntactic Specification:** Context Free Grammars, Derivations and Parse Trees, Capabilities of Context Free Grammars, Syntactic Phase errors, Semantic errors.

**Basic Parsing Techniques:** Parsers, Top-Down parsing, Predictive parsers and construction of predictive parsing and LL (1) parser table, LL (1) grammar.

## Unit - III

**Construction of efficient Parsers: introduction to Bottom Up parsing, shift reduce parser, LR Parsers, Canonical collection of LR(0) items, construction of SLR parsing tables, Construction of canonical LR(0) parsing tables, Construction of LALR parsing tables, Comparison of SLR,LALR and CALR parsers, Comparison of Top down and Bottom up parsers.**

## Unit - IV

**Syntax Directed Translation:** Syntax Directed Translation schemes, Intermediate codes, Postfix notation, Three Address code, Quadruples and triples..

**Run-Time Environments:** Storage allocation strategies, Stack allocation of space, Access to non-local names. **Symbol table:** Contents of Symbol table, Data Structures for symbol tables, representing scope information

## Unit - V

**Code Optimization:** Principal sources of optimization, Loop optimization, Copy Propagation, Dead code elimination, Redundant sub expression elimination.

**Code Generation:** Object programs, problems in Code generation, A Machine Model, A Simple Code generator, Register allocation and assignment, Peephole optimization.

## Text Book:

1. Alfred V Aho, Jeffrey D Ullman, Principles of Compiler Design, Pearson Education, 2001.

**Reference Books:**

1. J P Trembly and P G Sorenson, The Theory and practice of Compiler Writing, McGraw Hill, 2005.
2. Alfred V Aho, Ravi sethi, Jeffrey D Ullman, Compilers-Principles, Techniques and Tools, Pearson Education, second edition.
3. Dick Grone, Henri E Bal, Cerial J H Jacobs, Modern Compiler Design, Wiley Dreamtech, 2006.

## DATA WAREHOUSING & DATA MINING

III Year – II Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Understand the fundamentals of Data warehousing and OLAP technology.
2. Outline the Data Mining and Data pre-processing techniques.
3. Identify the frequent patterns using association algorithms.
4. Distinguish how classification algorithms are used on data sets.
5. Compare different clustering techniques on large data sets.

### UNIT – I

**Data Warehouse and OLAP Technology:** What is Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data ware housing to data mining.

### UNIT – II

**Introduction to Data Mining:** What motivated data mining? Why it is important? So- What is Data mining, Data Mining-On What Kind of Data, Data Mining Functionalities-What kind of patterns can be Mined, Are All of the patterns Interesting, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data warehouse system, Major issues in Data mining.

**Data pre-processing:-**Why Preprocess the Data, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

### UNIT – III

**Mining Frequent Patterns, Associations and Correlations:** Basic Concepts and a Road Map, Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

### UNIT – IV

**Classification & Prediction:** What is Classification? What is Prediction? Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back Propagation, Support Vector Machines, Associative Classification: Classification by Association Rule Analysis, Lazy Learners, Other Classification Methods, Prediction, Evaluating the Accuracy of a Classifier or Predictor.

### UNIT – V

**Cluster Analysis:** What is Cluster Analysis, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

### Text Books:

1. Data Mining- Concepts and Techniques by Jiawei Han, Micheline Kamber and Jian Pei Morgan Kaufmann publishers -2nd edition
2. Introduction to Data Mining Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education

**References:**

1. Data Mining Techniques – Arun K Pujari, 2<sup>nd</sup> edition, Universities Press.
2. Data Warehousing in the Real World – Sam Aanhory& Dennis Murray Pearson Edn Asia.
3. Insight into Data Mining, K.P. Soman, S. Diwakar, V.Ajay, PHI, 2008.
4. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition.

## OBJECT ORIENTED ANALYSIS & DESIGN

III Year – II Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Understand Object Oriented Software Development Process
2. Construct class and object diagrams for the given scenario
3. Model interaction diagrams, usecase diagrams and activity diagrams for a given project
4. Design State diagrams involving processes and threads
5. Apply Unified Modeling Language Construct for Developing Structural Design of an ATM Project.

### UNIT – I

**Introduction to UML:** Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture and Software Development Life Cycle.

### UNIT – II

**Basic Structural Modeling:** Classes, Relationships, common Mechanisms, and diagrams.

**Advanced Structural Modeling:** Advanced classes, advanced relationships, Interfaces, Packages.

**Class & Object Diagrams:** Terms, concepts, modeling techniques for Class & Object Diagrams.

### UNIT – III

**Basic Behavioral Modeling-I:** Interactions, Interaction diagrams.

**Basic Behavioral Modeling-II:** Use cases, Use case Diagrams, Activity Diagrams.

### UNIT – IV

**Advanced Behavioral Modeling:** Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

### UNIT – V

**Architectural Modeling:** Component, Deployment, Component diagrams and Deployment diagrams

**Case Study:** The Unified library application, ATM System.

### Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education 2nd Edition
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

### Reference Books:

1. Analysis and Design and Unified Process, Craig Larman, Pearson Education.
2. Object Oriented Analysis, Design and Implementation, B.Dathan. S.Ramnath, Universities Press.
3. Learning UML 2.0, Russ Miles and Kim Hamilton, O'Reilly, SPD.

**ARTIFICIAL INTELLIGENCE**  
**(Professional Elective-2)**

**III Year – II Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Outcomes:**

1. Understanding the evolution and present status of AI.
2. Understanding different algorithms of AI.
3. Understanding different AI techniques like HMM and Reinforcement Learning.
4. Able to apply the basic concepts of AI in real life.

**Unit – I**

Concept of AI, History, Current Status, Scope, Intelligent Agents, Environments, Problem Formulations, Review of Tree and Graph Structures, State Space Representation, Search Graph and Search Tree.

**Unit – II**

**Uninformed and Informed Search Algorithms:** Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search: Generate & Test, Hill Climbing, Best first search, A\* algorithm, Game Search, Alpha-Beta Pruning Genetic Algorithm

**Unit – III**

**Probabilistic Reasoning :** Probability, Conditional Probability, Bayes Rule, Bayesian Networks- Representation, Construction and Inference, Temporal Model, Hidden Markov Model, Dynamic Bayesian networks (DBN), Natural Language Processing using HMM

**Unit – IV**

Markov Decision Process, MDP Formulation, Utility Theory, Utility Functions, Value Iteration, Policy Iteration and Partially Observable MDPs.

**Unit – V**

**Reinforcement Learning:** Passive Reinforcement Learning, Direct Utility Estimation, Adaptive dynamic Programming, Temporal Difference Learning, Active Reinforcement Learning- Q Learning.

**Text Books**

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach”, 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill

**Reference Books:**

1. Trivedi, M.C., “A Classical Approach to Artificial Intelligence”, Khanna Publishing House, Delhi.
2. Saroj Kaushik, “Artificial Intelligence”, Cengage Learning India, 2011.

**INFORMATION SECURITY**  
**(Professional Elective-2)**

L	T	P	C
3	0	0	3

**III Year – II Sem**

**Course Outcomes:**

1. Identify various Security Attacks.
2. Understand various Encryption Principles and algorithms.
3. Implement Cryptography algorithms.
4. Understand various Security Associations and Key Management.
5. Design a Firewall for Security.

**UNIT - I**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

**UNIT – II**

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

**UNIT – III**

Public key cryptography principles; public key cryptography algorithms; digital signatures, digital Certificates; Certificate Authority and key management Kerberos, X.509; Directory Authentication Service; Email privacy: Pretty Good Privacy (PGP) and S/MIME.

**UNIT – IV**

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.  
Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

**UNIT - V.**

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats. Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

**Text Books:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn IdoDubrawsky, Steve W. Manzuik and Ryan Perme, wileyDreamech.

**Reference Books:**

1. Fundamentals of Network Security by Eric Maiwald (Dreamech press).
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson.
4. Principles of Information Security, Whitman, Thomson.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH.
6. Introduction to Cryptography, Buchmann, Springer.

## **SOFTWARE TESTING METHODOLOGIES** **(Professional Elective-2)**

**III Year – II Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **Course Outcomes:**

1. Understand the purpose of Software testing.
2. Discuss various testing techniques and able to prepare the test cases for specific requirements.
3. Understand transaction and data flow testing.
4. Construct the test plans and validate the test plan
5. Understand the testing policies and standards.

### **UNIT - I**

Testing as an Engineering Activity, Role of Process in Software Quality, Testing as a Process, Basic Definitions, Software Testing Principles, The Tester's Role in a Software Development Organization, Consequences of bugs and taxonomy of bugs, Levels of Testing.

### **UNIT - II**

Test Case Design Strategies, Using Black Box Approach to Test Case Design: Requirements based testing, positive and negative testing, Boundary Value Analysis, Logic based Testing, Equivalence Class Partitioning, State-transition testing, Domain Testing, Using White Box Approach to Test design: code functional testing, Coverage and Control Flow Graphs, Covering Code Logic, Paths and their Role in White-box Based Test Design.

### **UNIT - III**

Transaction Flow Testing: Transaction flows, Transaction flow testing techniques. Data Flow Testing: Basics of Data flow testing, strategies in dataflow testing, application of dataflow testing.

### **UNIT - IV**

Test Management: People and organizational issues in testing ,organization structures for testing teams, testing services, Test Planning – Test Plan Components, Test Plan Attachments, Locating Test Items, test management, test process, Reporting Test Results, The role of three groups in Test Planning and Policy Development, Introducing the test specialist, Skills needed by a test specialist, Building a Testing Group.

### **UNIT - V**

Test Automation: Skills needed for automation, scope of automation, design and architecture for automation, requirements for a test tool, challenges in automation, Test metrics and measurements, project, progress and productivity metrics.

### **Text Books:**

1. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson education, 2006.
2. Boris Beizer, "Software Testing Techniques", Second Edition, Dreamtech, 2003

### **Reference Books:**

1. Ilene Burstein, "Practical Software Testing" , Springer International Edition, 2003
2. Aditya P.Mathur, "Foundations of Software Testing", Pearson Education, 2008.
3. Elfriede Dustin, "Effective Software Testing", First Edition, Pearson Education, 2003.
4. RenuRajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004.

## PRINCIPLES OF PROGRAMMING LANGUAGES (Professional Elective-2)

III Year – II Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Understand the importance of programming paradigms.
2. Illustrate the syntax and semantics in formal notation.
3. Make use of expressions and statements for subprograms and blocks.
4. Select different object oriented concepts for solving a given problem.
5. Compare the features of different programming languages.

### UNIT I

**Preliminary Concepts:** Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming , Logic Programming. Programming Language Implementation – Compilation and Virtual Machines, programming environments

### UNIT II

**Syntax and Semantics:** general Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotation semantics and axiomatic semantics for common programming language features.

**Names, Bindings, Data types:** Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization. Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types.

### UNIT III

**Expressions and Statements:** Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements and guarded commands.

**Subprograms and Blocks:** Fundamentals of sub-programs, Scope and life time of variables, static and dynamic scope, design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

### UNIT IV

**Abstract Data types:** Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95

**Concurrency:** Subprogram level concurrency, semaphores, monitors, message passing, Java threads, C# threads.

**Exception handling:** Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.

## **UNIT V**

**Logic Programming Language:** Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

**Functional Programming Languages:** Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.

### **Text Books:**

1. Concepts of Programming Languages Robert.W. Sebesta, Tenth Edition, Pearson Education.

### **Reference Books:**

1. Programming Language Design Concepts, D. A. Watt, Wiley dreamtech, rp-2007.
2. Programming Languages, K. C. Loudon, 2nd Edition, Thomson, 2003.
3. LISP Patric Henry Winston and Paul Horn Pearson Education.
4. Programming in Prolog, W. F. Clocksin& C. S. Mellish, 5th Edition, Springer.
5. Programming Python, M. Lutz, 3rd Edition, O'reilly, SPD, rp-2007.
6. Core Python Programming, Chun, II Edition, Pearson Education, 2007.
7. Guide to Programming with Python, Michel Dawson, Thomson, 2008

## DATA MINING & CASE TOOLS LAB

III Year – II Sem

L	T	P	C
0	0	2	1

### Course outcomes:

1. Demonstrate frequent pattern algorithms
2. Explore Weka environment
3. Apply data mining techniques for realistic data
4. Design various UML diagrams for ATM application
5. Design Unified Library application
6. Explore real time applications

### Data Mining Lab

**Week-1:** Demonstrate Apriori based Association Rule Mining

**Week-2:** Demonstrate FP –growth based Association Rule Mining

**Week-3:** Weather classification using WEKA Tool

**Week-4:** Demonstrate K-means based Clustering

**Week-5:** Demonstrate Hierarchical Clustering

**Week-6:** Credit Risk Assessment

**Description:** The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the bank's profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

### Case Tools Lab

#### **Week 1 & Week 2:**

Draw the following diagrams using UML for an ATM system whose description is given below. UML diagrams to be developed are:

1. Use Case Diagram
2. Class Diagram
3. Sequence Diagram
4. Collaboration Diagram
5. State Diagram
6. Activity Diagram
7. Component Diagram
8. Deployment Diagram

### Description for an ATM System

The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash (in multiples of Rs. 100, Rs. 500 and Rs. 1000), a printer for printing customer receipts, and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank's computer over an appropriate communication link. (The software on the latter is not part of the requirements for this problem.). The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) - both of which will be sent to the bank for validation as part of each transaction. The customer will then be able to perform one or more transactions.

The card will be retained in the machine until the customer indicates that he/she desires no further transactions, at which point it will be returned - except as noted below.

The ATM must be able to provide the following services to the customer:

1. A customer must be able to make a cash withdrawal from any suitable account linked to the card, in multiples of Rs. 100 or Rs. 500 or Rs. 1000. Approval must be obtained from the bank before cash is dispensed.
2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.
3. A customer must be able to make a transfer of money between any two accounts linked to the card.
4. A customer must be able to make a balance inquiry of any account linked to the card.
5. A customer must be able to abort a transaction in progress by pressing the Cancel key instead of responding to a request from the machine.

The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope. (If the customer fails to deposit the envelope within the timeout period, or presses cancel instead, no second message will be sent to the bank and the deposit will not be credited to the customer.

If the bank determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it back. If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction. The ATM will provide the customer with a printed receipt for each successful transaction.

The ATM will have a key-operated switch that will allow an operator to start and stop the servicing of customers. After turning the switch to the "on" position, the operator will be required to verify and enter the total cash on hand. The machine can only be turned off when it is not servicing a customer. When the switch is moved to the "off" position, the machine will shut down, so that the operator may remove deposit envelopes and reload the machine with cash, blank receipts, etc.

### **Week 3 & Week 4:**

The student should take up the case study of Unified Library application which is mentioned in the theory, and Model it in different views i.e Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.

### **Week 5 & Week 6:**

Student has to take up another case study of his/her own interest and do the same whatever mentioned in first problem.

## WEB TECHNOLOGIES LAB

III Year – II Sem

L	T	P	C
0	0	2	1

### Course Outcomes:

1. Design static web pages that perform client side authentication.
2. Understand XML data representation.
3. Create dynamic web application using PHP and access database.
4. Implement sessions in web applications
5. Design dynamic web applications using MVC architecture.

### List of Experiments

**Week 1:** Create a Registration page using HTML.

**Week 2:** Create a static HTML application with three frames as below:

First frame at the top containing a header

Second frame a navigation frame that contains hyperlinks to open 3 other pages

Third frame that displays a page corresponding to the hyperlinks in the second frame

**Week 3:** Design a static HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).

**Week 4:** Design a HTML page with required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.

**Week 5:** Validate the fields of registration page created in the first experiment using regular expressions in JavaScript.

**Week 6:** Validate an XML document using DTD and XML schema.

**Week 7:** Create an XML document that contains 10 users information. Write a Java program, which takes User Id as input and returns the user details by taking the user information from the XML document using (a) DOM Parser and (b) SAX parser

**Week 8:** Create a PHP application that reads request parameters from the registration page created in the first experiment and stores in the database.

**Week 9:** Create a PHP application program for authenticating users for the above program using sessions.

**Week 10:** Installation and configuration of Tomcat and deploy a simple “Hello World” servlet.

**Week 11:** Write a servlet that reads request parameters from the registration page created in the first experiment and stores in the database.

**Week 12:** Write a servlet program for authenticating users for the above program.

**Week 13:** Implement the following session handling techniques using servlets:

- i) Cookies
- ii) Hidden form field
- iii) HttpSession
- iv) URL Rewriting

**Week 14:** Create a JSP application that reads request parameters from the registration page created in the first experiment and stores in the database using Java Beans.

**Week 15:** Create a JSP application for authenticating users for the above program.

## QUANTITATIVE METHODS & LOGICAL REASONING

III Year - I or II Sem

L	T	P	C
2	0	0	1

### Course Outcomes:

1. To perform well in various competitive exams and placement drives.
2. To solve basic and complex mathematical problems in short time.
3. To become strong in Quantitative Aptitude and Reasoning which can be applied for GRE, GATE, GMAT or CAT exam also.
4. To develop problem solving skills and analytical abilities, which play a great role in corporate and industry set up.

### Quantitative Aptitude and Reasoning:

#### Unit – I :

**Number System:** Speed Maths, Numbers, Factors, Prime & Co Primes, LCM & HCF, Divisibility Rules, Finding Unit Place Digit and Last Two Digits of an Expression

**Ratio, Proportion and Variations:** Definition of Ratio, Ratio of Proportion, Comparison of Ratios, Compound ratio, Direct and Indirect Proportion

**Percentages:** Converting Fractions and Decimal into Percentages, Successive Percentage, Populations, Expenditure and Savings

**Profit and loss:** Relation between Cost Price and Selling Price, Discount and Marked Price, Gain or Loss Percentages on Selling Price

**Simple and Compound Interest:** Problems on Interest (**I**), Amount (**A**), Principal (**P**) and Rate of Interest (**R**) difference between the Simple Interest and Compound Interest for 2 and 3 years.

#### Unit – II :

**Partnership:** Relation between Partners, Period of Investment and Shares

**Averages, Ages and Allegation :** Average of Different Groups, Change in Averages by Adding, Deleting and Replacement of Objects, Problems on ages, Allegation Rule, Mean Value of the Mixture, Replacement of Equal Amount of Quantity.

**Time and Work:** Men and Days, Work and Wages, Pipes and Cisterns, Hours and Work, Alternate Days Concept,

**Time and Distance:** Difference between the Average and Relative Speeds, Reaching the Destination Late and Early, Stoppage Time Per Hour, Time and Distance between Two Moving Bodies : Train Crossing Man - same and opposite directions, Speed of Boat and Stream,

#### Unit – III :

**Progressions and Quadratic Equations :** Arithmetic, Geometric and Harmonic Progressions, Arithmetic Mean, Geometric Mean and Harmonic Mean and their Relations. General form of Quadratic Equation, Finding the Roots of Quadratic Equation, Nature of the Roots.

**Permutation and Combination:** Fundamental Rules, Problems on Permutations & combinations.

**Probability:** Definition of probability, Notations and Formulae, Problems on Probability.

**Data Interpretation and Data Sufficiency:** Tabular and Pie-charts, Bar and Line Graphs, Introduction to Data Sufficiency, Problems on Data Sufficiency.

**Unit – IV:**

**Deductions:** Statements and conclusions using Venn diagram and Syllogism Method

**Series completion:** Number series, Alphabet series, Letter Series.

**Coding and Decoding:** Letter coding, Number coding, Number to letter coding, Matrix Coding, Substitution, Mixed Letter Coding, Mixed Number Coding, Deciphering Individual Letter Codes by Analysis.

**Analytical Reasoning Puzzles:**

Problems on Linear, Double line-up and Circular Arrangements, Selections and Comparisons.

**Blood Relations:**

Defining the various Relations among the Members of a Family, Solving Blood Relation Puzzles by using Symbols and Notations. Problems on Coded Relations.

**Unit – V:**

**Direction sense Test:** Sort of directions in puzzles distance between two points, problems on shadows, Application of triangular triplets.

**Clocks:** Relation between Minute-Hour Hands, Angle vs Time, Exceptional Cases in Clocks

**Calendars:** Definition of a Leap Year, Finding the Odd days, finding the Day of any Random Calendar Date, repetition of Calendar Years.

**Cubes and Dices:** Finding the Minimum and Maximum Number of Identical Pieces and Cuts, Painting of Cubes and cuts, Problems on Dice.

**Venn Diagrams:** Circular Representation of given words, Geometrical Representation of Certain class, Set theory based Problems.

**Text Books:**

1. Verbal Reasoning, GL Barrons, Pinterest, Latest Edition 2019
2. A Modern Approach to Logical Reasoning & Quantitative Aptitude, R S Agarwal, S. Chand, Publications, Revised edition, 2019.

**Reference Books:**

1. Quantitative Aptitude, G.L Barrons, Pinrest 2019
2. Quantitative Aptitude, Abhijit Guha, Mc Graw Hills, Edition 2019
3. Quantitative Aptitude, U. Mohan Rao SCITECH

## PERSONALITY DEVELOPMENT AND BEHAVIORAL SKILLS

III Year – I/II Sem

L	T	P	C
2	0	0	1

### Course Outcomes

1. Practice optimistic attitude for an efficient, socially viable and multi-faceted personality.
2. Demonstrate functions of non-verbal *communication in formal context*.
3. Build effective individual & team dynamics for professional accomplishments.
4. Analyze appropriate strategic Interpersonal Skills for productive workplace relationships.
5. Correspond in multiple contexts, for varied audiences, across genres and modalities.

### Unit – I:

#### Personality Development:

Definition - Various Aspects of Personality Development - Behavioural Traits.  
Importance of Soft Skills for personal and professional development - Success stories.

### Unit – II:

#### Non Verbal Communication:

Kinesics, Haptics, Proxemics, Vocalics, Oculistics Body Language informal contexts such as Group Discussions, Presentations and Interviews.

### Unit – III:

#### Team Dynamics:

Different Types of Teams– Role of an individual – Communicating as a group or team leader Individual Presentations/Team Presentation-Project Presentations- Case Studies

### UNIT-IV:

#### Interpersonal Skills:

Time Management- Stress Management- Emotional Intelligence- Conflict Management- Relationship Management

### UNIT-V:

#### Digital Correspondence:

Role of Multimedia in Communication - Communication in a Digital Edge (Video Conference Etc.) Social Networking: Importance and Effects.

### Text Book:

1. Personality Development and Soft Skills, Preparing for Tomorrow, Shikha Kapoor 2<sup>nd</sup> Edition, 2020.

### Reference Books

1. Barun, K Mitra, Personality Development and Soft Skills, Oxford University Press, 2<sup>nd</sup> Edition, 2016.
2. Professional Ethics. R Subramanian, Oxford University Press, 2<sup>nd</sup> Edition, 2015.

### COURSE STRUCTURE FOR B.TECH IV YEAR

#### B. Tech. IV Year I Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-16	Mobile Application Development	3	0	0	3
2	PC-17	Internet of Things	3	0	0	3
3	PE -3	Big Data Analytics Image Processing R Programming Data Science	3	0	0	3
4	PE-4	Machine Learning Block chain Technologies Advanced Databases Information Retrieval Systems	3	0	0	3
5	OE-3	Open Elective-3	3	0	0	3
6	PC Lab -7	Mobile Application Development Lab & IoT Lab	0	0	2	1
7	PE - 3 Lab	Big Data Analytics Lab Image Processing Lab R Programming Lab Data Science Lab	0	0	2	1
8	PW	Mini Project	0	0	6	3
<b>Total</b>			<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>

#### B. Tech. IV Year II Semester:

S. No.	Category	Course Title	L	T	P	Credits
1	PC-18	Semantic Web & Social Networks	3	0	0	3
2	PC-19	E-Commerce	3	0	0	3
3	PW	Technical Seminar	0	0	4	2
4	PW	Comprehensive Viva-Voce	0	0	4	2
5	PW	Major Project	0	0	20	10
<b>Total</b>			<b>6</b>	<b>0</b>	<b>28</b>	<b>20</b>

## MOBILE APPLICATION DEVELOPMENT

IV Year - I Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Understand the basics of Android devices and Platform.
2. Acquire knowledge on basic building blocks of Android programming required for App development.
3. Understand persistence Data storage mechanism in Android
4. Understand advanced application concepts like networking, Animations and Google Maps services etc.
5. Develop and publish Android applications in to Android Market

### UNIT I:

#### Java Fx Technology for Rich Client Applications

**Introduction:** Introduction to mobile application development, trends, introduction to various platforms, introduction to smart phones

**Android platform:** Android platform features and architecture, versions, comparison added features in each versions. ART (Android Runtime), ADB (Android Debug Bridge).

**Development environment/IDE:** Android studio and its working environment, gradle build system, emulator setup

**Application anatomy:** Application framework basics: resources, layout, values, asset XML representation and generated R.Javafile, Android manifest file. Creating a simple application.

### UNIT II:

#### Android UI Design

**GUI for Android:** Introduction to activities, activities life-cycle, Android v7 support library form API21 for lower version support

**Intent:** intent object, intent filters, adding categories, linking activities, user interface design components

**Views and View Groups:** Basic views, picker views, adapter views, Menu, App Bar etc, basics of screen design; different layouts. App widgets.

**Lollipop Material design:** new themes, new widgets, Card layouts. Recycler View

**Fragments:** Introduction to activities, activities life-cycle.

### UNIT III:

#### Data Persistence

**Different Data persistence schemes:** Shared preferences, File Handling, Managing data using SQLite database

**Content providers:** User content provider, Android in build content providers.

### UNIT IV:

#### Back Ground Running Process, Networking and Telephony Services

**Services: introduction** to services – local service, remote service and binding the service, the communication between service and activity, Intent Service.

**Multithreading:** Handlers, Async Task

**Android network programming: Http Url Connection,** Connecting to REST-based and SOAP based Web services

**Broad cast receivers:** Local Broadcast Manager, Dynamic broadcast receiver, System Broadcast. Pending Intent, Notifications

**Telephony Manager:** Sending SMS and making calls.

## **UNIT V:**

### **Advanced Applications**

**Location based services:** Google maps V2 services using Google API,

**Animations and Graphics:** Property Animation, View Animations, Drawable Animations

**Media and Camera API:** Working with video and audio inputs, camera API

**Sensor programming:** Motion sensors, Position sensors, Environmental sensors.

**Publishing Android Apps:** Guide lines, policies and process of uploading Apps to Google play.

### **Text Books:**

1. Dawn Griffiths, David Griffiths, *“Head First: Android Development”* ,OReilly2015,ISBN: 9781449362188
2. J.F. DiMarzio’s, *“Android 4 Application Development”*

### **Reference Books:**

1. Greg Milette, Adam Stroud, *“PROFESSIONAL Android™ Sensor Programming”*, John Wiley and Sons, Inc2012.
2. Paul Deital, Harvey Deital, Alexander Wald, *“Android 6 for Programmers ,App Driven approach”*,2015, Prentice Hall ,ISBN: 9780134289366

## INTERNET OF THINGS

IV Year - I Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Describe various IoT enabled technologies.
2. Understand the concepts of M2M with necessary protocols.
3. Illustrate Python programming for IoT
4. Examine the Python programming with Raspberry PI
5. Design web applications for IoT

### UNIT I

**Introduction to Internet of Things** Definition and Characteristics of IoT, Physical Design of IoT IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

### UNIT II

**IoT and M2M** Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPPER.

### UNIT III

**Introduction to Python** - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.

### UNIT IV

**IoT Physical Devices and Endpoints** - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

### UNIT V

**IoT Physical Servers and Cloud Offerings** Introduction to Cloud Storage models and communication APIs. Web server Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API.

**Case study:** Amazon web services for IoT.

### Text Books:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

### Reference Books:

1. Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, John Wiley and Sons, Ltd.
2. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, kindle edition.

**BIG DATA ANALYTICS**  
**(Professional Elective - 3)**

IV Year - I Sem

L	T	P	C
3	0	0	3

**Course Outcomes:**

1. Explain the foundations, definitions, and challenges of Big Data.
2. Use Hadoop file system interfaces.
3. Program using HADOOP and Map reduce.
4. Understand various Hadoop Eco Systems like Pig, Hive.
5. Outline Hadoop Eco System using HBase, Zookeeper.

**UNIT-I**

**Introduction to Big Data and Hadoop**

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analyzing Data with UNIX tools, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System.

**UNIT-II**

**HDFS (Hadoop Distributed File System)**

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

**UNIT-III**

**Map Reduce**

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

**UNIT-IV**

**Hadoop Eco System-I**

**Pig:** Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.

**Hive:** Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.

**UNIT-V**

**Hadoop Eco System-II**

**HBase:** HBasics, Concepts, Clients, Example, Hbase versus RDBMS.

**Zookeeper:** The Zookeeper Services, Zookeeper in Production.

**Text Books:**

1. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reily Media, 2012.

## Reference Books:

1. Seema Acharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015. References
2. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
3. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013).
4. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
5. Anand Rajaraman and Jeffrey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
6. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
7. Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
8. Pete Warden, "Big Data Glossary", O'Reily, 2011.

**IMAGE PROCESSING**  
**(Professional Elective - 3)**

**IV Year - I Sem**

L	T	P	C
3	0	0	3

**Course Outcomes:**

1. Understand Digital image fundamentals,
2. Program Image Transformations,
3. Design Color Image Processing and Restoration,
4. Implement Image segmentation techniques and
5. Program Image Compression techniques.

**UNIT-I**

Digital image fundamentals - Digital Image through scanner, digital camera. Concept of gray levels. Gray level to binary image conversion. Sampling and quantization. Relationship between pixels. Imaging Geometry.

**UNIT-II**

Image Transforms 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hotelling transform. Image enhancement Point processing. Histogram processing. Spatial filtering.

**UNIT-III**

Enhancement in frequency domain, Image smoothing, Image sharpening. Color image processing: Pseudo color image processing, full color image processing. Image Restoration Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

**UNIT-IV**

Image segmentation Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation.

**UNIT-V**

Image compression Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression.

**Text Books:**

- 1 Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education.

**References:**

- 1 Image Processing with Scilab and Image Processing Design Toolbox; Dr. Eng. (J) Harald Galda, 2011.
- 2 Fundamentals of Digital Image processing – A.K.Jain, PHI.
- 3 Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
- 4 Digital Image Processing – William K. Pratt, John Wiley, 3rd Edition, 2004.

**R PROGRAMMING**  
**(Professional Elective - 3)**

IV Year - I Sem

L	T	P	C
3	0	0	3

**Course Outcomes:**

1. Apply operations on basic data types using R
2. Apply various operators on data frames, factors and list
3. Develop functions using iterative programming for real world problems
4. Analyze the data by plotting using R
5. Formulate linear and multiple regression models for time series data & web data

**Unit – I**

**Basics of R:** Introduction, R-Environment Setup, Programming with R, Basic Data Types, Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector Subsetting, Matrices: Creating and Naming Matrices, Matrix Subsetting, Arrays, Class.

**Unit – II**

**Factors and Data Frames :** Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, Subsetting of Data Frames, Extending Data Frames, Sorting Data Frames,

**Lists:** Introduction, Creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors, Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements.

**Unit – III**

**Iterative Programming in R:** Introduction, While Loop, For Loop, Looping Over List.

**Functions in R:** Introduction, Writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R, Cumulative Sums and Products, Calculus in R, Input and Output Operations.

**Unit – IV**

**Apply Family in R :** Introduction, Using Apply in R, Using Lapply in R, Using Sapply, Using Tapply in R: Split Function, Using Mapply in R, Charts and Graphs : Introduction, Pie Chart: Chart Legend, 3D Pie Chart, Bar Chart, Box Plot, Histogram, Line Graph: Multiple Lines in Line Graph, Scatter Plot.

**Unit-V**

**Data Interfaces:** Introduction, CSV Files: Syntax, Importing a CSV File, Excel Files: Syntax, Importing an Excel file, Binary Files: Syntax, XML Files, Web Data, Databases.

**Statistical Applications:** Introduction, Basic Statistical Operations, Linear Regression Analysis, Chi-Squared Goodness of Fit Test, Chi-Squared Test of Independence, Multiple Regression, Time Series Analysis.

**Text Books:**

1. K G Srinivas, G M Siddesh “Statistical programming in R”, Oxford Publications.

**References:**

1. K Beginning R: The Statistical Programming Language, Mark Gardener, Wrox
2. Y. anchang Zhao, R and Data Mining: Examples and Case Studies. Elsevier in Dec 2012.
3. Avril Coghlan, A Little Book of R For Time Series, Release 0.2.

**DATA SCIENCE**  
**(Professional Elective - 3)**

**IV Year – I Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Outcomes:**

1. Understanding the fundamental concepts of Data Science
2. Understanding how data is collected, managed and stored for data science
3. Understand the real-world applications of data scientists
4. Visualize and present the inference using various tools
5. Implement data collection and management scripts using MongoDB

**UNIT – I**

**Introduction to Core Concepts and Technologies:**

Introduction to Data Science, Terminology, Data Science Process, Data Science Toolkit, Types of Data, Example Applications, Data Science Tools, Applications of Data Science

**UNIT – II**

**Data Collection and Management:**

Sources of data, Data Collection and APIs, Exploring and Fixing Data, Data Storage and Management, Using Multiple Data Sources

**UNIT-III**

**Data Analysis:**

Terminology and Concepts, Applying statistics, Central Tendencies and Distributions, Variance, Distribution Properties and Arithmetic, Samples/CLT, Basic Machine Learning Algorithms, Linear Regression, SVM, Naive Bayes.

**UNIT-IV**

**Data Visualization:**

Types of data Visualization, Data for Visualization: Data Types, Data Encodings, Retinal Variables, Mapping Variables to Encodings, Visual Encodings

**UNIT-V**

Different Technologies for Visualization, Bokeh (Python), Recent Trends in Various Data Collection and Analysis Techniques, Various Visualization Techniques, Application Development methods of used in Data science

**Text Books:**

1. Cathy O’Neil, Rachel Schutt, “Doing Data Science, Straight Talk from the Frontline”, O’Reilly
2. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, “Introducing Data Science”, Manning Publications Co., 1st Edition, 2016

**Reference Books:**

1. Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, “Mining of Massive Datasets”, v2.1, Cambridge University Press, 2014.
2. Joel Grus, “Data Science from Scratch: First Principles with Python”, O’Reilly, 1st Edition, 2015.

**MACHINE LEARNING**  
**(Professional Elective - 4)**

IV Year - I Sem

L	T	P	C
3	0	0	3

**Course Outcomes:**

1. Ability to understand the basic concepts such as Decision trees and Neural Networks.
2. Analyze various Machine Learning techniques and their efficiency.
3. Apply Machine Learning algorithms to solve problems of moderate complexity.
4. Understand Genetic algorithms and their applications.
5. Identify ML applications.

**Unit – I**

**Introduction and Concept Learning:** An illustrative learning task, A few approaches of learning task, what is known from algorithms? Theory, Experiment, Biology and Psychology, Introduction to Concept Learning, Version Space, Inductive Bias, Active Queries, Mistake Bound/PAC Model, Basic Results, Overview of issues regarding data sources, Success Criteria

**Unit - II**

**Decision Tree learning and Neural Network learning:** Introduction to Decision Tree Learning, Minimum Description Length Principle, Occam's razor, learning with active queries, Introduction to Neural Network Learning, Introduction to Perceptions, Perceptions, Introduction to Gradient Descent and Back propagation.

**Unit - III**

**Sample Complexity and Over fitting And Bayesian Approaches:** Introduction to Sample Complexity and Over fitting, Errors in estimating means, Cross Validation and Jackknifing VC Dimension, Irrelevant features, Multiplicative rules for Weight tuning, Introduction to Bayesian Approaches, The basics Expectation Maximization, Hidden Markov Models

**Unit – IV**

**Instance-based Techniques:** Introduction to Instance-based Techniques, Lazy vs. eager generalization, K nearest neighbor, Case-based reasoning

**Unit – V**

**Genetic Algorithms:** Different search methods for induction, Explanation based Learning, Using prior knowledge to reduce sample complexity

**Text Books:**

1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Trevor Hastie, Robert Tibshirani & Jerome Friedman. The Elements of Statistically Learning, Springer Verlag 2001

**Reference Books:**

1. Machine Learning Methods in the Environmental Science, Neural Network, William W Hsieh Cambridge University Press.
2. Richard O Duda, Peter E. Hart and David G. Stork, & pattern Classification, John Wiley & Sons Inc, 2001
3. Chris Bishop, Neural Network for, Pattern Recognition, Oxford University Press. 1995

**BLOCKCHAIN TECHNOLOGIES**  
**(Professional Elective - 4)**

**IV Year - I Sem**

L	T	P	C
3	0	0	3

**Course Outcomes:**

1. Understand the Cryptography, and Block Chain
2. Discuss about Generic elements of blockchain
3. Demonstrate various methods and routes of Decentralization
4. Analyze the concepts of Bitcoin
5. Apply Block chain in Real time scenario.

**Unit - I**

**Introduction to Cryptography and Blockchain:** Symmetric Cryptography, Stream Ciphers, Block Ciphers, Hash functions: Design of SHA-256, Merkle trees, Patricia trees, Distributed hash tables, Digital signatures. The Growth of Block Chain Technology: Electronic cash, Block Chain

**Unit - II**

Generic Elements of Blockchain, Blockchain working and Accumulation blocks, Benefits and Limitations of blockchain, Tiers of blockchain technology, Features of blockchain, Types of block chain, Consensus, CAP Theorem and block chain.

**Unit - III**

**Decentralization:** Decentralization using block chain, Methods of Decentralization, Routes to Decentralization, Block chain and full Ecosystem Decentralization, Smart Contracts, Platforms for Decentralization.

**Unit - IV**

**Introducing Bitcoin:** Digital keys and addresses, Transactions, Block Chain, Mining, the Bitcoin Network.

**Unit - V**

Ethereum blockchain, The Ethereum Network, Components of Ethereum Ecosystem. Current Landscape and what's next: Emerging trends, Blockchain Research.

**Text Books:**

1. Imran Bashir, Mastering Block chain, Packt Publishing, 2018.
2. VikramDhillon, David Metcalf, MaxHooper, BlockchainEnabledApplications, Apress, 2017.

**Reference Books:**

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

**ADVANCED DATABASES**  
**(Professional Elective - 4)**

IV Year – I Sem

L	T	P	C
3	0	0	3

**Course Outcomes:**

1. Understand the concepts of Distributed Database Systems.
2. Identify different Architectural Models for Distributed DBMS.
3. Characterize the query processors.
4. Design Algorithms for Concurrency control Mechanisms.
5. Identify different Parallel DBMS Techniques based on given constraints.

**UNIT-I**

**Introduction**

Distributed Data Processing, Distributed Database System, Promises of DDBSs, Design Issues.

**UNIT-II**

**Distributed DBMS Architecture:** ANSI SPARC, Centralized DBMS Architecture, Architectural Models for Distributed DBMS.

**Distributed Database Design:** Top-Down Design Process, Distribution Design issues, Fragmentation, Allocation.

**UNIT-III**

**Introduction to RDBMS:** Overview of Relational DBMS: Relational Database Concepts, Normalization, Relational Data Languages.

**Query Processing and Decomposition:** Query Processing Objectives, Characterization of query processors, layers of query processing, query decomposition, Localization of distributed data.

**UNIT-IV**

**Distributed Query Optimization:** Query optimization, centralized query optimization, Distributed query optimization algorithms.

**Transaction Management:** Definition, properties of transaction; types of transactions.

**UNIT-V**

**Distributed Concurrency Control:** Serializability theory, Concurrency control Mechanisms & Algorithms; Time stamped & Optimistic concurrency control algorithms, Deadlock Management, Relaxed Concurrency Control.

**Text Books:**

1. Distributed Databases Stefano Ceri and WillipsePelagatti: McGraw Hill.
2. Principles of Distributed Database Systems, M.TamerOzsu, Patrick Valduriez, 3<sup>rd</sup> Edition, Springer.

**Reference Books:**

1. M.Tamer OZSU and PauckValduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Henry F Korth, a Silberchatz and Sudershan: Database System Concepts. Tata MGH.
3. Raghuramakrishnan and JohhanesGehrke: Database Management Systems, MGH.

**INFORMATION RETRIEVAL SYSTEMS**  
(Professional Elective – 4)

IV Year - I Sem

L	T	P	C
3	0	0	3

**Course Outcomes**

1. Understand the concepts of information system models
2. Ability to use various retrieval utilities for improving search
3. Analyze the crossing language barrier and learn about crossing language information retrieval.
4. Evaluate indexing and compressing documents to improve space and time efficiency.
5. Understand issues in web search, structured and unstructured data.

**UNIT-I**

**Introduction:** Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

**Retrieval Strategies:** Vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model, Language Models.

**UNIT-II**

**Retrieval Utilities:** Relevance feedback, Clustering, N-grams, Regression analysis, Thesauri.

**UNIT-III**

**Retrieval Utilities:** Semantic networks, Parsing Cross-Language Information Retrieval: Introduction, Crossing the language barrier.

**UNIT-IV**

**Efficiency:** Inverted index, Query processing, Signature files, Duplicate document detection.

**UNIT-V**

**Integrating Structured Data and Text:** A Historical progression, Information retrieval as a relational application, Semi-structured search using a relational schema

**Distributed information Retrieval:** A Theoretical model of distributed retrieval Web search.

**Text Books:**

1. David A. Grossman, Ophir Frieder, information Retrieval Algorithms and Heuristics, Springer, 2<sup>nd</sup> Edition (Distributed by Universities Press), 2004.

**Reference Books:**

1. Gerald J Kowaiski, Mark T Maybury. Information Storage and Retrieval Systems, Springer, 2000
2. Soumen Chakrabarti, Mining the Web : Discovering Knowledge from Hypertext Data, Morgan- Kaufmann Publishers, 2002
3. Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, An Introduction to Information Retrieval, Cambridge University Press, Cambridge, England, 2009

## MOBILE APPLICATION DEVELOPMENT & INTERNET OF THINGS LAB

IV Year - I Sem

L	T	P	C
0	0	2	1

### Course outcomes:

1. Ability to develop GUI based Android applications.
2. Ability to develop event-based Android applications.
3. Design Android applications that can access database.
4. Apply the concepts of IoT by identifying different related technologies.
5. Apply IoT to different applications by evaluating IoT protocols.
6. Design and develop smart IoT solutions by analyzing the data received from sensors.

### Mobile Application Development Lab

#### Week 1:

Develop an application that receives user's name, contact and city and displays the same using Layout Managers and Event Listeners.

#### Week 2:

Create a native calculator application.

#### Week 3:

Develop a Registration and Login application that makes use of database.

#### Week 4:

Develop a native application that uses GPS location information.

#### Week 5:

Develop an application that creates notification upon receiving a message.

#### Week 6:

Create an alarm clock mobile application.

### Internet of Things Lab

#### Week 1:

1. Introduction to Arduino Uno – Sensors & Actuators
  - a. Temperature & Humidity Sensors
  - b. Air Quality Sensor
  - c. PIR Motion Sensor
  - d. Micro Servo Motor
  - e. Stepper Motor
  - f. 100RPM Motor

**Week 2:**

1. Introduction to NodeMCU – Sensors & Actuators
  - a. Temperature & Humidity Sensors
  - b. Air Quality Sensor
  - c. PIR Motion Sensor
  - d. Micro Servo Motor
  - e. Stepper Motor
  - f. 100RPM Motor

**Week 3:**

1. Setting up your Raspberry Pi. Installation of software.
2. Introduction to Raspberry Pi – Sensors & Actuators
  - a. **Temperature & Humidity Sensor**
  - b. **Ultrasonic Sensor**
  - c. Micro Servo Motor

**Week 4:**

1. Introduction to IoT & Sensor control with IFTTT

**Week 5:**

1. Open Source Cloud Platforms for IoT: [thinger.io](http://thinger.io), Google Cloud Platform.

**Week 6:**

1. Introduction to Open Web Services for IoT
2. Experiments with Open Web Services for IoT:
  - a. M2M Labs
  - b. The Thing Box
  - c. The Thing System
  - d. Node-RED

**BIG DATA ANALYTICS LAB**  
**(Professional Elective – 3 Lab)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**IV Year - I Sem**

**Course Outcomes:**

1. To introduce the tools required to manage and analyze big data like Hadoop, NoSql
2. To impart knowledge of map reduce paradigm to solve complex problems Map-Reduce
3. To introduce several new algorithms for big data mining like classification, clustering and finding frequent patterns.

**LIST OF EXPERIMENTS**

**Week 1, 2:**

1. Implement the following Data structures in Java  
a) Linked Lists b) Stacks c) Queues d) Set e) Map

**Week 3**

2. Perform setting up and Installing Hadoop in Pseudo distributed mode

**Week 4:**

3. Implement the following file management tasks in Hadoop:  
i. Adding files and directories  
ii. Retrieving files  
iii. Deleting files

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

**Week 5:**

4. Run a basic Word Count Map Reduce program to understand Map-Reduce Paradigm.

**Week 6:**

5. Write a Map Reduce program that mines weather data.  
Weather sensors collecting data every hour at many locations across the globe gather a Large volume of log data, which is a good candidate for analysis with Map-Reduce, since it is semi structured and record-oriented.

**Week 7:**

6. Implement Matrix Multiplication with Hadoop Map Reduce

**Week 8, 9:**

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your Data.

**Week 10, 11:**

8. i) Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, Functions and indexes  
ii) Performance techniques in Hive partitions, bucketing.

**Week 12:**

9. Migration from Mysql database to hive using Sqoop

**IMAGE PROCESSING LAB**  
**(Professional Elective–3 Lab)**

**IV Year - I Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Outcomes:**

1. Understand and apply mathematical transforms necessary for image processing.
2. Implement Edge detection and filtering techniques.
3. Implement Image Enhancement and Fourier Transformation techniques.
4. Develop segmentation Techniques.

**List of Experiments**

1. Display of Grayscale Images.
2. Histogram Equalization.
3. Non-linear Filtering.
4. Edge detection using Operators.
5. 2-D DFT and DCT.
6. Filtering in frequency domain.
7. Display of color images.
8. Conversion between color spaces.
9. DWT of images.
10. Segmentation using watershed transform.

**R PROGRAMMING LAB**  
**(Professional Elective - 3 Lab)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**IV Year - I Sem**

**Course outcomes:**

1. Explore R environment
2. Visualize data insights using charts and graphs.
3. Analysis data with linear regression model.

**LIST OF EXPERIMENTS**

**Week-1:**

Installation and Environment set up R and Rstudio

**Week-2:**

Experiments on Vector Arithmetic operations

**Week-3:**

Experiments on Matrices operations

**Week-4:**

Experiments on Arrays functions

**Week-5:**

Experiments on Factors

**Week-6:**

Experiments on Data Frames

**Week-7:**

Experiments on List operations

**Week-8:**

Write R scripts which demonstrate logical operations and Conditional Statements

**Week-9:**

Write R scripts which demonstrate Looping over List

**Week-10:**

Write R scripts which demonstrate Nested Functions and Function Scoping

**Week-11:**

Experiments on Mathematical Functions in R

**Week-12:**

Experiments on Calculus in R

**Week-13:**

Experiments on Lapply, Sapply and Apply functions

**Week-14:**

Generate different Charts and Graphs using R

**DATA SCIENCE LAB**  
**(Professional Elective - 3 Lab)**

**IV Year - I Sem**

L	T	P	C
0	0	2	1

**Course Outcomes:**

1. To make students understand learn about a Data Science – Python Programming, way of solving problems.
2. To teach students to write programs in Python to solve problems.
3. Demonstrate the usage of built-in objects in Python.
4. Analyze the significance of python program development environment by working on real world examples
5. Implement numerical programming, data handling and visualization through NumPy, Pandas and Matplotlib modules.

**1. INTRODUCTION TO PYTHON**

Structure of Python Program-Underlying mechanism of Module Execution-Branching and Looping-Problem Solving Using Branches and Loops-Functions - Lists and Mutability- Problem Solving Using Lists and Functions

**Week 1:**

1. Demonstrate usage of branching and looping statements
2. Demonstrate Recursive functions
3. Demonstrate Lists

**Week 2:**

**SEQUENCE DATATYPES AND OBJECT-ORIENTED PROGRAMMING**

Sequences, Mapping and Sets- Dictionaries- Classes: Classes and Instances-Inheritance-Exceptional Handling-Introduction to Regular Expressions using “re” module.

Lab Exercises.

1. Demonstrate Tuples and Sets
2. Demonstrate Dictionaries
3. Demonstrate inheritance and exceptional handling
4. Demonstrate use of “re”.

**Week 3: USING NUMPY**

Basics of NumPy-Computation on NumPy-Aggregations-Computation on Arrays-Comparisons, Masks and Boolean Arrays-Fancy Indexing-Sorting Arrays-Structured Data: NumPy’s Structured Array.

Lab Exercises;

1. Demonstrate Aggregation
2. Demonstrate Indexing and Sorting

#### **Week 4: DATA MANIPULATION WITH PANDAS - I**

Introduction to Pandas Objects-Data indexing and Selection-Operating on Data in Pandas-Handling Missing Data-Hierarchical Indexing - Combining Data Sets

Lab Exercises

1. Demonstrate handling of missing data
2. Demonstrate hierarchical indexing

#### **Week 5: DATA MANIPULATION WITH PANDAS - II**

Aggregation and Grouping-Pivot Tables-Vectorized String Operations -Working with Time Series-High Performance Pandas- and query ()

Lab Exercises

1. Demonstrate usage of Pivot table
2. Demonstrate use of and query ()

#### **Week 6: VISUALIZATION AND MATPLOTLIB**

Basic functions of matplotlib-Simple Line Plot, Scatter Plot-Density and Contour Plots-Histograms, Binnings and Density-Customizing Plot Legends, Colour Bars-Three-Dimensional Plotting in Matplotlib.

Lab Exercises;

1. Demonstrate Scatter Plot
2. Demonstrate 3D plotting

**Week 7:** Perform Data exploration and pre-processing in Python

**Week 8: Implement** regularized linear regression

**Week 9: Implement** Naive Bayes classifier for dataset stored as CSV file.

**Week 10: Implement** regularized logistic regression

**Week 11:** Build models using different Ensembling techniques

**Week 12: Build** models using Decision trees

**Week 13:** Build model using SVM with different kernels

**Week 14: Implement** K-NN algorithm to classify a dataset.

**Week 15:** Build model to perform Clustering using K-means after applying PCA and determining the value of K using Elbow method.

## MINI PROJECT

IV Year – I Sem

L	T	P	C
0	0	6	3

### Course Outcomes:

1. Analyze and communicate software requirement specifications
2. Apply design and development principles in the construction of software systems of varying complexity.

### METHOD OF EVALUATION:

The students in a group of 3 to 4 works on an industry oriented topic approved by the head of the department and prepare a comprehensive mini project report after completing the work to the satisfaction. The progress of the project is evaluated based on a minimum of two reviews. The review committee may be constituted by the Head of the Department. A mini project report is required at the end of the semester. The mini project work is evaluated based on oral presentation and the mini project report jointly by external and internal examiners constituted by the Head of the Department.

## SEMANTIC WEB AND SOCIAL NETWORKS

IV Year - II Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Identify the Structure of the Semantic Web Technology in reference with the World Wide Web.
2. Design the concepts of Resource Description Framework, Ontology and Web Ontology Language (OWL).
3. Understand Ontology Engineering Tools and Methods.
4. Apply Logic, Rule and Inference Engines in Semantic Applications.
5. Understand and Analyze Social Networks and design solution for Web based Social Networks like Blogs and Online Communities.

### UNIT-I

**Empowering the Information Age:** Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web.

**Turing: What is Machine Intelligence?** : Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents.

**Berners-Lee: What is Solvable on the Web?** : Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

### UNIT-II

**Resource Description Framework:** HTML Language, XML Language, RDF Language, Basic Elements, RDF Schema.

**Web Ontology Language:** Ontology Language, Ontology Language Requirements, Compatibility of OWL and RDF/RDFS, The OWL Language, Basic Elements, OWL Example: Compute Ontology, OWL Capabilities and Limitations.

### UNIT-III

**Ontology Engineering:** Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping.

### UNIT-IV

**Logic, Rules, Inference & Semantic Web Applications:** Logic, Rule and Inference, Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base.

**Semantic Search Technology:** Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods.

### UNIT-V

**Social Network Analysis:** What is Networks analysis, Development of the social networks analysis.

**Electronic sources for network analysis:** Electronic Discussion networks. Blogs and Online Communities, Web Based Networks.

**Developing social-semantic applications:** Building Semantic Web Applications with social network features, Semantic Web Architecture.

**Text Books:**

1. Thinking on the Web – Berners Lee, Godel and Turing, Wiley interscience, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

**Reference Books:**

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, Audi Studer, Paul Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

## E – COMMERCE

IV Year - II Sem

L	T	P	C
3	0	0	3

### Course Outcomes:

1. Identify the anatomy of E-Commerce applications and its process models.
2. Categorize different Electronic payment systems.
3. Examine Supply chain Management.
4. Analyze the various marketing strategies for an online business.
5. Design strategies for E-Commerce Catalogues.

### UNIT-I

#### Electronic Commerce

Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications and E-Commerce organization applications, Consumer Oriented Electronic commerce, Mercantile Process models.

### UNIT-II

#### Electronic Payment Systems

Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems. Inter Organizational Commerce EDI, EDI Implementation, Value added networks.

### UNIT-III

Intra Organizational Commerce work Flow, Automation Customization and internal Commerce, Supply chain Management.

### UNIT-IV

Corporate Digital Library Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing Information based marketing, advertising on Internet, on-line marketing process, market research.

### UNIT-V

#### Consumer Search and Resource Discovery

Information search and Retrieval, Commerce Catalogues, Information Filtering. Multimedia key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing's, Desktop video conferencing.

### Text Book:

1. Frontiers of electronic commerce Kalakata, Whinston, Pearson.

### References Books:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, John Wiley.
2. E-Commerce, S.JaiswalGalgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
4. Electronic Commerce Gary P.Schneider Thomson.

## TECHNICAL SEMINAR

IV Year – II Sem

L	T	P	C
0	0	4	2

### Course Outcomes:

1. Student able to communicate effectively.
2. Student able to develop good presentation skills.
3. Student able to analyze and consolidate the presentation
4. Student able to effectively interact with others.
5. Student able to explain the latest technologies and trends in computing.

### METHOD OF EVALUATION:

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. Each student is expected to present at least twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report. A Faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Evaluation is 100% internal.

## COMPREHENSIVE VIVA VOCE

IV Year – II Sem

L	T	P	C
0	0	4	2

### COURSE OUTCOMES:

1. Revise the Information Technology principles postulations and other technical information in order to apply in various conditions.
2. Explain the relevance of a technical note for a given application.
3. Collate and justify the design by the acquired comprehensive technical knowledge and skill.

### METHOD OF EVALUATION:

Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is intended to assess the student's understanding of the subjects he/she studied during the B. Tech. course of study. The Comprehensive VivaVoce is evaluated by the Committee. There are no internal marks for the Comprehensive Viva-Voce.

## MAJOR PROJECT

IV Year – II Sem

L	T	P	C
0	0	20	10

### Course Outcomes:

1. Analyze and communicate software requirement specifications
2. Apply design and development principles in the construction of software systems of varying complexity
3. Able to function effectively on team to accomplish a common goal
4. Exhibit documentation skills to generate project reports

### METHOD OF EVALUATION:

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepare a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.