

# **Academic Regulations**

## **Course Structure & Detailed Syllabus**

**CHOICE BASED CREDIT SYSTEM**

### **R25**

## **COMPUTER SCIENCE & ENGINEERING**

### **Bachelor of Technology (B.Tech)**

**For the batches admitted from the A.Y. 2025-26**



**MARRI  
LAXMAN  
REDDY**

**GROUP OF INSTITUTIONS**

# **MLR Institute of Technology**

**(Autonomous)**

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## **ACADEMIC REGULATIONS (R25)**

### **B. Tech. - Regular Four Year Degree Programme (For batches admitted from the academic year 2025-26)**

#### **1.0 For pursuing four year Under Graduate Degree Programme of study in Engineering & Technology (UGP in E&T) offered by MLR Institute of Technology under Autonomous status is herein referred to as MLRIT (Autonomous):**

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2022-23 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for M L R Institute of Technology (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, M L R Institute of Technology shall be the chairman of Academic Council.

#### **2.0 Eligibility for Admission**

- 2.1** Admission to the undergraduate(UG) programme shall be made either on the basis of the merit rank obtained by the qualified student in entrance test conducted by the Telangana State Government (EAMCET) or the College or on the basis of any other order of merit approved by the University/TSHE, subject to reservations as prescribed by the government from time to time.
- 2.2** The medium of instructions for the entire undergraduate programme in Engineering & Technology will be **English** only.

#### **3.0 B.Tech. Programme Structure**

- 3.1** A student after securing admission shall complete the B.Tech. programme in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course. Each student shall secure 160 credits (with CGPA  $\geq$  5) required for the completion of the undergraduate programme and award of the B.Tech. degree.
- 3.2 UGC/AICTE** specified definitions/descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/norms, which are listed below.

##### **3.2.1 Semester Scheme**

The undergraduate programme is of four academic years and there shall be two semesters in each academic year. There shall be a minimum of 15 weeks of instruction, excluding the mid- term and semester-end exams. Around 15

instruction hours, 30 instruction hours and 45 hours of learning need to be followed per one credit of theory course, practical course and project/field-based learning respectively. In each semester, there shall be 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS). The curriculum/course structure suggested by AICTE is followed as a reference document.

### 3.2.2 Credit Courses

All courses offered in each semester are to be registered by the student. Against each course in the course structure, the L: T: P: C (lecture periods: tutorial periods: practical periods: credits) pattern has been defined.

- One credit is allocated for one hour per week in a semester for lecture (L) or Tutorial (T) session.
- One credit is allocated for two hours per week in a semester for Laboratory/ Practical (P) session.
- One credit is allocated for three hours per week in a semester for Project/Mini-Project session.

For example, a theory course with three credit weightage requires three hours of classroom instruction per week, totaling approximately 45 hours of instruction over the entire semester.

### 3.2.3 Subject Course Classification

All subjects/courses offered for the undergraduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry courses
2		ES - Engineering Sciences	Includes Fundamental Engineering Courses
3		HS – Humanities and Social Sciences	Includes courses related to Humanities, Social Sciences and Management
4	Core Courses (CoC)	PC – Professional Core	Includes core courses related to the parent branch of Engineering.
5	Elective Courses (E!C)	PE – Professional Electives	Includes elective courses related to the parent branch of Engineering.
6		OE – Open Electives	Elective courses which include inter-disciplinary courses or courses in an area outside the parent branch of Engineering.
7	Project Core	Project Work	B.Tech. Project Work
8	Other Core	Industry Training/	Industry Training/ Internship/ Industry Oriented Mini-

9	Courses (OCC)	Internship/ Industry Oriented Mini-project/Skill Development Courses	Project/Skill Development Courses
10		Seminar	Seminar based on core contents related to parent branch of Engineering.
11	Skill Development Courses (SDC)	-	Courses designed to help individuals gain, improve, or refine specific skills
12	Value Added Courses (VAC)	-	Courses to build professional values, traditional knowledge and sensitization of societal issues

#### 4.0 Mandatory Induction Programme

An induction program of one week duration for the UG students entering the institution, right at the start shall be implemented. Normal classes commence only after the induction programme is conducted. Following activities could be part of the induction programme: i) Physical Activity, ii) Creative Arts, iii) Imparting Universal Human Values, iv) Literary Activities, v) Lectures by Eminent People, vi) Visits to Local Areas and vii) Familiarization to department as well as entire institute and viii) Making students understand Innovative practices at the college premises etc.

#### 5.0 Course Registration

- 5.1 A faculty advisor / mentor shall be assigned to a group of around 20 students, who will advise the students about the undergraduate programme, its course structure and curriculum, choices/options of the courses, based on their competence, progress, pre-requisites and interest.
- 5.2 The academic section of the college invites 'registration forms' from students before the beginning of the semester through 'on-line registration', ensuring 'date and time stamping'. The online registration requests for semester courses shall be completed two weeks before the commencement of SEEs (Semester End Examinations) of the preceding semester.
- 5.3 A student can apply for **on-line** registration, **only after** obtaining the '**written approval**' from faculty advisor/mentor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with the Head of the Department, faculty advisor/ mentor and the student.
- 5.4 A student shall register for all the courses offered in a semester as specified in the course structure.
- 5.5 Course options exercised through **on-line** registration are final and **cannot** be changed; further, alternative choices also will not be considered. However, if the course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any inevitable or unexpected reasons, then the student shall be allowed to have alternative choice either for a new course (subject to offering of such a course), or for another existing course. Such alternative arrangements will be made by the

Head of the Department, with due notification and time-framed schedule, within **a week**, but before the commencement of class- work of the semester.

- 5.6** The Head of the Department / Course Coordinator should review vacant slots in the timetable of each section once in every week or fortnight. The vacant slots in the time-table may be allocated to the subject teachers who could not take classes in proportion to the number of weeks completed from the commencement of the semester.
- 5.7** Two faculty members may be allocated for the tutorial session of Mathematics-1 course for better interaction/practice and to minimise the failures in the subject.
- 5.8 Professional Electives:** The students have to choose six Professional Electives (PE-I to PE- VI) from the six baskets of professional electives given.

Students have the flexibility to choose from the list of professional electives offered by the Institute or opt to register for the equivalent Massive Open Online Courses (MOOCs) as listed from time to time by the college.

- 5.9 Open Electives:** Students have to choose three Open Electives (OE-I, II & III) from three baskets of Open Electives given by other than the parent department. However, the student can opt for an Open Elective course offered by his parent department, if the student has not studied that course so far. Similarly, Open Elective courses being studied should not match with any courses of the forthcoming semesters.

**5.10 Provision for Early Registration of MOOCs:**

For a professional elective in a semester, students are allowed to register for an equivalent MOOCs course listed from time to time by the college one semester in advance. For example, a Professional Elective of III Year II Sem shall be allowed to register under MOOCs platform in III year I Sem.

The credits earned in one semester in advance can be submitted in the subsequent semester for the assessment.

The students who have registered in advance in an equivalent MOOCs course and fail to secure any pass grade in the MOOCs course, can register for the regular course offered in the following semester of their course structure.

- 5.11 Conversion of Marks Secured in MOOCs into Grades:** Marks secured in the internal and external evaluations of a MOOCs course shall be scaled to 40 and 60 marks respectively. The sum of these two components shall be considered as the total marks out of 100. The corresponding grade shall then be determined as per the marks-to-grades conversion rules specified in Clause 10.3.

- 5.12** MOOCs are allowed only for professional elective courses and for a few Minors & Honors courses

**5.13 Additional learning resources:**

Students are encouraged to acquire additional course-related knowledge by auditing learning resources from MOOCs platforms for each course offered in their course structure. These additional courses are not meant for earning

credits but are intended to enhance knowledge. The college shall notify such courses from time to time through their portals for the benefit of students. They are categorized into three types: prerequisite, reinforcement, and aspirational. Prerequisite courses help students gain familiarity and provide sufficient background. Reinforcement courses aim to offer different perspectives on learning, while aspirational courses focus on next-level or advanced learning.

## **6.0 Rules to offer Elective courses**

- 6.1** An elective course may be offered to the students, only if a minimum of 25% of class strength opts for it.
- 6.2** Same elective course for different sections may be offered by different faculty members. The selection of elective course by students will be based on first come first serve and / or CGPA criterion.
- 6.3** If the number of students registrations are more than the strength of one section, then it is choice of the concerned Department to offer the same course for more than one section based on the resources available in the department.

## **7.0 Attendance requirements:**

- 7.1** A student shall be eligible to appear for the semester-end examinations, if the student acquires a minimum of 75% of aggregate attendance of all the courses for that semester.
- 7.2** Shortage of attendance in aggregate upto 10% (securing 65% and above but below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.
- 7.3** A stipulated fee shall be payable for condoning of shortage of attendance as notified in the respective college websites.
- 7.4** Two hours of attendance for each theory course shall be considered, if the student appears for the mid-term examination of that course.
- 7.5** Shortage of attendance below 65% in aggregate shall in no case be condoned.
- 7.6** Students whose shortage of attendance is not condoned in any semester, are not eligible to take their semester-end examinations of that semester. They get detained and will not be promoted to the next semester. Their registration for that semester shall stand cancelled, including internal marks. They may seek re-registration for that semester in the next academic year.
- 7.7** A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same semester

## **8.0 Criteria for Earning of Credits in a Course**

- 8.1** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course, if the student secures not less than 35% (21 marks out of 60 marks) in the semester end examinations (SEE), and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE

(Continuous Internal Evaluation) and SEE (Semester End Examination) taken

together; in terms of letter grades, this implies securing 'C' grade or above in that course.

- 8.2** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Field Based Research Project / Industry Oriented Mini Project / Internship, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he/she (i) does not submit a report on Field-Based Research Project/Industry Oriented Mini Project/ Internship, or (ii) not make a presentation of the same before the evaluation committee as per schedule, or (iii) secures less than 40% marks in Field-Based Research Project / Industry Oriented Mini Project / Internship evaluations.
- 8.3** A student eligible to appear in the semester-end examination for any course, is absent from it or failed (thereby failing to secure 'C' grade or above) may re-appear for that course in the supplementary examination as and when it is conducted. In such cases, internal marks assessed in continuous internal evaluation (CIE) earlier for that course will be carried over, and added to the marks obtained in the SEE supplementary/make-up examination. If the student secures sufficient marks for passing, 'C' grade or above shall be awarded as specified in clause 10.3.

## **9.0 Distribution of Marks and Evaluation**

- 9.1** The performance of a student in every course (including Value Added Courses and Skill Development Courses, Laboratory/Practical and Project Work) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination), irrespective of the credits allocated.

## **9.2 Continuous Internal Evaluation (CIE)**

### **9.2.1 Theory Courses:**

For theory courses, during a semester, there shall be two mid-term examinations. Each Mid- Term examination consists of two parts i) Part – A for 10 marks, ii) Part – B for 20 marks, totaling to 30 marks. Total duration of mid-term examination is two hours.

1. Mid Term Examination for 30 marks:
  - a. Part - A: Objective/quiz paper for 10 marks.
  - b. Part - B: Descriptive paper for 20 marks.

The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks.

The descriptive paper shall contain 6 questions out of which, the student has to answer 4 questions, each carrying 5 marks. The average of the two Mid Term

Examinations shall be taken as the final marks for Mid Term Examination (for 30 marks).

While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus. Questions will be drawn from the mid-term exam syllabus, ensuring uniform coverage of all topics.

The remaining 10 marks of Continuous Internal Evaluation are distributed as follows:

2. Five marks for the assignment for 5 marks. Student shall submit two assignments and the average of 2 Assignments each for 5 marks shall be taken. The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination.
3. Five marks for the Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject. This assessment shall be completed before II Mid-Term Examination. The HODs shall schedule these sessions in their semester plan.

### **9.2.2 Engineering Drawing and Computer Aided Drafting Course:**

For this course, 20 marks will be allocated for day-to-day assessments conducted during drawing practice sessions, and another 20 marks will be allocated for the mid-term examination. In the mid-term examination, students shall attempt any four out of six given questions

**A Computer-Based Test (CBT)** in each course is available for students who either:

1. Missed one of the two mid-term examinations due to unavoidable circumstances, or
2. Attended both mid-term examinations but wish to improve their internal marks.

The CBT will be conducted at the end of the semester and will carry a total of 30 marks. The marks obtained in the CBT will be considered equivalent to those obtained in one mid-term examination. Zero marks will be awarded to students who are absent from the mid-term examination. The average of the best two scores from the three exams (the two mid-term exams and the CBT), combined with other internal assessment components, will constitute the Continuous Internal Improvement (CII) marks for that specific course. CBT exams shall be conducted by the College.

## **9.3 Semester End Examination for theory courses**

### **9.3.1 Theory Courses:**

The semester end examinations (SEE), for theory courses, will be conducted for 60 marks consisting of two parts viz. i) Part- A for 10 marks and ii) Part - B for 50 marks.

- Part-A is compulsory, consists of five short answer questions covering all units of syllabus; each question carries two marks.
- Part-B consists of five questions carrying 10 marks each. There shall be two questions asked in the question paper from each unit with either-or choice and the student should answer either of the two questions. The student shall answer one question from each of five units.

### **9.3.2 Engineering Drawing and Computer Aided Drafting Course:**

Question paper consists of five questions carrying 12 marks each. There shall be two questions asked in the question paper from each unit with either-or choice and the student should answer either of the two questions. The student shall answer one question from each of five units.

There shall be no section with short answer questions.

### **9.3.3 Duration of SEE:**

The duration of Semester End Examination of theory and drawing courses is 3 hours.

### **9.4 Semester End Examination for Practical Courses**

For practical courses there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and semester-end examination for 60 marks. The breakup of the continuous internal evaluation for 40 marks is as follows:

1. 10 marks for a write-up on day-to-day experiments in the laboratory (in terms of aim, components/procedure, expected outcome).
2. 10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
3. 10 marks for the internal practical examination conducted by the laboratory teacher concerned.
4. The remaining 10 marks are for Laboratory Report/Project and Presentation, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

The Semester End Examination for practical courses shall be conducted with an external examiner and the laboratory course teacher. The external examiner shall be appointed from the college outside their cluster and not from a group colleges.

In the Semester End Examination for practical courses held for 3 hours, rubrics of evaluation for 60 marks is as given below:

1. 10 marks for write-up
2. 15 for experiment/program
3. 15 for evaluation of results
4. 10 marks for presentation on another experiment/program in the same laboratory course and
5. 10 marks for viva-voce on concerned laboratory course.

For any change of experiment, 5 marks will be deducted from the total of 60 marks. If second time change of experiment is requested, another five marks will be deducted from the 60 marks. No third change will be permitted.

### **9.5 Field-based Research Project:**

There shall be a Field-based Research Project in the intervening summer between II-II and III- I Semesters. Students will register for this project immediately after II Year II Semester examinations and pursue it during summer vacation. The Field-based Research Project shall be submitted in a report form and presented before the committee in III year I semester. It shall be evaluated for 100 external marks. The evaluation committee shall consist of an External Examiner, Head of the Department, Supervisor of the Project and a Senior Faculty Member of the department. There shall be no internal marks for Field-based Research Project. Student shall have to earn 40% marks, i.e 40 marks out of 100 marks. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the committee as per schedule, or (iii) secures less than 40% marks in this course.

### **9.6 Internship/Industry Oriented Mini Project:**

There shall be an Internship/Industry Oriented Mini Project in collaboration with an industry from their specialization. Students shall register for this project immediately after III Year II Semester Examinations and pursue it during summer vacation. Internship should be carried out at an organization (or) Industry. The Industry Oriented Mini Project shall be submitted in a report form and presented before the committee in IV Year I Semester before the semester end examination. It shall be evaluated for 100 external marks. The committee consists of an External Examiner, Head of the Department, Supervisor of the Industry Oriented Mini Project/Internship, and a Senior Faculty Member of the Department.

**9.6.1** For evaluating industry-oriented mini-projects, it is preferable to appoint an external examiner from the industry, ideally from one of the organizations/ industries with which the institute has established / proposing to establish collaborations.

### **9.7 UG Project Work:**

**9.7.1** The UG project work shall be initiated at the beginning of the IV Year II Semester and the duration of the project work is one semester. The student must present in consultation with his/her supervisor, the title, objective and plan of action of his/her Project work to the departmental committee for approval within two weeks from the

commencement of IV Year II Semester. Only after obtaining the approval of the departmental committee, the student can start his/her project work.

**9.7.2** Student has to submit project work report at the end of IV Year II Semester. The project work shall be evaluated for 100 marks. Out of which 40 marks and 60 marks are allocated for CIE and External Evaluation respectively.

**9.7.3** For internal evaluation, the departmental committee consisting of Head of the Department, Project Supervisor and a Senior Faculty Member shall evaluate the project work for 40 marks. The distribution of marks is as follows:

• Objective(s) of the work done	-	05 Marks
• Methodology adopted	-	15 Marks
• Results and Discussions	-	15 Marks
• Conclusions and Outcomes	-	05 Marks
Total	-	40 Marks

**9.7.4** The External Evaluation shall be conducted by the external examiner for a total of 60 marks. It shall comprise the presentation of the work, communication skills, and viva-voce, with a weightage of 20 marks, 15 marks, and 25 marks respectively.

The topics for main Project shall be different from the topic of Industry Oriented Mini Project/ Internship/SDC. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the External Examiner as per schedule, or (iii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

**9.7.5** For conducting viva-voce exam of project work, principal appoints an external examiner. The external examiner may be selected from the list of experts submitted by the HOD of the college.

**9.7.6** A student who has failed, may re-appear once for the above evaluation, when it is scheduled again; if student fails in such 'one re-appearance' evaluation also, he/she has to appear for the same in the next subsequent year, as and when it is scheduled.

## **9.8 Skill Development Courses:**

Four Skill Development Courses are included in the Curriculum in II-1, II-2, III-1 and III-2 semesters. Each Skill Development Course carries one credit. The evaluation pattern will be same as that of a laboratory course including the internal and external assessments.

The objective of Skill Courses is to develop the cognitive skills as well as the psycho-motor skills.

## **9.9 Value-Added Courses:**

The evaluation of Value-Added Courses shall be similar to that of theory courses.

However, the scheduling of these mid-term exams and semester-end examinations may not be combined with main-stream examinations. One hour /45 mins proctored mid-term examination shall be conducted in the regular class by the same subject teacher. It should not impact the conduct of other classes on that day.

The scheduling of the semester-end examinations shall also be intimated by the College time to time.

## 10.0 Grading Procedure

**10.1** Absolute grading system is followed for awarding the grades to each course.

**10.2** Grades will be awarded to indicate the performance of students in each Theory, Laboratory, Industry-Oriented Mini Project/ Internship/ Skill development course and Project Work. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in clause 8 above, a letter grade shall be given as explained in the following clause.

**10.3** To measure the performance of a student, a 10-point grading system is followed. The mapping between the percentage of marks secured and the corresponding letter grade is as follows:

Range of % of Marks Secured in a Course	Letter Grade	Grade Points (GP)
Greater than or equal to 90	O (Outstanding)	10
80 and less than 90	A <sup>+</sup> (Excellent)	9
70 and less than 80	A (Very Good)	8
60 and less than 70	B <sup>+</sup> (Good)	7
50 and less than 60	B (Average)	6
40 and less than 50	C (Pass)	5
Below 40	F (FAIL)	0
Absent	Ab	0

**10.4** A student shall be declared successful or 'passed' in a semester, if he/she secures 'C' grade or above in every course (ie GP  $\geq$  5)

**10.5** A student who has obtained an 'F' grade in any course shall be deemed to have 'failed' and is required to re-appear for a supplementary exam as and when conducted. In such cases, internal marks in those courses will remain the same as those obtained earlier.

**10.6** To a student who has not appeared for an examination in any course, 'Ab' grade will be allocated in that course, and he/she is deemed to have 'Failed'. Such student will be required to re-appear for supplementary/make-up exam as and when conducted. The internal marks in those courses will remain the same as those obtained earlier.

**10.7** The students earn a Grade Point (G) in each course, on the basis of letter grade secured in that course. Every student who passes a course will receive grade point

GP  $\geq$  5 ('C' grade or above).

**10.8** The 'Credit Points' (C) are computed by multiplying the grade point with credits for a given course.

$$\text{Credit Points (C)} = \text{Grade Point (G)} \times \text{Credits}$$

**10.9** The Semester Grade Point Average (SGPA) is calculated only when all the courses offered in a semester are cleared by a student. It is calculated by dividing the sum of credit points ( $\sum CG$ ) secured from all courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to two decimal places. SGPA for each semester is thus computed as

$$\text{SGPA} = \{ \sum N C_i G_i \} / \{ \sum N C_i \}$$

where 'i' is the course indicator index (considering all courses in a semester), 'N' is the no. of courses registered for the semester (as listed under the course structure of the branch),  $C_i$  is the no. of credits allotted to the  $i$ th course, and  $G_i$  represents the grade points corresponding to the letter grade awarded for that  $i$ th course.

**10.10** If a student earns more than 160 credits, only the courses corresponding to the best 160 credits shall be considered for the computation of CGPA of B.Tech. degree.

**10.11** The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student for the courses correspond to best 160 credits out of all registered courses in all semesters, and the total number of credits correspond to those selected courses. CGPA is rounded off to two decimal places. CGPA is thus computed at the end of each semester, from the I year II semester onwards, as per the formula

$$\text{CGPA} = \{ \sum M C_j G_j \} / \{ \sum M C_j \}$$

where 'M' is the total no. of courses corresponding to the best 160 credits from the courses registered in all eight semesters, 'j' is the course indicator index (takes into account all courses from 1 to 8 semesters),  $C_j$  is the no. of credits allotted to the  $j$ th course, and  $G_j$  represents the grade points (GP) corresponding to the letter grade awarded for that  $j$ th course.

#### Illustration of the Calculation of SGPA:

Course	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	3	O	10	3 x 10 = 30
Course 3	3	C	5	3 x 5 = 15
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A	8	3 x 8 = 24

Course 6	2	A+	9	2 x 9 = 18
Course 7	1	C	5	1 x 5 = 5
Course 8	1	O	10	1 x 10 = 10
	20			152

$$\text{SGPA} = 152/20 = 7.6$$

The CGPA of the entire B.Tech. programme shall be calculated considering the best 160 credits earned by the student.

**10.12** For merit ranking or comparison purposes or for any other listing, only the 'rounded off' values of the CGPAs will be used.

**10.13** SGPA of a semester will be mentioned in the semester Memorandum of Grades if all courses of that semester are cleared in first attempt. Otherwise, the SGPA shall be mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester.

### **11.0 Declaration of Results and issue of Grade Memo**

**11.1** While declaring the results, the web-version should display the marks earned by the students with the internal and external marks break-up. However, in the memorandum of grades, the marks need not be shown.

**11.2** After the completion of each semester, a certificate of memorandum of grades shall be issued to all the registered students, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, course title, no. of credits), letter grade and credits earned.

### **12.0 Withholding of Results**

**12.1** If the student has not paid the fees to the College at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and the student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

### **13.0 Supplementary Examinations:**

**13.1** At the end of each semester, along with regular semester examinations, supplementary examinations shall be conducted for the students who have back-log subjects.

**13.2** Advanced supplementary examinations in IV Year II Semester courses may be conducted for those who failed in any course offered in IV Year II Semester. It may enable the students to receive their B.Tech. provisional certificate at an early date.

Advanced supply examinations may be scheduled within one month period after the declaration of the final semester results.

There shall be no supplementary examination in the successive semester. The students who could not secure any pass grade in advance supplementary examinations have to wait for regular series examination of next batch to write their back-log examination.

#### 14.0 Promotion Rules

S.No.	Promotion	Conditions to be Fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester and fulfilment of attendance requirement.
2	First year second semester to Second year first semester	(i) Regular course of study of first year second semester and fulfilment of attendance requirement (ii) <b>Must have secured at least 25% of the total credits</b> up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester to Second year second semester	Regular course of study of second year first semester and fulfilment of attendance requirement.
4	Second year second semester to Third year first semester	(i) Regular course of study of second year second semester and fulfilment of attendance requirement. (ii) <b>Must have secured at least 25% of the total credits</b> up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to Third year second semester	Regular course of study of third year first semester and fulfilment of attendance requirement.
6	Third year second semester to Fourth year first semester	Regular course of study of third year second semester and fulfilment of attendance requirement.
7	Fourth year first semester to Fourth year second semester	Regular course of study of fourth year first semester and fulfilment of attendance requirement.

#### 15.0 Re-admission after Detention

- i) A student detained due to lack of credits, shall be promoted to the next academic year only after acquiring the required number of credits.

- ii) A student detained due to shortage of attendance shall be admitted in the same semester in the successive academic years.
- iii) When a student is readmitted in the following academic years, the academic regulations under which the student seeks re-admission shall only be applicable to this student, not the academic regulations in which he got admitted in his/her first year of study.

## 16.0 Credit Exemption

A student (i) shall register for all courses covering 164 credits as specified and listed in the course structure and (ii) earn 160 or more credits to successfully complete the undergraduate programme.

- Best 160 credits shall be considered for CGPA computation. The student can avail exemption of courses totaling up to 4 credits other than Professional core courses, Laboratory Courses, Seminars, Project Work and Field Based Research Project / Industry Oriented Mini Project / Internship, for optional drop out from these 164 credits registered;
- The semester grade point average (SGPA) of each semester shall be mentioned at the bottom of the grade card, when all the subjects in that semester have been passed by the student.
- Credits earned by the student in either a Minor or Honors program cannot be counted towards the required 160 credits for the award of the B.Tech. degree.

## 17.0 Award of Degree

**17.1** A student who registers for all the courses specified in the course structure and secures the required number of 160 credits within 8 academic years from the date of commencement of the first academic year, shall be declared to have qualified for the award of B.Tech. degree in the branch of Engineering selected at the time of admission.

**17.2** A student who qualifies for award of the degree as listed in item 17.1 shall be placed in the following classes.

**17.3** A student with final CGPA (at the end of the undergraduate programme)  $\geq 7.5$ , and fulfilling the following conditions - shall be placed in 'First Class with Distinction':

- (i) Should have passed all the courses in 'First Appearance'.
- (ii) Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

A student not fulfilling any of the above conditions with final CGPA  $\geq 7.5$  shall be placed in 'First Class'.

**17.4** Students with final CGPA (at the end of the undergraduate programme)  $\square 6.5$  but  $< 7.5$  shall be placed in 'First Class'.

**17.5** Students with final CGPA (at the end of the undergraduate programme)  $\square 5.5$  but  $< 6.5$ , shall be placed in 'Second Class'.

**17.6** All other students who qualify for the award of the degree (as per item 17.1), with

final CGPA (at the end of the undergraduate programme)  $\geq 5.00$  but  $< 5.5$ , shall be placed in 'pass class'.

### **17.7 Grace Marks**

Grace marks shall be given to those students who complete the course work of four year B. Tech. degree, not secured pass grade in not more than three subjects and adding a specified grace marks enables the student to pass the subject(s) as well as gets eligibility to receive the provisional degree certificate.

Grace marks for students admitted under the R-25 Academic Regulations should not exceed 0.15% of the total maximum marks in all eight semesters (excluding the marks allocated for value added courses and skill development courses).

### **18.0 Award of Gold Medals**

**18.1** Students fulfilling the conditions listed under item 17.3 alone will be eligible for award of 'Gold Medal'.

**18.2** If more than one student secures the same highest CGPA, then the following tie resolution criteria, in the same order of preference shall be followed for selecting the Gold Medal winner, until the tie is resolved: 1) more number of times secured highest SGPAs, ii) more number of O and A+ grades in that order and iii) highest SGPA in the order of first semester to eight semester.

### **19.0 Conversion of CGPA into equivalent Percentage of Marks**

**19.1** The following formula shall be used for the conversion of CGPA into equivalent marks, whenever it is necessary

$$\text{Percentage (\%)} \text{ of Marks} = (\text{Final CGPA} - 0.5) \times 10$$

### **20.0 Honours and Minor Degree Programs**

Honours and Minor Degree programs will be available in all branches of B.Tech. degree. Minor Degree programs will commence from II Year II Semester and continue till IV Year I semester and Honours Degree programs will commence from III Year I Semester and continue till IV Year II semester.

### **21.0 Multiple Entry Multiple Exit Scheme (MEME)**

#### **21.1 Exit Option after Second Year:**

Students enrolled in the 4-Year B.Tech. program are permitted to exit the program after successful completion of the second year (B.Tech. II Year II Semester). The students who desire to exit after the II year shall formally inform the exit plan one semester in advance i.e. at the commencement of II Year II Semester itself. Such students need to fulfil the additional requirements as specified in Clause 21.2 described below.

Upon fulfilling the requirements like earning all the credits up to II Year II Semester and successfully completing the additional requirements, the students will be awarded a 2-Year Undergraduate (UG) Diploma in the concerned engineering branch.

### **21.2 Additional Requirements for Diploma Award**

To qualify for the diploma under the exit option, students must also complete 2 additional credits through one of the following college-prescribed pathways:

#### **Work-based Vocational Course:**

Participation in a practical, hands-on vocational training program relevant to the engineering field, typically conducted during the summer term.

#### **Internship/Apprenticeship:**

Completion of a minimum 8-week internship or apprenticeship in their related field to gain practical industry exposure.

In addition, students must clear any associated course(s) and submit the internship/apprenticeship report as per the college's schedule and guidelines.

### **21.3 Re-entry into the B.Tech. Program**

Students who have exited the B.Tech. program with a 2-Year UG Diploma may apply for re- entry into the Third Year (Fifth Semester) of the B.Tech. program. Re-entry is subject to the following conditions:

- The student must surrender the awarded UG Diploma Certificate.
- Students who wish to rejoin in III Year must join the same B.Tech. program and same college from which the student exited. Before rejoining, students should check for continuation of the same branch at the college. If the specific branch is closed in college, then student should consult the college for the possible alternative solutions.
- Re-registered students will be governed by the academic regulations in effect at the time of re-entry, regardless of the original regulations under which they were admitted.
- If a student opts to continue his/her studies without a gap after being awarded the diploma, they must register for the third-year courses before the commencement of classwork.

### **21.4 Break in Study and Maximum Duration**

Students are allowed to take a break of up to four years after completion of II Year II Semester with prior college permission through the Principal of the college.

Re-entry after such a break is subject to the condition that the student completes all academic requirements within twice the duration of the program (i.e., within 8 years for a 4-year B.Tech. program).

### **22.0 Transitory Regulations for the students re-admitted in R-25 Regulations:**

- 22.1** Transitory regulations are applicable to the students detained due to shortage of attendance as well as detained due to the shortage of credits and seek permission to re-join the B.Tech. programme, where R-25 regulations are in force.
- 22.2** A student detained due to shortage of attendance and re-admitted in R-25 regulations: Such students shall be permitted to join the same semester, but in R-25 Regulations.
- 22.3** A student detained due to shortage of credits and re-admitted in R-25 regulations: Such students shall be promoted to the next semester in R-25 regulations, only after acquiring the required number of credits as per the corresponding regulations of his/her previous semester.
- 22.4** A student who has failed in any course in a specific regulation has to pass those courses in the same regulations.
- 22.5** If a student is readmitted to R-25 Regulations and has any course with 80% of syllabus common with his/her previous regulations, that particular course in R-25 Regulations will be substituted by an equivalent course of R-22 regulations by the college. All these details are summarized in a set of look-up Table; one set for each B. Tech. branch.
- 22.6** The R-25 Academic Regulations are applicable to a student from the year of re-admission. However, the student is required to complete the study of B.Tech. degree within the stipulated period of eight academic years from the year of first admission.

### **23.0 Student Transfers**

- 23.1** There shall be no branch transfers after the completion of admission process.
- 23.2** The students seeking transfer to college from various other Universities/institutions is having back-logs at the previous University/institute, have to pass the courses offered at MLRIT/JNTUH which are equivalent to the failed courses at the previous University/institute.
- 23.3** The transferred students from other Universities/Institutions to MLRIT, shall be given a chance to write CBTs for getting CIE component in the equivalent course(s).

### **24.0 Value Added Courses**

- 24.1** Faculty members who have received a certificate in Innovation and Entrepreneurship / Entrepreneurship from a reputed foundation/organization may be given preference to teach the "Innovation and Entrepreneurship" course. This certificate course should include an assessment. Total training duration (online or physical), excluding

assessment, should be at least 30 hours. Faculty members from all disciplines with innovative mindset and aptitude to co-create an entrepreneurial ecosystem are eligible to teach this subject.

**24.2** Faculty members who have credited a course on Intellectual Property Rights in their UG or PG programme or credited an equivalent course in MOOCs platform/ reputed foundation/organization in which assessment is a part, may be given preference to teach the elective course on Intellectual Property Rights.

**24.3** To ensure quality delivery and standardization in teaching the Indian Knowledge System (IKS) and other value-added courses, the following guidelines must be adhered to: i) faculty members must undergo a Faculty Development Program (FDP) organized by UGC- MMTTC.(Malaviya Mission Teacher Training Centre), or Any other recognized and competent institution/organization offering similar certified programs, ii) the total instructional duration of the FDP should be a around 32 hours or more, III) all sessions in the FDP must be conducted by certified and qualified resource persons with recognized expertise in the respective domains, iv) A formal assessment component must be included as part of the FDP.

## **25.0 Mapping with the Sustainable Development Goals**

All the courses specified in the course structure of every programme are mapped with the one or more sustainable development goals.

## **26.0 Scope**

**26.1** The academic regulations should be read as a whole, for the purpose of any interpretation.

**26.2** In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

**26.3** The college may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dates notified by the college authorities.

**26.4** Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

## **27.0 Malpractice Prevention Committee**

A malpractice prevention committee shall be constituted to examine and punish the students who involve in malpractice / indiscipline in examinations. The committee shall consist of:

- a) Controller of examinations - Chairman
- b) Addl. Controller of examinations.- Member Convener

- c) Subject expert - member
- d) Head of the department of which the student belongs to. - Member
- e) The invigilator concerned - member

The committee shall conduct the meeting after taking explanation of the student and punishment will be awarded by following the malpractice rules meticulously.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations, in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and will be recommended for appropriate punishment after thorough enquiry.

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## MLR Institute of Technology

### ACADEMIC REGULATIONS FOR B.TECH. (LATERAL ENTRY SCHEME) FROM THE AY 2026-27

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

1. The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.
2. The student shall register for 123 credits and secure 120 credits with CGPA  $\geq 5$  from II year to IV- year B.Tech. programme (LES) for the award of B.Tech. degree.
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 seat in B.Tech.
4. The attendance requirements of B.Tech. (Regular) shall be applicable to B.Tech. (LES).
5. **Promotion rule**

S. No	Promotion	Conditions to be fulfilled
1	Second year first semester to Second year second semester	Regular course of study of second year first semester and fulfilment of attendance requirement.
2	Second year second semester to Third year first semester	(i) Regular course of study of second year second semester and fulfilment of attendance requirement. (ii) Must have secured at least 25% of the total credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to Third year second semester	Regular course of study of third year first semester and fulfilment of attendance requirement.
4	Third year second semester to Fourth year first semester	Regular course of study of third year second semester and fulfilment of attendance requirement.
5	Fourth year first semester to Fourth year second semester	Regular course of study of fourth year first semester and fulfilment of attendance requirement.

6. All the other regulations as applicable to B.Tech. 4-year degree course (Regular) will hold good for  
B. Tech. (Lateral Entry Scheme).
7. LES students are not permitted to exit the B.Tech. program after completion of second year (B.Tech. II Year II Semester).

**Malpractices Rules**  
**Disciplinary Action For/Improper Conduct in Examinations**

<b>Rule</b>	<b>Nature of Malpractices/ Improper conduct</b>	<b>Punishment</b>
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, 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) in which student is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
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 student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled

3.	Impersonates any other student in connection with the examination.	<p>The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year.</p> <p>The student is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</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>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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. The student is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the student 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 marks.	Cancellation of the performance in that subject.

6.	Refuses to obey the orders of the chief superintendent/COE/ACoE/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 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.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students 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.
7.	Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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. The student is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student 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. The student is also debarred and forfeits the seat.

9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student 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. The student is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared for including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared for including practical examinations and project work of that semester/year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal for further action to award a suitable punishment.	

### Malpractices identified by squad or special invigilators

1. Punishments to the students as per the above guidelines.
2. Punishment for staff: (if the squad reports that the staff is also involved in encouraging malpractices)
  - a. A show-cause notice shall be issued to the staff.
  - b. Impose a suitable fine on the staff.

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# **COURSE STRUCTURE**

## COURSE STRUCTURE

### B. TECH – COMPUTER SCIENCE AND ENGINEERING

#### REGULATIONS: R25

I YEAR I SEMESTER									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A7BS01	Matrices and Calculus	BSC	3	1	0	4	40	60	100
A7BS10	Engineering Chemistry	BSC	3	0	0	3	40	60	100
A7HS01	English for Skill Enhancement	HSMC	3	0	0	3	40	60	100
A7EC01	Electronic Devices and Applications	ESC	3	0	0	3	40	60	100
A7CS01	Programming for Problem Solving	ESC	3	0		3	40	60	100
A7BS11	Engineering Chemistry Lab	BSC	0	0	2	1	40	60	100
A7CS02	Programming for Problem Solving Lab	ESC	0	0	2	1	40	60	100
A7HS02	English Language and Communication Skills Laboratory	HSMC	0	0	2	1	40	60	100
A7ME03	Engineering Work shop	ESC	0	0	2	1	40	60	100
	Induction Program								
<b>TOTAL</b>			<b>15</b>	<b>1</b>	<b>8</b>	<b>20</b>			<b>900</b>
I YEAR II SEMESTER									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A7BS02	Ordinary Differential Equations and Vector Calculus	BSC	3	0	0	3	40	60	100
A7BS08	Advanced Engineering Physics	BSC	3	0	0	3	40	60	100
A7ME02	Computer Aided and Engineering Drawing	ESC	2	0	2	3	40	60	100
A7EE04	Basic Electrical Engineering	ESC	3	0	0	3	40	60	100
A7CS03	Data Structures	ESC	3	0	0	3	40	60	100
A7BS09	Advanced Engineering Physics Lab	BSC	0	0	2	1	40	60	100
A7CS04	Data Structures Lab	ESC	0	0	2	1	40	60	100
A7CS05	Python Programming Lab	ESC	0	0	2	1	40	60	100
A7EE05	Basic Electrical Engineering Lab	ESC	0	0	2	1	40	60	100
A7CS06	IOT& IT Workshop	ESC	0	0	2	1	40	60	100
<b>TOTAL</b>			<b>14</b>	<b>0</b>	<b>12</b>	<b>20</b>			<b>1000</b>

II YEAR I SEMESTER									
Code	Course	Category	Periods perWeek			Credits	Scheme of Examination MaximumMarks		
			L	T	P		Internal	External	Total
A7CS07	Discrete Mathematics	PCC	3	0	0	3	40	60	100
A7CS08	Computer Organization and Architecture	PCC	3	0	0	3	40	60	100
A7CS09	Object Oriented Programming through java	PCC	3	0	0	3	40	60	100
A7CS11	Software Engineering	PCC	3	0	0	3	40	60	100
A7CS13	Database Management Systems	PCC	3	0	0	3	40	60	100
A7HS08	Innovation and Entrepreneurship	HSMC	2	0	0	2	40	60	100
A7CS10	Object Oriented Programming through java Lab	PCC	0	0	2	1	40	60	100
A7CS12	Software Engineering Lab	PCC	0	0	2	1	40	60	100
A7CS14	Database Management Systems Lab	PCC	0	0	2	1	40	60	100
A7CS53	Web Technologies	PCC	0	0	2	1	0	100	100
A7BS12	Environmental Science	MC	1	0	0	1	50	-	50
<b>TOTAL</b>			<b>16</b>	<b>0</b>	<b>8</b>	<b>22</b>			<b>1050</b>
II YEAR II SEMESTER									
Code	Course	Category	Periods perWeek			Credits	Scheme of Examination MaximumMarks		
			L	T	P		Internal	External	Total
A7BS05	Computer oriented Statistical Methods	BSC	3	0	0	3	40	60	100
A7CS15	Operating Systems	PCC	3	0	0	3	40	60	100
A7CS17	Algorithm design and Analysis	PCC	3	0	0	3	40	60	100
A7CS18	Computer Networks	PCC	3	0	0	3	40	60	100
A7AI03	Machine Learning	PCC	3	0	0	3	40	60	100
A7BS07	Computational Mathematics Lab	BSC	0	0	2	1	40	60	100
A7CS16	Operating Systems Lab	PCC	0	0	2	1	40	60	100
A7CS19	Computer Networks Lab	PCC	0	0	2	1	40	60	100
A7AI05	Machine Learning Lab	PCC	0	0	2	1	40	60	100
A7DS03	Skill Development(Data Visualization-R/ Python/ Power BI)	PCC	0	0	2	1	0	100	100
<b>TOTAL</b>			<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>			<b>1000</b>

III YEAR I SEMESTER									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination MaximumMarks		
			L	T	P		Internal	External	Total
A7CS20	Automata Theory and Compiler Design	PCC	3	0	0	3	40	60	100
A7AI01	Artificial Intelligence	PCC	3	0	0	3	40	60	100
A7CS22	DevOps	PCC	3	0	0	3	40	60	100
PE	Professional Elective-I	PEC	3	0	0	3	40	60	100
OE	Open Elective-I	OEC	2	0	0	2	40	60	100
A7CS21	Compiler Design Lab	PCC	0	0	2	1	40	60	100
A7AI02	Artificial Intelligence Lab	PCC	0	0	2	1	40	60	100
A7CS23	DevOps Lab	PCC	0	0	2	1	40	60	100
A7CS55	Field-Based Research Project	PCC	0	0	4	2	0	100	100
A7CS54	UI Design – Flutter/ Android Studio	PCC	0	0	2	1	0	100	100
A7HS05	Indian Knowledge System	MC	1	0	0	1	50	-	50
<b>TOTAL</b>			<b>15</b>	<b>0</b>	<b>12</b>	<b>21</b>			<b>1050</b>
III YEAR II SEMESTER									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination MaximumMarks		
			L	T	P		Internal	External	Total
A7CS28	Cryptography and Networks Security	PCC	3	0	0	3	40	60	100
A7AI10	Deep Learning	PCC	3	0	0	3	40	60	100
A7HS06	Business Economics and Financial Analysis	HSMC	3	0	0	3	40	60	100
PE	Professional Elective-II	PEC	3	0	0	3	40	60	100
OE	Open Elective – II	OEC	2	0	0	2	40	60	100
A7CS29	Cryptography and Networks Security Lab	PCC	0	0	2	1	40	60	100
A7AI12	Deep Learning Lab	PCC	0	0	2	1	40	60	100
A7CS34	Advanced Data Structures using Python Lab	PCC	0	0	2	1	40	60	100
A7HS03	English for Employability Skills Lab	HSMC	0	0	2	1	40	60	100
A7AI14	Prompt Engineering	PCC	0	0	2	1	0	100	100
A7HS04	Gender Sensitization Lab*/ Human Values and Professional Ethics*	MC	1	0	0	1	50	-	50
<b>TOTAL</b>			<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>			<b>1050</b>
<p><b>*Note: For the courses Gender Sensitization Lab and Human Values and Professional Ethics - one hour of instruction will be conducted on alternate weeks. For example, if a one-hour class for Gender Sensitization Lab is conducted this week, then a one-hour class for Human Values and Professional Ethics will be conducted in the following week.</b></p>									

IV YEAR I SEMESTER									
Code	Course	Category	Periods perWeek			Credits	Scheme of Examination MaximumMarks		
			L	T	P		Internal	External	Total
A7AI04	Natural Language Processing	PCC	3	0	0	3	40	60	100
A7CS35	Cyber Security	PCC	3	0	0	3	40	60	100
A7HS07	Fundamentals of Management	HSMC	3	0	0	3	40	60	100
PE	Professional Elective-III	PEC	3	0	0	3	40	60	100
PE	Professional Elective – IV	PEC	3	0	0	3	40	60	100
OE	Open Elective – III	OEC	2	0	0	2	40	60	100
A7AI06	Natural Language Processing Lab	PCC	0	0	2	1	40	60	100
A7CS36	Cyber Security Lab	PCC	0	0	2	1	40	60	100
A7CS56	Industry Oriented Mini Project/ Summer Internship	PCC	0	0	4	2	0	100	100
<b>TOTAL</b>			<b>17</b>	<b>0</b>	<b>08</b>	<b>21</b>			<b>900</b>
IV YEAR II SEMESTER									
Code	Course	Category	Periods perWeek			Credits	Scheme of Examination MaximumMarks		
			L	T	P		Internal	External	Total
PE	Professional Elective – V	PEC	3	0	0	3	40	60	100
PE	Professional Elective – VI	PEC	3	0	0	3	40	60	100
A7CS57	Project Work	PCC	0	0	28	14	40	60	100
<b>TOTAL</b>			<b>6</b>	<b>0</b>	<b>28</b>	<b>20</b>			<b>300</b>

**\*Environmental Studies have to be taken by LE in 2-1**

**\*\*MC: Satisfactory/Non-Satisfactory**

<b>PROFESSIONAL ELECTIVES</b>			
<b>PE – I</b>		<b>PE – II</b>	
A7CS24	Computer Graphics	A7CS58	Image Processing
A7DS01	Introduction to Data Science	A7CS30	Blockchain Technology
A7CS25	Software Testing Methodologies	A7CS31	Software Project Management
A7DS22	Data Mining	A7DS18	Mining Massive Datasets
A7CS26	Web Programming	A7CS32	Full Stack Development
A7CS27	Distributed Systems	A7AI09	Generative AI
<b>PE – III</b>		<b>PE – IV</b>	
A7AI20	Computer Vision	A7AI21	Augmented Reality & Virtual Reality
A7CS37	Scripting Languages	A7CS41	Agile Methodology
A7CS38	Vulnerability Assessment and Penetration Testing	A7DS08	Big Data Technologies
A7DS12	Data Stream Mining	A7AI22	Quantum Computing
A7CS39	Cloud Computing	A7AI23	Robotic Process Automation
A7CS40	Information Retrieval Systems	A7CS42	Cyber Forensics
<b>PE – V</b>		<b>PE – VI</b>	
A7DS21	Social Media Mining	A7CS47	High Performance Computing
A7CS44	Nature Inspired Computing	A7CS48	Edge Computing
A7AI24	Ethics of Artificial Intelligence	A7CS49	Graph Theory
A7AI25	Game Theory	A7CS50	Adhoc and Sensor Networks
A7CS45	Mobile Application Development	A7CS51	Sustainable Engineering
A7CS46	Human Computer Interaction	A7CS52	Distributed Databases

**OPEN ELECTIVE COURSES**

<b>OPEN ELECTIVE - I</b>			
<b>S. No.</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Offering Department</b>
1	A7CS15	Operating Systems	Computer Science and Engineering
2	A7CS13	Database Management Systems	
<b>OPEN ELECTIVE - II</b>			
3	A7CS33	Introduction to Computer Networks	Computer Science and Engineering
4	A7CS11	Software Engineering	
<b>OPEN ELECTIVE - III</b>			
5	A7CS17	Algorithms Design and Analysis	Computer Science and Engineering
6	A7CS43	Fundamentals of Cyber Security	

## Academic Guidelines

### Professional Electives:

- a. Professional Electives are streamed to either Data Science/AIML/Block Chain/Cyber Security
- b. Students must choose the same stream in all Professional Electives.

### Skill Development:

- a. Skill development courses will be conducted as practical hours and evaluated for one credit.

### Summer Internship/Research Project in II-II semester

#### Summer Internship/Internship

- a. Student can either do internship from AICTE approved Internships or in any Industry.
- b. In case of Internship from Industry, two supervisors will be supporting the students. Supervisors: 1. One Internal supervisor and 2. One Industry Personnel (External)
- c. Evaluation will be done in III-I

#### Rubrics - Internship

	Internal Supervisor	External Supervisor	Total
Marks	40 Mid - 20; Final 20;	60	100

#### Mini Project in III-II

Student can carry out mini project based on the courses learned in II and III years.

- a. Student can carry out project in guidance of an internal supervisor.
- b. Students can carry out projects in team of three or individually.
- c. One supervisor per student/team will supervise a project and the supervisor shall be internal supervisor.
- d. Evaluation will be done in III-II itself.

#### Research Project:

- a. Student can carry out project with respect to research question.
- b. Students can carry out projects in team of three or individually.
- c. One supervisor per student/team will supervise a research project and the supervisor shall be internal supervisor or external supervisor from JNTU/IIIT/IIT.
- d. Evaluation will be done in III-I.

#### Rubrics

S.No.	Tasks	Marks	Review
1	Research Problem/Question	5	Review-I
2	Research Design	5	
3	Methodology	5	
4	Implementation	40	Review-II
5	Results and Discussion	20	
6	Deployment	10	Review-III
7	Publish/Patent	10	
8	Viva/Presentation	5	

### **Massive Open Online Courses (MOOCs)**

- a. Student can undergo one MOOC course from NPTEL/INFOSYS Springboard/any platform which permits credit transfer as per AICTE.
- b. It is purely self-paced/self-study course.
- c. Certificate should be produced by student to the department/exam cell for considering the credit at the end of semester.
- d. Evaluation will be done in III-II itself for 100%

### **Global Certification**

- a. Student can undergo Global Certification on their own or in support of Placement cell or department.
- b. Student can choose a course in such way that the course must have minimum 40 hours of duration and certificate must be directly from company.
- c. Ex: Computer Networks and Security [ CISCO ], AWS Certification [AWS Academy]
- d. Evaluation will be done in III-II itself for 100%

# **I B.TECH I SEMESTER SYLLABUS**

## MATRICES & CALCULUS

<b>I B.TECH - I SEMESTER: Common for All (ECE/EEE/MECH/AERO/ CSE/AI&amp;ML/DS)</b>								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
A7BS01	BSC	3	1	0	4	40	60	100
		<p><b>COURSE OBJECTIVES</b>  <b>The course will enable the students to:</b></p> <ol style="list-style-type: none"> <li>1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.</li> <li>2. Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form.</li> <li>3. Geometrical approach to the mean value theorems and their application to the mathematical problems.</li> <li>4. Finding maxima and minima of functions of two and three variables.</li> <li>5. Evaluation of multiple integrals and their applications.</li> </ol> <p><b>COURSE OUTCOMES</b>  <b>After learning the contents of this Course, the student must be able to</b></p> <ol style="list-style-type: none"> <li>1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.</li> <li>2. Find the Eigenvalues and Eigen vectors, Reduce the quadratic form to canonical form using orthogonal transformations.</li> <li>3. Solve the applications of the mean value theorems.</li> <li>4. Find the extreme values of functions of two variables with/ without constraints.</li> <li>5. Evaluate the multiple integrals and apply the concept to find areas, volumes.</li> </ol>						
<b>UNIT-I</b>	<b>MATRICES</b>						<b>Classes: 08</b>	
Rank of a matrix by Echelon form and Normal form –Inverse of Non-singular matrices by Gauss-Jordan method. System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations. Gauss Seidel Iteration Method.								
<b>UNIT-II</b>	<b>EIGEN VALUES AND EIGEN VECTORS</b>						<b>Classes: 10</b>	
Eigen values – Eigen vectors and their properties– Diagonalization of a matrix by Orthogonal Transformation – Cayley-Hamilton Theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms – Reduction of Quadratic form to canonical form by Orthogonal Transformation.								
<b>UNIT-III</b>	<b>SINGLE VARIABLE CALCULUS</b>						<b>Classes: 10</b>	
Limit and Continuity of functions and its properties. Mean value theorems: Rolle's theorem – Lagrange's Mean value theorem with their Geometrical Interpretation and applications – Cauchy's Mean value Theorem – Taylor's Series (All theorems without proof). <b>Curve Tracing:</b> Curve tracing in Cartesian coordinates.								
<b>UNIT-IV</b>	<b>MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)</b>						<b>Classes: 10</b>	
Definitions of Limit and continuity – Partial Differentiation: Applications of Euler's Theorem– Total derivative – Jacobian – Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.								
<b>UNIT-V</b>	<b>MULTIPLE INTEGRALS</b>						<b>Classes: 10</b>	

Evaluation of Double Integrals (Cartesian and polar coordinates) – change of order of integration (only Cartesian form) – Change of variables for double integrals (Cartesian to polar). Evaluation of Triple Integrals, Applications: Areas by double integrals and volumes by triple integrals.

#### **TEXT BOOKS**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

#### **WEB REFERENCES**

1. [https://www.efunda.com/math/math\\_home/math.cfm](https://www.efunda.com/math/math_home/math.cfm)
2. <https://www.sosmath.com/>
3. <https://www.wolframalpha.com/>

#### **E -TEXT BOOKS**

1. <https://www.e-booksdirectory.com/details.php?ebook=10166>
2. [Calculus and Linear Algebra. Vol. 1 - Download link \(e-booksdirectory.com\)](#)

#### **MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

## ENGINEERING CHEMISTRY

I B.TECH - I SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7BS10	BSC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<b>COURSE OBJECTIVES</b>								
<b>The course will enable the students to:</b>								
<ol style="list-style-type: none"> <li>1. To develop adaptability to new advances in Engineering Chemistry and acquire the essential skills to become a competent engineering professional.</li> <li>2. To understand the industrial significance of water treatment, fundamental principles of battery chemistry, and the impact of corrosion along with its control methods for structural protection.</li> <li>3. To impart foundational knowledge of various energy sources and their practical applications in engineering.</li> <li>4. To equip students with an understanding of smart materials, biosensors, and analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.</li> </ol>								
<b>COURSE OUTCOMES</b>								
<b>After learning the contents of this Course, the student must be able to</b>								
<ol style="list-style-type: none"> <li>1. Students will be able to understand the fundamental properties of water and its applications in both domestic and industrial purposes.</li> <li>2. Students will gain basic knowledge of electrochemical processes and their relevance to corrosion and its control methods.</li> <li>3. Students will comprehend the significance and practical applications of batteries and various energy sources, enhancing their potential as future engineers and entrepreneurs.</li> <li>4. Students will learn the basic concepts and properties of polymers and other engineering materials.</li> <li>5. Students will be able to apply the principles of UV-Visible, IR spectroscopy and Raman spectroscopy in analyzing pollutants in dye industries and biomedical applications.</li> </ol>								
<b>UNIT - I</b>	<b>Water and its treatment</b>						<b>CLASSES: 08</b>	
Introduction- Hardness, types, degree of hardness and units. Estimation of hardness of water by complexometric method - Numerical problems. Potable water and its specifications (WHO) - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break- point chlorination. Defluoridation - Nalgonda technique. Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water - Calgon conditioning, Phosphate conditioning, Colloidal conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of brackish water – Reverse osmosis.								
<b>UNIT - II</b>	<b>Electrochemistry and Corrosion</b>						<b>CLASSES: 08</b>	
Introduction- Electrode potential, standard electrode potential, Nernst equation (no derivation), electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of electrodes, reference electrodes - Primary reference electrode - Standard Hydrogen Electrode (SHE), Secondary reference electrode - Calomel electrode. Construction, working and determination of pH of unknown solution using SHE and Calomel electrode. Corrosion: Introduction- Definition, causes and effects of corrosion – Theories of corrosion, chemical and electrochemical theories of corrosion, Types of corrosion: galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion - Nature of the metal, Nature of the corroding environment. Corrosion control methods - Cathodic protection Methods - Sacrificial anode and impressed current methods.								
<b>UNIT - III</b>	<b>Energy sources</b>						<b>CLASSES: 08</b>	

<p>Batteries: Introduction – Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Zn-air and Lithium ion battery. Fuel Cells – Differences between a battery and a fuel cell, Construction and applications of Direct Methanol Fuel Cell (DMFC).</p> <p>Fuels: Introduction and characteristics of a good fuel, Calorific value – Units - HCV, LCV- Dulong's formula - Numerical problems.</p> <p>Fossil fuels: Introduction, Classification, Petroleum - Refining of Crude oil, Cracking - Types of cracking - Moving bed catalytic cracking. LPG and CNG composition and uses.</p> <p>Synthetic Fuels: Fischer-Tropsch process, Introduction and applications of Hythane and Green Hydrogen.</p>		
<b>UNIT - IV</b>	<b>Polymers</b>	<b>CLASSES: 08</b>
<p>Definition - Classification of polymers: Based on origin and tacticity with examples – Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization.</p> <p>Plastics, Elastomers and Fibers: Definition and applications (PVC, Buna-S, Nylon-6,6). Differences between thermoplastics and thermo setting plastics, Fiber reinforced plastics (FRP).</p> <p>Conducting polymers: Definition and Classification with examples - Mechanism of conduction in trans- polyacetylene and applications of conducting polymers.</p> <p>Biodegradable polymers: Polylactic acid and its applications.</p>		
<b>UNIT - V</b>	<b>Advanced Functional Materials</b>	<b>CLASSES: 08</b>
<p>Smart materials: Introduction, Classification with examples - Shape Memory Alloys – Nitinol, Piezoelectric materials – quartz and their engineering applications.</p> <p>Biosensor - Definition, Amperometric Glucose monitor sensor.</p> <p>Interpretative spectroscopic applications of UV-Visible spectroscopy for Analysis of pollutants in dye industry, IR spectroscopy in night vision-security, Pollution Under Control- CO sensor (Passive Infrared detection), Raman spectroscopy (application) - Tumour detection in medical applications.</p>		
<b>TEXT BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010.</li> <li>2. Engineering Chemistry by Rama Devi, Dr. P. Aparna and Rath, Cengage learning, 2025.</li> </ol>		
<b>REFERENCE BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Engineering Chemistry: by Thirumala Chary Laxminarayana &amp; Shashikala, Pearson Publications (2020)</li> <li>2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.</li> <li>3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.</li> <li>4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.</li> <li>5. Challenges and Opportunities in Green Hydrogen by Editors: Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.</li> <li>6. Raman Spectroscopy in Human Health and Biomedicine, <a href="https://www.worldscientific.com/doi/epdf/10.1142/13094">https://www.worldscientific.com/doi/epdf/10.1142/13094</a></li> <li>7. E-Content- <a href="https://doi.org/10.1142/13094">https://doi.org/10.1142/13094</a>   October 2023</li> <li>8. E-books: <a href="https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2u">https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2u</a></li> </ol>		

## ENGLISH FOR SKILL ENHANCEMENT

I B.TECH - I SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7HS01	HSMC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

### INTRODUCTION

National Education Policy-2020 aims at preparing students with knowledge, skills, values, leadership qualities and initiates them for lifelong learning. It also emphasizes language study and promotion of languages through understanding and proper interpretation. English language is central to the educational eco system. The importance of language as medium of communication for personal, social, official and professional needs to be emphasized for clear and concise expression. Teaching and learning of receptive and productive skills viz., Listening, Speaking, Reading and Writing (LSRW) are to be taught and learnt effectively in the undergraduate Engineering programs. Learners should be encouraged to engage in a rigorous process of learning to become proficient users of English language by adopting a deeply focused and yet flexible approach as opposed to rote learning.

In this connection, suitable syllabus, effective pedagogy, continuous assessments and students' involvement result in productive learning. This course supports the latest knowledge and skill requirements and shall meet specified learning outcomes. The main objectives of English language teaching and learning as medium of communication and for promotion of cultural values are embedded in this syllabus. Efforts are being made in providing a holistic approach towards value-based language learning which equips the learner with receptive as well as productive skills.

The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed textbook for detailed study. The students should be encouraged to read the texts leading to reading comprehension. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material.

### LEARNING OBJECTIVES:

This course will enable the students to:

1. Improve their vocabulary.
2. Use appropriate sentence structures in their oral and written communication.
3. Develop their reading and study skills.
4. Equip students to write paragraphs, essays, précis and draft letters.
5. Acquire skills for Technical report writing.

### COURSE OUTCOMES:

**After learning the contents of this Course, the student must be able to**

1. Choose appropriate vocabulary in their oral and written communication.
2. Demonstrate their understanding of the rules of functional grammar and sentence structures.
3. Develop comprehension skills from known and unknown passages.
4. Write paragraphs, essays, précis and draft letters.
5. Write abstracts and reports in various contexts.

<b>UNIT - I</b>		
<b>Theme</b>	Perspectives <b>Lesson on 'The Generation Gap' by Benjamin M. Spock from the prescribed textbook titled <i>English for the Young in the Digital World</i> published by Orient Black Swan Pvt. Ltd.</b>	

Vocabulary	The Concept of Word Formation -The Use of Prefixes and Suffixes - Words Often Misspelt - Synonyms and Antonyms	
Grammar	Identifying Common Errors in Writing with Reference to Parts of Speech particularly Articles and Prepositions – Degrees of Comparison	
Reading:	Reading and Its Importance- Sub Skills of Reading – Skimming and Scanning.	
Writing	Sentence Structures and Types -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing Precisely –Nature and Style of Formal Writing.	
<b>UNIT - II</b>		
<b>Theme:</b>	Digital Transformation <b>Lesson on ‘Emerging Technologies’ from the prescribed textbook titled <i>English for the Young in the Digital World</i> published by Orient BlackSwan Pvt. Ltd.</b>	
<b>Vocabulary</b>	Homophones, Homonyms and Homographs	
<b>Grammar</b>	Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.	
<b>Reading</b>	Reading Strategies-Guessing Meaning from Context – Identifying Main Ideas – Exercises for Practice	
<b>Writing</b>	Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence – Linkers and Connectives - Organizing Principles in a Paragraph – Defining- Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence - Essay Writing - Writing Introduction and Conclusion.	
<b>UNIT - III</b>		
<b>Theme:</b>	<b>Attitude and Gratitude Poems on ‘Leisure’ by William Henry Davies and ‘Be Thankful’ - Unknown Author from the prescribed textbook titled <i>English for the Young in the Digital World</i> published by Orient BlackSwan Pvt. Ltd.</b>	
<b>Vocabulary</b>	Words Often Confused - Words from Foreign Languages and their Use in English.	
<b>Grammar</b>	Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.	
<b>Reading</b>	Sub-Skills of Reading – Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.	
<b>Writing</b>	Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Job Application with CV/Resume –Difference between Writing a Letter and an Email - Email Etiquette.	
<b>UNIT - IV</b>		
<b>Theme:</b>	<b>Entrepreneurship Lesson on ‘Why a Start-Up Needs to Find its Customers First’ by Pranav Jain from the prescribed textbook titled <i>English for the Young in the Digital World</i> published by Orient BlackSwan Pvt. Ltd.</b>	
<b>Vocabulary</b>	Standard Abbreviations in English – Inferring Meanings of Words through Context – Phrasal Verbs – Idioms.	
<b>Grammar</b>	Redundancies and Clichés in Written Communication – Converting Passive to Active Voice and Vice-Versa.	

<b>Reading</b>	Prompt Engineering Techniques– Comprehending and Generating Appropriate Prompts - Exercises for Practice
<b>Writing</b>	Integrity and Professionalism Lesson on 'Professional Ethics' from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.
<b>UNIT - V</b>	
<b>Theme:</b>	Integrity and Professionalism Lesson on 'Professional Ethics' from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.
<b>Vocabulary</b>	Technical Vocabulary and their Usage– One Word Substitutes – Collocations.
<b>Grammar</b>	Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
<b>Reading</b>	Survey, Question, Read, Recite and Review (SQ3R Method) – Inferring the Meaning and Evaluating a Text- Exercises for Practice
<b>Writing</b>	Report Writing - Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical Report.
<p><b>Note: Listening and Speaking skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.</b></p> <p>➤ (Note: As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech. First Year is <b>Open-ended</b>, besides following the prescribed textbook, it is required to prepare teaching/learning materials <b>by the teachers collectively</b> in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.)</p>	
<b>TEXT BOOKS</b>	
1. Board of Editors. 2025. <i>English for the Young in the Digital World</i> . Orient Black Swan Pvt. Ltd.	
<b>REFERENCE BOOKS</b>	
<ol style="list-style-type: none"> <li>Swan, Michael. (2016). <i>Practical English Usage</i>. Oxford University Press. New Edition.</li> <li>Karal, Rajeevan. 2023. <i>English Grammar Just for You</i>. Oxford University Press. New Delhi</li> <li>2024. <i>Empowering with Language: Communicative English for Undergraduates</i>. Cengage Learning India Pvt. Ltd. New Delhi</li> <li>Sanjay Kumar &amp; Pushp Lata. 2022. <i>Communication Skills – A Workbook</i>. Oxford University Press. New Delhi</li> <li>Wood, F.T. (2007). <i>Remedial English Grammar</i>. Macmillan.</li> <li>Vishwamohan, Aysha. (2013). <i>English for Technical Communication for Engineering Students</i>. Mc Graw-Hill Education India Pvt. Ltd.</li> </ol>	

## ELECTRONIC DEVICES AND APPLICATIONS

Course Code:	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
A7EC01	ESC	3	0	0	3	40	60	100
<b>Contact Classes: 45</b>		<b>Tutorial Classes: 00</b>		<b>Practical Classes: Nil</b>		<b>Total Classes: 45</b>		
<p><b>Course Objectives:</b>  <b>The course should enable the students to:</b></p> <ol style="list-style-type: none"> <li>To introduce components such as diodes, BJTs, and FETs.</li> <li>To know the applications of devices.</li> <li>To know the basics of advanced devices for VLSI applications.</li> </ol> <p><b>Course Outcomes:</b>  <b>At the end of the course, students will be able to:</b></p> <ol style="list-style-type: none"> <li>Acquire knowledge of various electronic devices, such as diode, their characteristics, and their use in real life.</li> <li>Know the Applications of the P-N diode, such as rectifiers and filter circuits.</li> <li>Analyze the concept of Bipolar Junction Transistor, and compare it with BJT. MOSFET and its applications.</li> <li>Know the concepts of special-purpose diodes and advanced FET devices.</li> <li>Acquire knowledge about the role of special-purpose devices and Advanced FET devices.</li> </ol>								
<b>UNIT-I</b>	<b>P-N JUNCTION DIODE AND ITS CHARACTERISTICS</b>						<b>Classes: 10</b>	
P-type and N-type material, Formation of PN junction diode – I-V characteristics, Diode's static and dynamic resistance, diode's transition and diffusion capacitances, diode models (Ideal, Simplified, Piecewise Linear), Diode as a switch, diode's switching times.								
<b>UNIT-II</b>	<b>APPLICATIONS OF P-N JUNCTION DIODE</b>						<b>Classes: 9</b>	
Diode rectifier circuits — Half-wave rectifier, Full-wave rectifier (Center-tap and Bridge), properties of diode rectifier circuits, Filter circuits: Capacitor Filters for Rectifiers, Inductor Filters for Rectifiers, diode clippers (two-level clipper circuit), and diode clampers.								
<b>UNIT-III</b>	<b>BIPOLAR JUNCTION TRANSISTOR (BJT) and UJT</b>						<b>Classes: 9</b>	
The junction transistor, Current components and transistor action, BJT symbol, Configurations: Common Base (CB), Common Emitter (CE), Common Collector (CC), Input and output characteristics, comparison of CB, CE, and CC, Need for biasing, a transistor as an amplifier, and a switch, UJT and characteristics.								
<b>UNIT-IV</b>	<b>FIELD-EFFECT TRANSISTOR (FET) and MOSFET</b>						<b>Classes: 9</b>	
JFET: Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, FET as an amplifier (Common Source), Comparison of BJT and FET/MOSFET (depletion mode and Enhancement mode, MOSFET as a Capacitor.								
<b>UNIT-V</b>	<b>SPECIAL PURPOSE DIODES and ADVANCED TRANSISTORS</b>						<b>Classes: 8</b>	
Principle of Operation of - SCR, Tunnel Diode, Varactor Diode, Photo Diode, Solar Cell, LED, Zener Diode, and Zener Diode as a voltage regulator, Introduction to Fin FET.								
<b>TEXT BOOKS:</b>								
<ol style="list-style-type: none"> <li>Millman, Jacob, and Christos C. Halkias. <i>Electronic Devices and Circuits</i>. Tata McGraw-Hill, 1991.</li> <li>Boylestad, Robert L., and Louis Nashelsky. <i>Electronic Devices and Circuit Theory</i>. Pearson, 11th ed., 2013.</li> <li>Sedra, Adel S., and Kenneth C. Smith. <i>Microelectronic Circuits</i>. Oxford University Press, 7th ed.,</li> </ol>								

2014.

**REFERENCE BOOKS:**

1. Bell, David A. *Electronic Devices and Circuits*. Oxford University Press, 5th ed., 2008.
2. Neamen, Donald A. *Electronic Circuit Analysis and Design*. McGraw-Hill, 2nd ed., 2001.
3. Salivahanan, S., and N. Suresh Kumar. *Electronic Devices and Circuits*. McGraw-Hill Education, 4th ed., 2017.
4. Razavi, Behzad. *Fundamentals of Microelectronics*. Wiley, 2nd ed., 2013.
5. Taur, Yuan, and Tak H. Ning. *Fundamentals of Modern VLSI Devices*. Cambridge University Press, 2nd ed., 2009.

## PROGRAMMING FOR PROBLEM SOLVING

<b>I B.TECH - I SEMESTER: Common for CSE Allied Branches</b>								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
<b>A7CS01</b>	<b>ESC</b>	L	T	P	C	CIE	SEE	Total
		3	-	-	3	40	60	100
<b>Contact Classes: 50</b>	<b>Tutorial Classes: Nil</b>	<b>Practical Classes: Nil</b>			<b>Total Classes: 50</b>			
<p><b>COURSE OBJECTIVES</b></p> <ol style="list-style-type: none"> <li>1. To familiarize with the syntax and semantics of C programming language.</li> <li>2. To learn the usage of structured programming approach in solving problems.</li> <li>3. To use arrays, pointers, strings and structures in solving problems.</li> <li>4. To understand how to solve problems related to matrices, Searching and sorting.</li> <li>5. To understand how to use files to perform read and write operations.</li> </ol> <p><b>COURSEOUTCOMES</b></p> <ol style="list-style-type: none"> <li>1. To demonstrate the ability to write and understand basic C programs using language elements, variable declarations, arithmetic expressions, and selection structures.</li> <li>2. Develop computer programs using programming constructs and control structures and to use arrays to develop C programs</li> <li>3. Decompose a problem into functions to develop modular reusable code and to use pointers to solve complex problems.</li> <li>4. To utilize string manipulation functions and user-defined structures and unions to design and implement algorithms in C.</li> <li>5. To perform file operations and implement searching and sorting algorithms.</li> </ol>								
<b>UNIT - I</b>	<b>OVERVIEW OF C AND SELECTION STRUCTURES</b>						<b>CLASSES: 10</b>	
<p><b>Overview of C:</b> C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Arithmetic Expressions, Formatting Numbers in Program Output.</p> <p><b>Selection Structures:</b> Control Structures, Conditions, if Statement, if Statements with Compound Statements, Decision Steps in Algorithms.</p>								
<b>UNIT - II</b>	<b>REPETITION, LOOP STATEMENTS AND ARRAYS</b>						<b>CLASSES: 10</b>	
<p><b>Repetition and Loop Statements:</b> Repetition in Programs, Counting Loops and the while Statement, computing a Sum or Product in a Loop, for Statement, Conditional Loops, Loop Design, Nested Loops, do-while Statement.</p> <p><b>Arrays:</b> Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Array Arguments, Parallel Arrays and Enumerated Types, Multidimensional Arrays.</p>								
<b>UNIT - III</b>	<b>FUNCTIONS AND POINTERS</b>						<b>CLASSES: 10</b>	
<p><b>Top-Down Design with Functions:</b> Library Functions, Top-Down Design and Structure Charts, Functions without Arguments, Using Array Elements as Function Arguments, Parameter Passing Techniques: Call by Value, Call by Reference, Functions with Input Arguments.</p> <p><b>Recursion:</b> The Nature of Recursion, Tracing a Recursive Function, Recursive Mathematical Functions, storage classes.</p> <p><b>Pointers and Modular Programming:</b> Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, Functions returning pointers, Dynamic memory allocation</p>								
<b>UNIT - IV</b>	<b>STRINGS AND USER DEFINED DATA TYPES</b>						<b>CLASSES: 10</b>	
<p><b>Strings:</b> String Basics, String Library Functions: Assignment and Substrings, Longer Strings: Concatenation and Whole-Line Input, String Comparison, Arrays of strings.</p> <p><b>Structure and Union Types:</b> User- Defined Structure Types, Structure Type Data as Input and Output Parameters, Functions with Structured Result Values, Union Types.</p>								
<b>UNIT - V</b>	<b>FILE HANDLING, SEARCHING AND SORTING</b>						<b>CLASSES: 10</b>	

**File Handling:** Command Line Arguments, File Modes, Basic File Operations Read, Write and Append, Example Programs. Random Access Using fseek, ftell and rewind Functions.  
**Basic Searching and Sorting Algorithms:** Linear and Binary Search, Bubble Sort, Insertion Sort, Selection Sort.

#### TEXT BOOKS

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

#### REFERENCE BOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGrawHill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, McGraw-Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

#### WEB REFERENCE

1. . [https://en.wikipedia.org/wiki/Computational\\_thinking](https://en.wikipedia.org/wiki/Computational_thinking)
2. <https://nptel.ac.in/courses/106/104/106104128/>
3. <https://en.cppreference.com/w/c/language>
4. <https://www.learn-c.org/>

#### E-TEXT BOOKS

1. [https://slidelegend.com/queue/computational-thinking-for-the-modern-problem-solver\\_59d6f01e1723ddb0c7a0df47.html](https://slidelegend.com/queue/computational-thinking-for-the-modern-problem-solver_59d6f01e1723ddb0c7a0df47.html)
2. <http://www.freebookcentre.net/Language/Free-C-Programming-Books-Download.htm>

#### MOOC COURSE

1. <https://www.coursera.org/learn/computational-thinking-problem-solving>
2. [https://onlinecourses.nptel.ac.in/noc18\\_cs33/preview](https://onlinecourses.nptel.ac.in/noc18_cs33/preview)
3. <https://www.alison.com/courses/Introduction-to-Programming-in-c>
4. <http://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-effective-programming-in-c-and-c-january-iap-2014/index.html>

## ENGINEERING CHEMISTRY LAB

I B.TECH - I SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7BS11	BSC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100

### Course Description:

The course includes experiments based on fundamental principles of chemistry essential for engineering students, aiming to develop practical skills and reinforce theoretical concepts.

### COURSE OBJECTIVES

1. Students will understand and perform experiments based on core chemical principles relevant to engineering applications.
2. Students will learn to estimate the hardness of water to assess its suitability for drinking purposes.
3. Students will acquire the ability to perform acid-base titrations using instrumental methods such as conductometry, potentiometry, and pH metry.
2. Students will gain hands-on experience in synthesizing polymers like Bakelite and Nylon – 6, 6 in the laboratory.
3. Students will learn to determine the unknown concentration of potassium permanganate (KMnO<sub>4</sub>) using a calibration curve.

### COURSE OUTCOMES

1. Students will develop practical skills through hands-on chemistry experiments relevant to engineering.
2. Students will learn to determine important parameters such as water hardness and the corrosion rate of mild steel under various conditions.
3. Students will be able to apply techniques like conductometry, potentiometry, and pH metry to determine concentrations or equivalence points in acid-base reactions.
4. Students will gain experience in synthesizing polymers such as Bakelite and Nylon-6,6.
5. Students will understand the working principle of colorimetry and the relationship between absorbance and concentration (Beer-Lambert Law).

### LIST OF EXPERIMENTS

#### WEEK - 1

- I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.

#### WEEK - 2

Conductometry:

1. Estimation of the concentration of strong acid by Conductometry.
2. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.

#### WEEK - 3

Potentiometry:

1. Estimation of concentration of Fe<sup>+2</sup> ion by Potentiometry using KMnO<sub>4</sub>.
2. Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone

#### WEEK - 4

**pH Metry:** Determination of an acid concentration using pH meter.

<b>WEEK - 5</b>	
<b>I. Colorimetry:</b> Verification of Lambert-Beer's law using $\text{KMnO}_4$ .	
<b>WEEK - 6</b>	Preparations:
	1. Preparation of Bakelite. 2. Preparation Nylon – 6, 6.
<b>WEEK - 7</b>	
<b>I. Corrosion:</b> Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.	
<b>WEEK - 8</b>	
	<b>Corrosion:</b> Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
<b>WEEK - 9</b>	Virtual lab experiments:
	1. Construction of Fuel cell and it's working. 2. Smart materials for Biomedical applications 3. Batteries for electrical vehicles. 4. Functioning of solar cell and its applications.
<b>REFERENCE BOOKS</b>	
1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022) 2. Vogel's text book of practical organic chemistry 5th edition 3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications. 4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).	

## PROGRAMMING FOR PROBLEM SOLVING LAB

I B.TECH - I SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7CS02	ESC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100

*[Note: The programs may be executed using any available Open Source/ Freely available IDE Some of the Tools available are:*

*CodeLite: <https://codelite.org/> Code::Blocks:*

*<http://www.codeblocks.org/>*

*DevCpp : <http://www.bloodshed.net/devcpp.html> Eclipse:*

*<http://www.eclipse.org>*

*This list is not exhaustive and is NOT in any order of preference]*

**Course Objectives:** The students will learn the following:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To Write programs using the Dynamic Memory Allocation concept.
6. To create, read from and write to text and binary files

**Course Outcomes:** The candidate is expected to be able to:

1. formulate the algorithms for simple problems
2. translate given algorithms to a working and correct program
3. correct syntax errors as reported by the compilers
4. identify and correct logical errors encountered during execution
5. represent and manipulate data with arrays, strings and structures
6. use pointers of different types
7. create, read and write to and from simple text and binary files
8. modularize the code with functions so that they can be reused

**PRACTICE SESSIONS:****Simple numeric problems:**

- a) Write a program for finding the max and min from the three numbers.
- b) Write the program for the simple, compound interest.
- c) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
 
$$5 \times 1 = 5$$

$$5 \times 2 = 10$$

$$5 \times 3 = 15$$
- d) Write a program that shows the binary equivalent of a given positive number between 0 to 255.

**Expression Evaluation:**

- a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement).
- b) Write a program that finds if a given number is a prime number.
- c) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
- d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

**Arrays, Pointers and Functions:**

- a) Write a C program to find the minimum, maximum and average in an array of integers.
- b) Write a C program that uses functions to perform the following:
  - I. Addition of Two Matrices
  - II. Multiplication of Two Matrices
- c) Write a program for reading elements using a pointer into an array and display the values using the array.
- d) Write a program for display values reverse order from an array using a pointer.

**Files:**

- a) Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
- b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

**Strings:**

- a) Write a C program that uses functions to perform the following operations:
  - I. To insert a sub-string into a given main string from a given position.
  - II. To delete n Characters from a given position in a given string
- b) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
- c) Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
- d) Write a C program to count the lines, words and characters in a given text.

**Sorting and Searching:**

- a) Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search method.
- b) Write a C program that uses non-recursive function to search for a Key value in a given sorted list of integers using binary search method.
- c) Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- d) Write a C program that sorts the given array of integers using selection sort in descending order
- e) Write a C program that sorts the given array of integers using insertion sort in ascending order
- f) Write a C program that sorts a given array of names.

**TEXT BOOKS**

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

**REFERENCE BOOKS**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

## ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

I B.TECH - I SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7HS02	HSMC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100
<p>The <b>English Language and Communication Skills (ELCS) Lab</b> focuses on listening and speaking skills, particularly on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.</p> <p><b>Listening Skills:</b> Objectives</p> <ol style="list-style-type: none"> <li>1. To enable students develop their active listening skills</li> <li>2. To equip students with necessary training in listening, so that they can comprehend the speech of people from different linguistic backgrounds</li> </ol> <p><b>Speaking Skills:</b></p> <ol style="list-style-type: none"> <li>3. To improve their pronunciation and neutralize accent</li> <li>4. To enable students express themselves fluently and appropriately</li> <li>5. To practise speaking in social and professional contexts</li> </ol> <p><b>Learning Outcomes:</b> Students will be able to:</p> <ol style="list-style-type: none"> <li>1. Listen actively and identify important information in spoken texts</li> <li>2. Interpret the speech and infer the intention of the speaker</li> <li>3. Improve their accent for intelligibility</li> <li>4. Speak fluently with clarity and confidence</li> <li>5. Use the language in real life situations</li> </ol>								
<p><b>Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:</b></p> <ol style="list-style-type: none"> <li>a. <b>Computer Assisted Language Learning (CALL) Lab</b> which focusses on listening skills</li> <li>b. <b>Interactive Communication Skills (ICS) Lab</b> which focusses on speaking skills</li> </ol> <p>The following course content is prescribed for the <b>English Language and Communication Skills Lab.</b></p>								
<b>EXERCISE - 1</b>	<p><b>CALL Lab:</b> <i>Instruction:</i> Speech Sounds-Listening Skill - Importance – Purpose - Types- Barriers- Active Listening <i>Practice:</i> Listening to Distinguish Speech Sounds (Minimal Pairs) - <i>Testing Exercises</i></p> <p><b>ICS Lab:</b> ❖ <b>Diagnostic Test – Activity titled ‘Express Your View’</b> <i>Instruction:</i> Spoken and Written language - Formal and Informal English - Greetings - Introducing Oneself and Others <i>Practice:</i> Any Ice-Breaking Activity</p>							
<b>EXERCISE – 2</b>	<p><b>CALL Lab:</b> <i>Instruction:</i> Listening vs. Hearing - Barriers to Listening <i>Practice:</i> Listening for General Information - Multiple Choice Questions - Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)</p> <p><b>ICS Lab:</b> <i>Instruction:</i> Features of Good Conversation – Strategies for Effective Communication <i>Practice:</i> Role Play Activity - Situational Dialogues –Expressions used in Various Situations – Making Requests and Seeking Permissions – Taking Leave - Telephone Etiquette</p>							
<b>EXERCISE - 3</b>	<p><b>CALL Lab:</b> <i>Instruction:</i> Errors in Pronunciation – Tips for Neutralizing Mother Tongue Influence (MTI) <i>Practice:</i> Differences between British and American Pronunciation –Listening Comprehension Exercises</p>							

	<p><b>ICS Lab:</b> Instruction: Describing Objects, Situations, Places, People and Events Practice: Picture Description Activity – Looking at a Picture and Describing Objects, Situations, Places, People and Events (A wide range of Materials / Handouts are to be made available in the lab.)</p>
<b>EXERCISE – 4</b>	<p><b>CALL Lab:</b> Instruction: Techniques for Effective Listening Practice: Listening for Specific Details - Listening - Gap Fill Exercises - Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)</p> <p><b>ICS Lab:</b> Instruction: How to Tell a Good Story - Story Star- Sequencing-Creativity Practice: Activity on Telling and Retelling Stories - Collage</p>
<b>EXERCISE – 5</b>	<p><b>CALL Lab:</b> Instruction: Identifying the literal and implied meaning Practice: Listening for Evaluation - Write the Summary – Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)</p> <p><b>ICS Lab:</b> Instruction: Understanding Non-Verbal Communication Practice: Silent Speech - Dumb Charades Activity</p>
<p>❖ <b>Post-Assessment Test on ‘Express Your View’</b></p> <p><b>Minimum Requirement of infrastructural facilities for ELCS Lab:</b></p> <p><b>1. Computer Assisted Language Learning (CALL) Lab:</b> <b>The Computer Assisted Language Learning Lab</b> has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.</p> <p><b>System Requirement (Hardware component):</b> <i>Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:</i></p> <ol style="list-style-type: none"> <li>i) Computers with Suitable Configuration</li> <li>ii) High Fidelity Headphones</li> </ol> <p><b>2. Interactive Communication Skills (ICS) Lab:</b> <b>The Interactive Communication Skills Lab:</b> A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio &amp; video system and camcorder etc.</p> <p><input type="checkbox"/> <b>Note: English Language Teachers are requested to prepare Materials / Handouts for each Activity for the Use of those Materials in CALL &amp; ICS Labs.</b></p>	
<p><b>Suggested Software:</b></p> <ul style="list-style-type: none"> <li>• Cambridge Advanced Learners’ English Dictionary with CD.</li> <li>• Grammar Made Easy by Darling Kindersley.</li> <li>• Punctuation Made Easy by Darling Kindersley.</li> <li>• Oxford Advanced Learner’s Compass, 10<sup>th</sup> Edition.</li> <li>• English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.</li> <li>• English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.</li> <li>• English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.</li> <li>• TOEFL &amp; GRE (KAPLAN, AARCO &amp; BARRONS, USA, Cracking GRE by CLIFFS).</li> </ul>	
<p><b>REFERENCES</b></p> <ol style="list-style-type: none"> <li>1. Shobha, KN &amp; Rayen, J. Lourdes. (2019). <i>Communicative English – A workbook</i>. Cambridge University Press</li> <li>2. Board of Editors. (2016). <i>ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities</i>. a. Orient BlackSwan Pvt. Ltd.</li> </ol>	

3. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press
4. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
5. Ur, Penny and Wright, Andrew. 2022. *Five Minute Activities – A Resource Book for Language Teachers*. Cambridge University Press.

## ENGINEERING WORKSHOP

I B.TECH - I SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7ME03	ESC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100
<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To introduce students to basic manufacturing processes and workshop practices.</li> <li>2. To provide hands-on training in carpentry, fitting, welding, sheet metal, and machining</li> <li>3. To develop skills in using hand tools and measuring instruments.</li> <li>4. To enhance safety awareness and proper handling of workshop equipment.</li> <li>5. To build a foundational understanding of industrial production and fabrication.</li> </ol> <p><b>Course Outcomes:</b></p> <p>At the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic manufacturing processes and operations.</li> <li>2. Use hand tools and equipment safely and efficiently.</li> <li>3. Perform basic operations in carpentry, fitting, welding, sheet metal work, and machining</li> <li>4. Read and interpret workshop drawings</li> <li>5. Develop teamwork, time management, and quality awareness in a workshop environment.</li> </ol> <p><b>1. TRADES FOR EXERCISES:</b> At least two exercises from each trade:</p> <ol style="list-style-type: none"> <li>i. <b>Carpentry:</b> T- Lap Joint, Dovetail Joint, Mortise and Tenon Joint</li> <li>ii. <b>Fitting:</b> V- Fit, Dovetail Fit and Semi- circular fit</li> <li>iii. <b>Tin Smithy:</b> Square Tin, Rectangular Tray and Conical Funnel</li> <li>iv. <b>Foundry:</b> Preparation of Green Sand Mould using Single Piece and Split Pattern</li> <li>v. <b>Welding Practice:</b> Arc Welding and Gas Welding</li> <li>vi. <b>House wiring:</b> Parallel and Series, Two-way Switch and Tube Light</li> <li>vii. <b>Black Smithy:</b> Round to Square, Fan Hook and S- Hook</li> </ol> <p><b>2. TRADES FOR DEMONSTRATION AND EXPOSURE:</b> Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working</p>								
<p><b>TEXT BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Workshop Practice, B. L. Juneja, Cengage Learning India, 1st edition, 2015.</li> <li>2. Workshop Practice Manual, K. Venkata Reddy, BS Publication, 6th Edition, Rpt.2025.</li> </ol>								
<p><b>REFERENCES</b></p> <ol style="list-style-type: none"> <li>1. Workshop Manual, K. Venugopal, Anuradha Publications, 2012th edition, 2012</li> </ol>								

# I B.TECH II SEMESTER

## ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B.TECH - II SEMESTER: Common for All (ECE/EEE/MECH/AERO/ CSE/AI&ML/DS)								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7BS02	BSC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<p><b>Course Objectives:</b></p> <p><b>To learn</b></p> <ol style="list-style-type: none"> <li>1. Methods of solving first order ordinary differential equations.</li> <li>2. Methods of solving higher order ordinary differential equations.</li> <li>3. Solving ordinary differential equations using Laplace transform techniques.</li> <li>4. The physical quantities involved in engineering field related to vector valued functions.</li> <li>5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.</li> </ol> <p><b>Course Outcomes:</b></p> <p>After learning the contents of this paper, the student must be able to</p> <ol style="list-style-type: none"> <li>1. Determine whether the given differential equation of first order is exact or not.</li> <li>2. Solve higher order differential equations and apply the concept of differential equations to real world problems.</li> <li>3. Evaluate Ordinary differential equations using Laplace transforms.</li> <li>4. Compute the gradient of a scalar field and evaluate directional derivatives at given points.</li> <li>5. Evaluate the Line, Surface and Volume integrals and converting them from one to another.</li> </ol>								
<b>UNIT - I</b>	<b>FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS</b>						<b>CLASSES: 08</b>	
Exact differential equations – Equations reducible to exact differential equations – linear and Bernoulli's equations – Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling – Law of natural growth and decay.								
<b>UNIT - II</b>	<b>ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER</b>						<b>CLASSES: 10</b>	
Higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $e^{ax}$ , $\sin ax$ , $\cos ax$ , polynomials in $x$ , $e^{ax}V(x)$ and $x V(x)$ – Method of variation of parameters.								
<b>UNIT - III</b>	<b>LAPLACE TRANSFORMS</b>						<b>CLASSES: 10</b>	
Laplace Transforms: Laplace Transform of standard functions – First shifting theorem – Laplace transforms of functions multiplied by 't' and divided by 't' – Laplace transforms of derivatives and integrals of function – Evaluation of improper integrals by Laplace transforms – Laplace transform of periodic functions – Inverse Laplace transforms - partial fractions, First shifting theorem, derivatives and integrals,, convolution theorem. Applications: solving Initial value problems of ODE by Laplace transform method (All theorems / Properties without proof).								
<b>UNIT - IV</b>	<b>VECTOR DIFFERENTIATION</b>						<b>CLASSES: 10</b>	
Vector point functions and scalar point functions – Gradient – Directional derivatives - Divergence and Curl – Solenoidal and Irrotational vectors - Scalar potential functions –Vector operators and Identities.								
<b>UNIT - V</b>	<b>VECTOR INTEGRATION</b>						<b>CLASSES: 10</b>	

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

#### **WEB REFERENCES**

1. [https://www.efunda.com/math/math\\_home/math.cfm](https://www.efunda.com/math/math_home/math.cfm)
2. <https://www.ocw.mit.edu/resources/#Mathematics>
3. <https://www.sosmath.com/>

#### **E-TEXT BOOKS**

1. <https://www.e-booksdirectory.com/details.php?ebook=10166>

#### **MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

## ADVANCED ENGINEERING PHYSICS

I B.TECH - II SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7BS08	BSC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<b>Pre-requisites:</b> 10+2 Physics								
<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To study crystal structures, defects, and material characterization techniques like XRD and SEM.</li> <li>2. To understand fundamental concepts of quantum mechanics and their applications in solids and nanomaterials.</li> <li>3. To introduce quantum computing principles, quantum gates, and basic quantum algorithms.</li> <li>4. To learn the properties and applications of magnetic and dielectric materials.</li> <li>5. To explore the working and applications of lasers and fibre optics in modern technology.</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. <b>CO1:</b> Analyze crystal structures, identify defects, and apply XRD and SEM techniques for material characterization.</li> <li>2. <b>CO2:</b> Apply quantum mechanical principles to explain particle behaviour and energy band formation in solids.</li> <li>3. <b>CO3:</b> Understand quantum computing concepts, use quantum gates, and explain basic quantum algorithms.</li> <li>4. <b>CO4:</b> Classify magnetic and dielectric materials and explain their properties, synthesis, and applications.</li> <li>5. <b>CO5:</b> Explain the principles of lasers and fibre optics and their applications in communication and sensing.</li> </ol>								
<b>UNIT - I</b>	<b>Crystallography &amp; Materials Characterization</b>							
Introduction: Unit cell, space lattice, basis, lattice parameters; crystal structures, Bravais lattices, packing factor: SC, BCC, FCC; Miller indices, inter-planar distance; defects in crystals (Qualitative): point defects, line defects, surface defects and volume defects. concept of nanomaterials: surface to volume ratio, X -ray diffraction: Bragg's law, powder method, calculation of average crystallite size using Debye Scherrer's formula, scanning electron microscopy (SEM): block diagram, working principle.								
<b>UNIT - II</b>	<b>Quantum Mechanics</b>							
Introduction, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, eigen values and eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box, Bloch's theorem (qualitative), Kronig-Penney model (qualitative): E-k diagram, effective mass of electron, formation of energy bands, origin of bandgap, classification of solids, concept of discrete energy levels and quantum confinement in nanomaterials.								
<b>UNIT - III</b>	<b>Quantum Computing</b>							
Introduction, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits, multiple Qubit system, quantum computing system for information processing, evolution of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, quantum algorithms: Deutsch-Jozsa, Shor, Grover.								

<b>UNIT - IV</b>	<b>Magnetic and Dielectric Materials</b>	
<p>Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, synthesis of ferrimagnetic materials using sol-gel method, applications: magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device.</p> <p>Introduction to dielectric materials, types of polarization (qualitative): electronics, ionic &amp; orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM), load cell and fire sensor.</p>		
<b>UNIT - V</b>	<b>Laser and Fibre Optics</b>	
<p>Introduction to laser, characteristics of laser, Einstein coefficients and their relations, metastable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, CO<sub>2</sub> laser, semiconductor diode laser, applications: Bar code scanner, LIDAR for autonomous vehicle.</p> <p>Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres, losses in optical fibre, applications: optical fibre for communication system, sensor for structural health monitoring.</p>		
<b>TEXT BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Walter Borchardt-Ott, <i>Crystallography: An Introduction</i>, Springer.</li> <li>2. Charles Kittel, <i>Introduction to Solid State Physics</i>, John Wiley &amp; Sons, Inc.</li> <li>3. Thomas G. Wong, <i>Introduction to Classical and Quantum Computing</i>, Rooted Grove</li> </ol>		
<b>REFERENCE BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Jozef Gruska, <i>Quantum Computing</i>, McGraw Hill</li> <li>2. Michael A. Nielsen &amp; Isaac L. Chuang, <i>Quantum Computation and Quantum Information</i>, Cambridge University Press.</li> <li>3. John M. Senior, <i>Optical Fiber Communications Principles and Practice</i>, Pearson Education Limited.</li> </ol>		
<b>USEFUL LINKS</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fiber-communications-principles-and-pr.pdf">https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fiber-communications-principles-and-pr.pdf</a></li> <li>2. <a href="https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf">https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf</a></li> <li>3. <a href="https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles-Kittel.pdf">https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles-Kittel.pdf</a></li> <li>4. <a href="https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf">https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf</a></li> <li>5. <a href="https://www.fi.muni.cz/usr/gruska/qbook1.pdf">https://www.fi.muni.cz/usr/gruska/qbook1.pdf</a></li> <li>6. <a href="https://profmcruez.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf">https://profmcruez.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf</a></li> </ol>		

## COMPUTER AIDED AND ENGINEERING DRAWING

I B.TECH - II SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7ME02	ESC	L	T	P	C	CIE	SEE	Total
		2	0	2	3	40	60	100
<p><b>COURSE OBJECTIVES</b></p> <ol style="list-style-type: none"> <li>1. To introduce the fundamentals of engineering drawing and projection systems.</li> <li>2. To develop skills in constructing orthographic, isometric, and sectional views.</li> <li>3. To train students in interpreting and creating technical drawings using CAD tools.</li> <li>4. To familiarize students with dimensioning standards and drafting conventions.</li> <li>5. To bridge manual drafting techniques with computer-aided drafting practices.</li> </ol> <p><b>COURSE OUTCOMES</b></p> <p>At the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand and apply the principles of orthographic and isometric projections.</li> <li>2. Create sectional views and dimensioned drawings using BIS standards.</li> <li>3. Use CAD software to generate 2D engineering drawings.</li> <li>4. Visualize and construct solid models from 2D views.</li> <li>5. Interpret and produce engineering drawings of mechanical components and assemblies.</li> <li>6. Demonstrate drafting skills for practical and industrial applications.</li> </ol>								
<b>UNIT - I</b>	<b>Introduction to Engineering Graphics (Conventional)</b>							
Principles of Engineering Graphics and their Significance, Geometrical Constructions, Scales, Plain and Diagonal, Conic Sections including the Rectangular Hyperbola, General method only. Cycloid, Epicycloid and Hypocycloid.								
<b>UNIT - II</b>	<b>Orthographic Projections (Conventional and Computer Aided)</b>							
Principles of Orthographic Projections, Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections, points, lines and planes. Introduction to Computer aided drafting, views, commands and conics.								
<b>UNIT - III</b>	<b>Projections of Regular Solids (Conventional and Computer Aided)</b>							
Auxiliary Views, Sections or Sectional views of Right Regular Solids, Prism, Cylinder, Pyramid, Cone, Auxiliary views, Computer aided projections of solids, sectional views								
<b>UNIT - IV</b>								
<b>Development of Surfaces (Conventional):</b> Prism, Cylinder, Pyramid and Cone.								
<b>UNIT - V</b>	<b>Isometric Projections (Conventional and Computer Aided)</b>							
Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Simple and Compound Solids, Isometric Projection of objects having non-isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions. Conversion of orthographic projection into isometric view.								

**Note:**

1. The End Semester Examination will be in conventional mode.
2. CIE – I will be in conventional mode.
3. CIE – II will be using Computer.

**TEXT BOOKS**

1. Engineering Drawing, N.D. Bhatt, Charotar, 54<sup>th</sup> Edition, 2023.
2. Engineering Drawing and graphics Using AutoCAD, T. Jeyapoovan and Vikas, S. Chand and company Ltd., 3<sup>rd</sup> Edition, 2010.

**REFERENCE BOOKS**

1. Engineering Drawing, Basant Agrawal and C.M. Agrawal, McGraw Hill, 3<sup>rd</sup> Edition, 2019.
2. Engineering Graphics and Design, WILEY, John Wiley and Sons Inc, 3<sup>rd</sup> Edition, 2020.
3. Engineering Drawing, M. B. Shah and B.C. Rane, Pearson, 2<sup>nd</sup> Edition, 2009.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford, 1<sup>st</sup> Edition, 2015.
5. Computer Aided Engineering Drawing, K. Balaveera Reddy, CBS Publishers, 2<sup>nd</sup> Edition, 2015.

## BASIC ELECTRICAL ENGINEERING

I B.TECH - II SEMESTER: (CSE, CSM, CSD)								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7EE04	ESC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<b>Prerequisites:</b> Mathematics								
<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1. To understand DC and Single &amp; Three phase AC circuits</li> <li>2. To study and understand the different types of DC, AC machines and Transformers.</li> <li>3. To import the knowledge of various electrical installations and the concept of power, power factor and its improvement.</li> </ol>								
<b>Course Outcomes:</b> After learning the contents of this paper the student must be able to <ol style="list-style-type: none"> <li>1. Analyze and solve for current values in resistive circuits with independent sources.</li> <li>2. Analyze and solve for current and voltage values of R-L-C circuits with AC Excitations.</li> <li>3. Analyze the working of Transformer and solve the numerical problems</li> <li>4. Analyze the working of AC and DC electrical machines and solve the numerical problems.</li> <li>5. Design Basic Electrical Circuits and Install Electrical Wiring Systems</li> </ol>								
<b>UNIT - I</b>	<b>D.C. CIRCUITS</b>							
Introduction to R, L and C elements, independent voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton Theorems, Maximum Power Transfer Theorem.								
<b>UNIT - II</b>	<b>A.C. CIRCUITS</b>							
Introduction to sinusoidal waveforms, phasor representation, the concept of power, and power factor, Analysis of single-phase R-L-C series circuits. Resonance of series RLC circuit, Three-phase balanced circuits, voltage and current relations in star and delta connections.								
<b>UNIT - III</b>	<b>TRANSFORMERS</b>							
Principle of operation, EMF equation, equivalent circuit, losses, regulation and efficiency.								
<b>UNIT - IV</b>	<b>ELECTRICAL MACHINES</b>							
Principle of operation of DC machine, performance characteristics of dc shunt machine. Principle of operation of three phase induction motor and synchronous generator.								
<b>UNIT - V</b>	<b>ELECTRICAL INSTALLATIONS</b>							
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries and Characteristics. Elementary calculations for energy consumption, power factor improvement and battery backup.								
<b>TEXT BOOKS</b>								
<ol style="list-style-type: none"> <li>1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.</li> <li>2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008</li> </ol>								
<b>REFERENCE BOOKS</b>								

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

## DATA STRUCTURES

I B.TECH - II SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7CS03	ESC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<p><b>Prerequisites:</b> A course on “Programming for Problem Solving</p> <p><b>Course Objectives</b></p> <ol style="list-style-type: none"> <li>1. Exploring basic data structures such as stacks and queues.</li> <li>2. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.</li> <li>3. Introduces sorting and pattern matching algorithms.</li> </ol> <p><b>Course Outcomes</b></p> <ol style="list-style-type: none"> <li>1. Ability to select the data structures that efficiently model the information in a problem.</li> <li>2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.</li> <li>3. Implement and know the application of algorithms for sorting and pattern matching.</li> <li>4. Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.</li> </ol>								
<b>UNIT - I</b>								
Introduction to Data Structures: Basic Terminology, Classification of Data Structures, Operation on Data Structures, abstract data types, selecting a Data Structure, Linear list – Introduction, singly linked list, Circular Linked Lists, Doubly Linked List, Stacks- Operations, Stack algorithm, Stack ADT, Stack applications, Queues- operations, Queue Algorithm, Queue ADT, Queue Applications.								
<b>UNIT - II</b>								
Trees: Introduction, Types of Trees, creating a Binary Tree from a General Tree, traversing a Binary Tree, Binary Search Trees (BST), BST Operations- Searching, Insertion and Deletion, BST ADT, BST Applications, Threaded Binary Trees, AVL Trees, Red –Black Trees, Splay Trees								
<b>UNIT - III</b>								
Multi way Search Trees: Introduction, B Trees, B Trees ADT, 2-3 Trees, 2-3- Tree, B* Tree, B+ Trees Heaps: Binary Heaps, Binomial heaps, Fibonacci heaps, Comparison of Various Heaps, Applications Searching: Introduction, Interpolation Search, Jump search								
<b>UNIT - IV</b>								
Graphs: Introduction, Directed Graphs, Bi connected Components, Representation of Graphs, Graph Traversal Algorithms, Graph ADT, Applications of Graphs Sorting: Radix Sort, Heap sort, Shell Sort, Tree Sort,								
<b>UNIT - V</b>								
Hashing and Collision: Introduction, Hash Tables, Hash Functions, Different Hash Functions: Division Method, Multiplication Method, Mid-square Method, Folding Method; collisions: Collision Resolution by Open Addressing, Collision Resolution by Chaining Files and their Organization: Introduction, Data hierarchy, File Attributes, Text and Binary Files, Basic File Operations, File Organization, Indexing								
<b>TEXT BOOKS</b>								

1. Data Structures: A Pseudocode Approach with C, 2<sup>nd</sup> Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning
2. Data Structure using C– Reema Thareja, 3<sup>rd</sup> Edition, Oxford University Press.

**REFERENCE BOOKS**

1. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education

## ADVANCED ENGINEERING PHYSICS LAB

I B.TECH - II SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
<b>A7BS09</b>	<b>BSC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIE</b>	<b>SEE</b>	<b>Total</b>
		0	0	2	1	40	60	100
<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To provide practical sure to advanced concepts in solid-state and modern physics.</li> <li>2. To synthesize and study the physical properties of materials like semiconductors, ferromagnetic, and ferroelectric substances.</li> <li>3. To perform semiconductor characterization using Hall effect and band gap experiments.</li> <li>4. To explore the working principles of lasers and optical fibers through hands-on experiments.</li> <li>5. To develop skills in data analysis, interpretation, and scientific reporting.</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. <b>CO1:</b> Synthesize and analyze nanomaterials such as magnetite (<math>Fe_3O_4</math>) using chemical methods.</li> <li>2. <b>CO2:</b> Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.</li> <li>3. <b>CO3:</b> Characterize semiconductors using Hall effect and energy gap measurement techniques.</li> <li>4. <b>CO4:</b> Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.</li> <li>5. <b>CO5:</b> Apply scientific methods for accurate data collection, analysis, and technical report writing.</li> </ol>								
LIST OF EXPERIMENTS								
<ol style="list-style-type: none"> <li>1. Synthesis of magnetite (<math>Fe_3O_4</math>) powder using sol-gel method.</li> <li>2. Determination of energy gap of a semiconductor.</li> <li>3. Determination of Hall coefficient and carrier concentration of a given semiconductor.</li> <li>4. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.</li> <li>5. Study of B-H curve of a ferro magnetic material.</li> <li>6. Study of P-E loop of a given ferroelectric crystal.</li> <li>7. Determination of dielectric constant of a given material.</li> <li>8. Determination of Curie's temperature of a given ferroelectric material.</li> <li>9. A) Determination of wavelength of a laser using diffraction grating. B) Study of V-I &amp; L-I characteristics of a given laser diode.</li> <li>10. A) Determination of numerical aperture of a given optical fibre. B) Determination of bending losses of a given optical fibre.</li> </ol> <p><b>Note: Any 8 experiments are to be performed.</b></p>								

## DATA STRUCTURES LAB

I B.TECH - II SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7CS04	ESC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100
<p><b>Prerequisites:</b> 1. A Course on “Programming for problem solving”.</p> <p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. It covers various concepts of C programming language</li> <li>2. It introduces searching and sorting algorithms</li> <li>3. It provides an understanding of data structures such as stacks and queues.</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.</li> <li>2. Ability to Implement searching and sorting algorithms</li> </ol>								
<b>LIST OF EXPERIMENTS</b>								
<ol style="list-style-type: none"> <li>1. Write a program that uses functions to perform the following operations on singly linked list.: i) Creation      ii) Insertion      iii) Deletion      iv) Traversal</li> <li>2. Write a program that uses functions to perform the following operations on doubly linked list.: i) Creation      ii) Insertion      iii) Deletion      iv) Traversal</li> <li>3. Write a program that uses functions to perform the following operations on circular linked list.: i) Creation      ii) Insertion      iii) Deletion      iv) Traversal</li> <li>4. Write a program that implement stack (its operations) using i) Arrays      ii) ADT</li> <li>5. Write a program that implement Queue (its operations) using i) Arrays      ii) ADT</li> <li>6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order i) Radix Sort, ii) Heap sort, iii) Shell Sort, iv) Tree Sort</li> <li>7. Write a program to implement the tree traversal methods (Recursive and Non-Recursive).</li> <li>8. Write a program to implement i) Binary Search tree      ii) B Trees      iii) B+ Trees      iv) AVL trees      v) Red - Black trees</li> <li>9. Write a program to implement the graph traversal methods.</li> <li>10. Write a program to implement the following Hash Functions: i) Division Method, ii) Multiplication Method, iii) Mid-square Method, iv) Folding Method</li> </ol>								
<b>TEXT BOOKS</b>								
<ol style="list-style-type: none"> <li>1. Fundamentals of Data Structures in C, 2<sup>nd</sup> Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.</li> <li>2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.</li> </ol>								
<b>REFERENCE BOOKS</b>								
<ol style="list-style-type: none"> <li>1. Data Structures: A Pseudocode Approach with C, 2<sup>nd</sup> Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.</li> </ol>								

## PYTHON PROGRAMMING LAB

### I B.TECH - II SEMESTER: Common to CSE allied branches

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
A7CS05	ESC	-	-	2	1	40	60	100

**COURSE OBJECTIVES:**

1. To install and run the Python interpreter
2. To learn control structures.
3. To Understand Lists, Dictionaries in python
4. To Handle Strings and Files in Python

**COURSE OUTCOMES:****At the end of the course, student will be able to**

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O, Python standard library
4. Implement Digital Systems using Python

**LIST OF EXPERIMENTS**

<b>WEEK - I</b>		
	1. i) Use a web browser to go to the Python website <a href="http://python.org">http://python.org</a> . This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation. ii) Start the Python interpreter and type <code>help()</code> to start the online help utility.	
	2. Start a Python interpreter and use it as a Calculator.	
<b>WEEK - 2</b>		
	1. Write a program to calculate compound interest when principal, rate and number of periods are given. 2. Read the name, address, email and phone number of a person through the keyboard and print the details. 3. Print the below triangle using for loop. 5 4 4 3 3 3 2 2 2 2 1 1 1 1 1	
<b>WEEK - 3</b>		
	1. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder) 2. Python program to print all prime numbers in a given interval (use break) 3. Write a program to convert a list and tuple into arrays.	
<b>WEEK - 4</b>		

	<ol style="list-style-type: none"> <li>1. Write a program to find common values between two arrays.</li> <li>2. Write a function called <code>palindrome</code> that takes a string argument and returns <code>True</code> if it is a palindrome and <code>False</code> otherwise. Remember that you can use the built-in function <code>len</code> to check the length of a string.</li> <li>3. Write a function called <code>is_sorted</code> that takes a list as a parameter and returns <code>True</code> if the list is sorted in ascending order and <code>False</code> otherwise.</li> </ol>
<b>WEEK - 5</b>	
	<ol style="list-style-type: none"> <li>1. Write a function called <code>has_duplicates</code> that takes a list and returns <code>True</code> if there is any element that appears more than once. It should not modify the original list.</li> <li>2. Write a function called <code>remove_duplicates</code> that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.</li> <li>3. The wordlist I provided, <code>words.txt</code>, doesn't contain single letter words. So you might want to add "l", "a", and the empty string.</li> </ol>
<b>WEEK - 6</b>	
	<ol style="list-style-type: none"> <li>1. Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.</li> <li>2. Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e' Remove the given word in all the places in a string? Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?</li> </ol>
<b>WEEK - 7</b>	
	<ol style="list-style-type: none"> <li>1. Writes a recursive function that generates all binary strings of n-bit length</li> <li>2. Write a python program that defines a matrix and prints</li> </ol> <p>Write a python program to perform multiplication of two square matrices</p>
<b>WEEK - 8</b>	
	<ol style="list-style-type: none"> <li>1. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.</li> <li>2. Use the structure of exception handling all general-purpose exceptions.</li> <li>3. Write a function called <code>draw_rectangle</code> that takes a <code>Canvas</code> and a <code>Rectangle</code> as arguments and draws a representation of the <code>Rectangle</code> on the <code>Canvas</code>.</li> </ol>
<b>WEEK - 9</b>	
	<ol style="list-style-type: none"> <li>1. Add an attribute named <code>color</code> to your <code>Rectangle</code> objects and modify <code>draw_rectangle</code> so that it uses the <code>color</code> attribute as the fill color.</li> <li>2. Write a function called <code>draw_point</code> that takes a <code>Canvas</code> and a <code>Point</code> as arguments and draws a representation of the <code>Point</code> on the <code>Canvas</code>.</li> <li>3. Define a new class called <code>Circle</code> with appropriate attributes and instantiate a few <code>Circle</code> objects. Write a function called <code>draw_circle</code> that draws circles on the <code>canvas</code>.</li> </ol>
<b>WEEK - 10</b>	
	<ol style="list-style-type: none"> <li>1. Write a python code to read a phone number and email-id from the user and validate it for correctness.</li> <li>2. Write a Python code to merge two given file contents into a third file. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.</li> </ol>
<b>WEEK - 11</b>	
	<ol style="list-style-type: none"> <li>1. Write a Python code to Read text from a text file, find the word with most number of occurrences</li> <li>2. Write a function that reads a file <i>file</i> and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.</li> <li>3. Import <code>numpy</code>, <code>Plotpy</code> and <code>Scipy</code> and explore their functionalities.</li> </ol>

**WEEK - 12**

1. Install NumPy package with pip and explore it.
2. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
3. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

**TEXT BOOKS**

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

**REFERENCE BOOKS**

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Introduction to Python Programming, Gowrishakar S, Veena A, CRC Press
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Python for Data Science, Dr. Mohd Abdul Hameed, Wiley publications
6. Core Python Programming, Dr. R. Nageswara Rao, Dreamtech press
7. Introduction to Python, Gowrishankar S, Veena A., CRC Press

## BASIC ELECTRICAL ENGINEERING LAB

I B.TECH - II SEMESTER								
Course Code:	Category	Hours/Week			Credits	Maximum Marks		
A7EE05	ESC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100
<p><b>Prerequisites:</b> Basic Electrical Engineering</p> <p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.</li> <li>2. To study the transient response of various R, L and C circuits using different excitations.</li> <li>3. To determine the performance of different types of DC, AC machines and Transformers.</li> </ol> <p><b>Course Outcomes:</b> After learning the contents of this paper, the student must be able to</p> <ol style="list-style-type: none"> <li>1. Analyze the circuit using Kirchhoff's law and network simplification theorems</li> <li>2. Evaluate the efficiency of single-phase Transformer</li> <li>3. Evaluate the efficiency and critical speed and critical field resistance of DC Machine Evaluate the efficiency of AC Machine</li> </ol>								
<p><b>List of experiments/demonstrations:</b></p>								
<p><b>PART- A (compulsory)</b></p>								
1.Verification of KVL and KCL								
2.Verification of Thevenin's theorem								
3.Verification of Norton's theorem								
4.Resonance in series RLC circuit								
5.Maximum Power Transfer Theorem								
6.Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer								
7.Performance Characteristics of a DC Shunt Motor								
8.Torque-Speed Characteristics of a Three-phase Induction Motor.								
<p><b>PART-B (Any two experiments from the given list)</b></p>								
1.Verification of Superposition theorem.								

2.Magnetization characteristics of DC Shunt Generator.

3.Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

4.Measurement of Active Power in a balanced Three-phase circuit

5.No-Load Characteristics of a Three-phase Alternator

**TEXT BOOKS**

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2<sup>nd</sup> Edition,2008.

**REFERENCE BOOKS**

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

## IOT and IT Workshop

<b>I B.TECH - I SEMESTER</b>								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7CS06	ESC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100
<b>COURSE OBJECTIVES</b>								
<p><b>The course will enable the students to:</b></p> <ol style="list-style-type: none"> <li>1. To develop basic programming skills through graphical programming</li> <li>2. To learn hardware interfacing and debugging techniques</li> <li>3. To design and develop android apps</li> </ol>								
<b>COURSE OUTCOMES</b>								
<p><b>At the end of the course, student will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Write the algorithms for simple problems</li> <li>2. CO 1: Able to demonstrate various sensor interfacing using Visual Programming Language.</li> <li>3. CO 2: Able to analyze various Physical Components.</li> <li>4. CO 3: Able to demonstrate Wireless Control of Remote Devices.</li> <li>5. CO 4: Able to design and develop Mobile Application which can interact with Sensors</li> </ol>								
<b>INTRODUCTION TO IOT</b>								
<ol style="list-style-type: none"> <li>1. Introduction to basic electronic components and digital electronic</li> <li>2. Introduction to sensors and Actuators</li> <li>3. Introduction to microcontroller</li> <li>4. Introduction to Arduino IDE</li> </ol>								
<b>IOT LAB EXPERIMENTS</b>								
<b>WEEK - 1</b>	To interface LED /buzzer with Arduino board and write a program to turn ON LED for 1sec after every 2 sec.							
<b>WEEK - 2</b>	Interface IR sensor with Arshi I							
<b>WEEK - 3</b>	Interface ultrasonic sonic sensor with Arduino							
<b>WEEK - 4</b>	Interface LDR and temperature sensor with Arduino							
<b>WEEK - 5</b>	Interface LCD using Arduino and print the message in 16*2 LCD							
<b>WEEK - 6</b>	Interface servo motor with Arduino							
<b>WEEK - 7</b>	Interfacing HC-05 Bluetooth module with Arduino and write a program to control home automation using Bluetooth and android mobile							
<b>WEEK - 8</b>	Introduction to ESP 8266 module							
<b>WEEK - 9</b>	Smart home android app development/ project							
<b>IT WORKSHOP LAB EXPERIMENTS</b>								
<b>WEEK - 10</b>	<p><b>Assembling and Disassembling Computers</b></p> <p>Task 1: Identify the peripherals of a computer, components in a CPU and its functions.</p> <p>Task 2: Every student should disassemble and assemble the PC back to working condition. Lab</p>							

	instructors should verify the work and follow it up with a Viva.
<b>WEEK - 11</b>	<b>OS installation</b> Task 1: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.  Task 2: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.
<b>WEEK - 12</b>	<b>MS-Office</b> MS WORD, EXCEL, PowerPoint Case study
<b>REFERENCES</b>	
<ol style="list-style-type: none"><li>1. Sylvia Libow Martinez, Gary S Stager, Invent To Learn: Making, Tinkering, and Engineering in the Classroom, Constructing Modern Knowledge Press, 2016</li><li>2. Michael Margolis, Arduino Cookbook, O'Reilly, 2011</li></ol>	

## **II B.TECH I SEMESTER**

## DISCRETE MATHEMATICS

II B. TECH- I SEMESTER								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A7CS07	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<p><b>COURSE OBJECTIVES</b>  <b>The course should enable the students to:</b></p> <ol style="list-style-type: none"> <li>1. Learn various methods of mathematical reasoning and proof (direct, contra positive, contradiction, and induction).</li> <li>2. Understand operations on sets and relations and helps to know the concepts of functions.</li> <li>3. Understand the concepts of permutation, combination, the pigeonhole principle, and the inclusion-exclusion principle.</li> <li>4. Learn and solving recurrence relations using different techniques.</li> <li>5. Analyze graphs, trees, traversals, and related algorithms relevant to computer science and networking.</li> </ol> <p><b>COURSE OUTCOMES</b>  <b>By the end of this course, the student shall be able to:</b></p> <ol style="list-style-type: none"> <li>1. Analyze and evaluate the validity of arguments using propositional and predicate logic.</li> <li>2. Apply the properties of sets, relations, and functions to complete operations on discrete structures.</li> <li>3. Apply fundamental counting techniques to solve a variety of combinatorial problems.</li> <li>4. Apply the concepts of substitution method, generating functions and method of characteristic roots to solve the given recurrence relation.</li> <li>5. Apply fundamental concepts of graph theory to address theoretical and practical problems.</li> </ol>								
<b>UNIT - I</b>	<b>MATHEMATICAL LOGIC</b>						<b>CLASSES: 10</b>	
Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.								
<b>UNIT - II</b>	<b>SET THEORY</b>						<b>CLASSES: 8</b>	
Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.								
<b>UNIT - III</b>	<b>ALGEBRAIC STRUCTURES</b>						<b>CLASSES: 10</b>	
Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.								
<b>UNIT - IV</b>	<b>ELEMENTARY COMBINATORICS</b>						<b>CLASSES: 7</b>	
Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.								
<b>UNIT - V</b>	<b>GRAPH THEORY</b>						<b>CLASSES: 10</b>	

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed 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 Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe I. Mott, Abraham Kandel, Theodore P. Baker, Prentis Hall of India, 2nd ed.

**REFERENCE BOOKS**

1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearson education, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co.

## COMPUTER ORGANIZATION AND ARCHITECTURE

<b>II B. TECH- I SEMESTER</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A7CS08	PCC	L	T	P	C	CIE	SE E	Total
		3	0	0	3	40	60	100
<p><b>Prerequisites:</b> No prerequisites.</p> <p><b>Co-requisite:</b> A Course on “Digital Electronics”.</p> <p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.</li> <li>2. It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.</li> <li>3. Topics include computer arithmetic, instruction set design, microprogrammed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Understand the basics of instruction sets and their impact on processor design.</li> <li>2. Demonstrate an understanding of the design of the functional units of a digital computer system.</li> <li>3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.</li> <li>4. Design a pipeline for consistent execution of instructions with minimum hazards.</li> <li>5. Recognize and manipulate representations of numbers stored in digital computers</li> </ol>								
<b>UNIT - I</b>								
<p><b>Boolean Algebra and Logic Gates:</b> Binary codes, Binary Storage and Registers, Binary logic. <b>Digital logic gates. Data Representation:</b> Data types, Complements, Fixed Point Representation, Floating Point Representation</p> <p><b>Digital Computers:</b> Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.</p>								
<b>UNIT - II</b>								
<p><b>Combinational Logic:</b> Combinational Circuits, Analysis procedure Design procedure, Binary Adder- Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.</p> <p><b>Sequential Logic:</b> Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure. Registers, shift Registers, Ripple counters, synchronous counters, other counters.</p>								
<b>UNIT - III</b>								
<p><b>Register Transfer Language and Micro operations:</b> Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.</p> <p><b>Basic Computer Organization and Design:</b> Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.</p>								
<b>UNIT - IV</b>								

<p><b>Microprogrammed Control:</b> Control memory, Address sequencing, micro program example, design of control unit.</p> <p><b>Central Processing Unit:</b> General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.</p> <p><b>Computer Arithmetic:</b> Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.</p>		
<b>UNIT - V</b>		
<p><b>Input-Output Organization:</b> Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.</p> <p><b>Memory Organization:</b> Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.</p>		
<b>TEXT BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Digital Design – M. Morris Mano, Third Edition, Pearson/PHI.</li> <li>2. Computer System Architecture – M. Morris Mano, Third Edition, Pearson/PHI.</li> </ol>		
<b>REFERENCE BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Switching and Finite Automata Theory, ZVI. Kohavi, Tata Mc Graw Hill.</li> <li>2. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.</li> <li>3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.</li> <li>4. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.</li> </ol>		

## OBJECT ORIENTED PROGRAMMING THROUGH JAVA

II B. TECH- I SEMESTER								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A7CS09	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To Understand the basic object-oriented programming concepts and apply them in problem solving.</li> <li>2. To Illustrate inheritance concepts for reusing the program.</li> <li>3. To Demonstrate multitasking by using multiple threads and event handling</li> <li>4. To Develop data-centric applications using JDBC.</li> <li>5. To Understand the basics of java console and GUI based programming</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.</li> <li>2. Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords</li> <li>3. Use multithreading concepts to develop inter process communication.</li> <li>4. Understand the process of graphical user interface design and implementation using AWT or swings.</li> <li>5. Develop applets that interact abundantly with the client environment and deploy on the server.</li> </ol>								
<b>UNIT - I</b>								
<p>Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, exploring String class.</p>								
<b>UNIT - II</b>								
<p>Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super keyword uses, using final keyword with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.</p>								
<b>UNIT - III</b>								
<p>Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads.</p>								
<b>UNIT - IV</b>								

Exploring String class, Object class, Exploring java.util package, Exploring java.io package Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.		
<b>UNIT - V</b>		<b>CLASSES: 12</b>
Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JFrame and JComponent, JLabel, ImageIcon, JTextField, JButton, JCheckBox, JRadioButton, JList, JComboBox, Tabbed Panes, Scroll Panes, Trees, and Tables. Menu Basics, Menu related classes - JMenuBar, JMenu, JMenuItem, JCheckBoxMenuItem, JRadioButtonMenuItem, JSeparator. creating a popup menu		
<b>TEXT BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Java the complete reference, 13th edition, Herbert schildt, Dr. Denny Coward, Mc Graw Hill.</li> <li>2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.</li> </ol>		
<b>REFERENCE BOOKS</b>		
<ol style="list-style-type: none"> <li>1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley &amp; sons.</li> <li>2. An Introduction to OOP, third edition, T. Budd, Pearson education.</li> <li>3. Introduction to Java programming, Y. Daniel Liang, Pearson education.</li> <li>4. An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.</li> <li>5. Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education.</li> <li>6. Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education</li> <li>7. Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.</li> <li>8. Java and Object Orientation, an introduction, John Hunt, second edition, Springer.</li> <li>9. Maurach's Beginning Java2 JDK 5, SPD.</li> </ol>		

## SOFTWARE ENGINEERING

II B. TECH- I SEMESTER								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A7CS11	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<p><b>COURSE OBJECTIVES</b></p> <ol style="list-style-type: none"> <li>1. To familiarize with software engineering methods, practices and its applications.</li> <li>1. To familiarize with software requirements and the SRS documents.</li> <li>2. To facilitate students in software design.</li> <li>3. To familiarize with testing strategies.</li> <li>4. Understanding working knowledge, quality management and risk management of large software development projects.</li> </ol> <p><b>COURSE OUTCOMES</b></p> <ol style="list-style-type: none"> <li>1. Analyze software development life cycle and select appropriate model for software application.</li> <li>2. Analyze the customer's requirements for a project to be developed and formulate the software requirements document.</li> <li>3. Conceptualize the system through design on architectural modelling and user interface.</li> <li>4. Classify software testing strategies and recommend testing techniques during the construction of software projects.</li> <li>5. Analyze the risk management, quality management and quality standards before releasing the software product.</li> </ol>								
<b>UNIT - I</b>	<b>INTRODUCTION TO SOFTWARE ENGINEERING</b>						<b>CLASSES: 9</b>	
<p><b>Introduction to Software Engineering:</b> The evolving role of software, changing nature of software, software myths. <b>A Generic view of process:</b> Software engineering- a layered technology, a process framework, SDLC life cycle, <b>Process models:</b> The waterfall model, Spiral model and Agile methodology</p>								
<b>UNIT - II</b>	<b>SOFTWARE REQUIREMENTS &amp; REQUIREMENTS ENGINEERING PROCESS</b>						<b>CLASSES: 9</b>	
<p><b>Software Requirements:</b> Functional and non-functional requirements, user requirements, system requirements, Interface Specification, the software requirements document.  <b>Requirements engineering process:</b> Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management</p>								
<b>UNIT - III</b>	<b>DESIGN ENGINEERING</b>						<b>CLASSES: 9</b>	
<p><b>Design Engineering:</b> Design process and design quality, design concepts, the design model. <b>Creating an architectural design:</b> software architecture, architectural styles and patterns, architectural design, <b>UML Diagrams:</b> class diagrams and sequence diagrams, collaboration diagrams and use case diagrams, component diagrams.</p>								
<b>UNIT - IV</b>	<b>TESTING STRATEGIES</b>						<b>CLASSES: 9</b>	
<p><b>Testing Strategies:</b> Test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.  <b>Software Measurement Techniques:</b> Size and Cost Estimation: Function point analysis, LOC estimation, COCOMO. Software metrics.</p>								
<b>UNIT - V</b>	<b>RISK MANAGEMENT &amp; QUALITY MANAGEMENT</b>						<b>CLASSES: 9</b>	

**Risk management:** Reactive Vs proactive risk strategies, software risks and risk identification, risk projection and risk refinement, RMMM. **Quality Management:** Quality concepts, software quality assurance, formal technical reviews, statistical software quality assurance and software reliability, the ISO 9000 quality standards.

**TEXT BOOKS**

1. Software Engineering, A practitioner's Approach-Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

**REFERENCE BOOKS**

1. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

## DATABASE MANAGEMENT SYSTEMS

II B. TECH- I SEMESTER								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A7CS13	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<p><b>Prerequisites:</b> A course on “Data Structures”.</p> <p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To understand the basic concepts and the applications of database systems.</li> <li>2. To master the basics of SQL and construct queries using SQL.</li> <li>3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Gain knowledge of fundamentals of DBMS, database design and normal forms</li> <li>2. Master the basics of SQL for retrieval and management of data.</li> <li>3. Be acquainted with the basics of transaction processing and concurrency control.</li> <li>4. Familiarity with database storage structures and access techniques</li> </ol>								
<b>UNIT - I</b>								
<p><b>Database System Applications:</b> A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS</p> <p><b>Introduction to Database Design:</b> Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model</p>								
<b>UNIT - II</b>								
<p><b>Introduction to the Relational Model:</b> Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.</p> <p>Relational Algebra, Tuple relational Calculus, Domain relational calculus.</p>								
<b>UNIT - III</b>								
<p><b>SQL: QUERIES, CONSTRAINTS, TRIGGERS:</b> form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.</p> <p><b>Schema Refinement:</b> Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multivalued dependencies, FOURTH normal form, FIFTH normal form.</p>								
<b>UNIT – IV</b>								
<p>Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.</p>								

<b>UNIT - V</b>		
Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.		
<b>TEXT BOOKS</b>		
<ol style="list-style-type: none"><li>1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition</li><li>2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill</li></ol>		
<b>REFERENCE BOOKS</b>		
<ol style="list-style-type: none"><li>1. Database Systems design, Implementation, and Management, Peter Rob &amp; Carlos Coronel 7<sup>th</sup> Edition.</li><li>2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education</li><li>3. Introduction to Database Systems, C. J. Date, Pearson Education</li><li>4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.</li><li>5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.</li><li>6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.</li></ol>		

## INNOVATION AND ENTREPRENEURSHIP

<b>III SEMESTER: OPEN ELECTIVE-I</b>								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
A7HS08	HSMC							
		2	2	0	0	40	60	100
<p><b>COURSE OBJECTIVES</b>  <b>The course should enable the students to:</b></p> <ol style="list-style-type: none"> <li>To familiarize on the basic concepts of innovation, entrepreneurship and its importance.</li> <li>To Identify and analyze the process of problem-opportunity identification, market segmentation, and idea generation techniques.</li> <li>To initiate prototype development and understand minimum viable product.</li> <li>To develop initial Business and financial planning and Go-to-Market strategies</li> <li>To impart knowledge on establishing startups, venture pitching and IPR</li> </ol> <p><b>COURSE OUTCOMES</b>  <b>Upon successful completion of this course, student will be able to:</b></p> <ol style="list-style-type: none"> <li>Generate ideas and understand the entrepreneurship and the entrepreneurial process and its significance in economic development.</li> <li>Assess the problem from an industry perspective and generate solutions using the design thinking principles.</li> <li>Assess market competition, estimate market size, and develop a prototype.</li> <li>Analyze Business and financial planning models and Go-to-Market strategies.</li> <li>Able to build a start-up, register IP and identify funding opportunities.</li> </ol>								
<b>UNIT-I</b>	<b>FOUNDATIONS OF INNOVATION &amp; ENTREPRENEURSHIP</b>						<b>CLASSES: 9</b>	
<p>Innovation: Introduction, Need for innovation, Features, Types of innovations, Planning for innovation, Diffusion of Innovation (Rogers' Theory), Fostering a culture of innovation.          Entrepreneurship: Introduction, types of entrepreneurship attributes, mindset of entrepreneurial and intrapreneurial leadership, Role of entrepreneurs in economic development. Woman Entrepreneurship, Importance of on-campus startups. Understanding to build entrepreneurial mindset, attributes and networks individuals while on campus.          Class Presentation: Present the innovative idea that you love.</p>								
<b>UNIT-II</b>	<b>PROBLEM AND CUSTOMER IDENTIFICATION</b>						<b>CLASSES: 10</b>	
<p>Problem: Real-world problems, Analyzing the problem from an industry perspective, Design thinking principles, Porter's Five Forces Model. Idea generation techniques: Brainstorming, Brain writing, Round robin, and SCAMPER, Customer: Identify Your Customer Segments, the difference between a consumer and a customer (decision maker), Market and customer segmentation &amp; targeting, Defining the Personas, Understanding Early Adopters and Customer Adoption Patterns, Identify the innovators and early adopters for your startup          Craft Your Value Proposition - Come up with creative solutions for the identified problems, Deep dive into Gains, Pains and "Jobs-To- Be-Done" (using Value Proposition Canvas, or VPC), Identify the UVP of your solution using the Value Proposition section of the VPC, Outcome-Driven Innovation          Activities including: Class, game, Gen AI, 'Get out of the Building' and Venture Activity Core Teaching Tool: Several types of activities including: Class, game, Gen AI, 'Get out of the Building' and Venture Activity.</p>								
<b>UNIT-III</b>	<b>OPPORTUNITY ASSESSMENT AND PROTOTYPE DEVELOPMENT</b>						<b>CLASSES: 10</b>	
<p>Identify and map global competitors, review industry trends, and understand market sizing: TAM, SAM, and SOM. Assessing scope and potential scale for the opportunity.          Understanding prototyping and Minimum Viable Product (MVP). Developing a prototype: Testing, and</p>								

validation. Core Teaching Tool: Venture Activity, no-code Innovation tools, Class activity		
<b>UNIT-IV</b>	<b>BUSINESS &amp; FINANCIAL MODELS</b>	<b>CLASSES: 11</b>
Introduction to Business Model and types, Lean Canvas Approach: 9-block lean canvas model, building lean canvas for your startup. Business planning: components of Business plan- Sales plan, People plan and financial plan, Financial Planning: Types of costs, preparing a financial plan for profitability using a financial template, Understanding the basics of Unit economics, Economies of Scale and analyzing financial performance. Go-To-Market (GTM) approach – Selecting the Right Channel, Creating digital presence, and building customer acquisition strategy. Core Teaching Tool: Founder Case Studies – Sama and Securely Share; Class activity and discussions; Venture Activities.		
<b>UNIT-V</b>	<b>STARTUPS AND IPR</b>	<b>CLASSES: 10</b>
Startup requirements, Building founding team members and mentors, Pitch preparation, Start-up registration process, funding opportunities and schemes, Institutional support to entrepreneurs, startup lifecycle, documentation, Legal aspects in startup, venture pitching readiness, National Innovation Startup Policy (NISP) and its features. Patents, Designs, Patentability, Procedure for grants of patents. Indian Scenario of Patenting, International Scenario: International cooperation on Intellectual Property. Patent Rights: Scope of Patent Rights. Copyright, trademark, and GI. Licensing and transfer of technology. Core Teaching Tool: Expert talks; Cases; Class activity and discussions; Venture Activities.		
<b>TEXT BOOKS</b>		
<ol style="list-style-type: none"> <li>1. John R Bessant, Joe Tidd, Innovation and Entrepreneurship, 4E, Wiley, Latest Edition.</li> <li>2. Ajay Batra, The Startup Launch Book- A Practical Guide for Launching Customer Centric Ventures, Wiley, 2020. (For Core Teaching Tool).</li> <li>3. Entrepreneurship Development and Small Business Enterprises, Poornima M Charantimath, 3E, Pearson, 2018.</li> <li>4. D.F. Kuratko and T.V. Rao, Entrepreneurship: A South-Asian Perspective, Cengage Learning, 2013.</li> <li>5. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha (2020). Entrepreneurship, McGrawHill, 11th Edition.</li> </ol>		
<b>REFERENCE BOOKS</b>		
<ol style="list-style-type: none"> <li>1. "The Lean Startup" by Eric Ries (published by Crown Business),</li> <li>2. "The Innovator's Dilemma" by Clayton Christensen (published by Harvard Business Review Press),</li> <li>3. Vasant Desai — Small Scale industries and entrepreneurship   Himalaya publishing 2012.</li> <li>4. Rajeev Roy — Entrepreneurship   2e, Oxford, 2012.</li> <li>5. B.Janakiram and M.Rizwana    Entrepreneurship Development: Text &amp; Cases, Excel Books, 2011.</li> <li>6. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.</li> <li>7. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013</li> </ol>		
<b>WEB REFERENCES</b>		
<ol style="list-style-type: none"> <li>1. <a href="http://freevideolectures.com/Course/3641/Entrepreneurship-Through-the-Lens-of-Venture-Capital">http://freevideolectures.com/Course/3641/Entrepreneurship-Through-the-Lens-of-Venture-Capital</a></li> <li>2. <a href="http://www.onlinevideolecture.com/?course=mba-programs&amp;subject=entrepreneurship">http://www.onlinevideolecture.com/?course=mba-programs&amp;subject=entrepreneurship</a></li> <li>3. <a href="http://nptel.ac.in/courses/122106032/Pdf/7_4.pdf">http://nptel.ac.in/courses/122106032/Pdf/7_4.pdf</a></li> <li>4. <a href="https://www.scribd.com/doc/21516826/Entrepreneurship-Notes">https://www.scribd.com/doc/21516826/Entrepreneurship-Notes</a></li> <li>5. <a href="http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurship/50">http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurship/50</a></li> <li>6. Journal of Entrepreneurship &amp; Organization Management, Vikalpa, IIMA, IIMB Review, Decision, IIMC, Vision, HBR.</li> </ol>		

## OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

### II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
A7CS10	PCC	0	0	2	1	40	60	100

#### Course Objectives:

1. To write programs using abstract classes.
2. To write programs for solving real world problems using the java collection framework.
3. To write multithreaded programs.
4. To write GUI programs using swing controls in Java.
5. To introduce java compiler and eclipse platform.
6. To impart hands-on experience with java programming.

#### Course Outcomes:

1. Able to write programs for solving real world problems using the java collection framework.
2. Able to write programs using abstract classes.
3. Able to write multithreaded programs.
4. Able to write GUI programs using swing controls in Java.

#### Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of the Eclipse platform.
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

### LIST OF EXPERIMENTS

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, \*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
3.
  - A) Develop an applet in Java that displays a simple message.
  - B) Develop an applet in Java that receives an integer in one text field, and computes its factorial
4. Value and returns it in another text field, when the button named "Compute" is clicked.
5. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
6. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread

computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

7. Write a Java program for the following: Create a doubly linked list of elements. Delete a given element from the above list. Display the contents of the list after deletion.
8. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in the selected color. Initially, there is no message shown.
9. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
10. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas.
11. Write a java program to display the table using Labels in Grid Layout.
12. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
13. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
17. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.
19. Write a Java program to list all the files in a directory including the files present in all its subdirectories.
20. subdirectories.

#### **TEXT BOOKS**

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.

#### **REFERENCE BOOKS**

1. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
2. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

## SOFTWARE ENGINEERING LAB

II B. TECH- I SEMESTER								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A7CS012	PCC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100
<p><b>Prerequisites:</b> A course on “Programming for Problem Solving”.</p> <p><b>Co-requisite:</b> A Course on “Software Engineering”.</p> <p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To have hands-on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Ability to translate end-user requirements into system and software requirements</li> <li>2. Ability to generate a high-level design of the system from the software requirements</li> <li>3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report</li> </ol>								
List of Experiments								
<p>Do the following seven exercises for any two projects given in the list of sample projects or any other Projects:</p> <ol style="list-style-type: none"> <li>1. Development of problem statements.</li> <li>2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.</li> <li>3. Preparation of Software Configuration Management and Risk Management related documents.</li> <li>4. Study and usage of any Design phase CASE tool</li> <li>5. Performing the Design by using any Design phase CASE tools.</li> <li>6. Develop test cases for unit testing and integration testing</li> <li>7. Develop test cases for various white box and black box testing techniques.</li> </ol> <p><b>Sample Projects:</b></p> <ol style="list-style-type: none"> <li>1. Passport automation System</li> <li>2. Book Bank</li> <li>3. Online Exam Registration</li> <li>4. Stock Maintenance System</li> <li>5. Online course reservation system</li> <li>6. E-ticketing</li> <li>7. Software Personnel Management System</li> <li>8. Credit Card Processing</li> <li>9. E-book management System.</li> <li>10. Recruitment system</li> </ol>								
TEXT BOOKS								
<ol style="list-style-type: none"> <li>1. Software Engineering, A practitioner’s Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.</li> <li>2. Software Engineering- Sommerville, 7th edition, Pearson Education.</li> <li>3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.</li> </ol>								
REFERENCE BOOKS								

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill

## DATABASE MANAGEMENT SYSTEMS LAB

<b>II B. TECH- I SEMESTER</b>								
Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
A7CS14	PCC	0	0	2	1	40	60	100
<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Introduce ER data model, database design and normalization</li> <li>2. Learn SQL basics for data definition and data manipulation</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Design database schema for a given application and apply normalization</li> <li>2. Acquire skills in using SQL commands for data definition and data manipulation.</li> <li>3. Develop solutions for database applications using procedures, cursors and triggers</li> </ol>								
<b>List of Experiments</b>								
<ol style="list-style-type: none"> <li>1. Concept design with E-R Model</li> <li>2. Relational Model</li> <li>3. Normalization</li> <li>4. Practicing DDL commands</li> <li>5. Practicing DML commands</li> <li>6. A) Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.) B) Nested, Correlated subqueries</li> <li>7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.</li> <li>8. Triggers (Creation of insert trigger, delete trigger, update trigger)</li> <li>9. Procedures</li> <li>10. Usage of Cursors</li> </ol>								
<b>TEXT BOOKS</b>								
<ol style="list-style-type: none"> <li>1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill,3rd Edition</li> <li>2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.</li> </ol>								
<b>REFERENCE BOOKS</b>								
<ol style="list-style-type: none"> <li>1. Database Systems design, Implementation, and Management, Peter Rob &amp; Carlos Coronel 7<sup>th</sup> Edition.</li> <li>2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education</li> <li>3. Introduction to Database Systems, C.J. Date, Pearson Education</li> <li>4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.</li> <li>5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.</li> <li>6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.</li> </ol>								

## WEB TECHNOLOGIES

<b>II.B.Tech.I.SEMESTER</b>								
CourseCode:	Category	Hours/Week			Credits	Maximum Marks		
A7CS53	PCC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	0	100	100
<p><b>Prerequisites:</b> Object Oriented Programming through Java, HTML Basics.</p> <p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To implement the static web pages using HTML and do client-side validation using JavaScript.</li> <li>2. To design and work with databases using Java</li> <li>3. To develop an end to end application using java full stack.</li> <li>4. To introduce Node JS implementation for server-side programming.</li> <li>5. To experiment with single page application development using React.</li> </ol> <p><b>Course Outcomes:</b></p> <p>At the end of the course, the student will be able to,</p> <ol style="list-style-type: none"> <li>1. Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.</li> <li>2. Demonstrate Advanced features of JavaScript and learn about JDBC</li> <li>3. Develop Server – side implementation using Java technologies like</li> <li>4. Develop the server – side implementation using Node JS.</li> <li>5. Design a Single Page Application using React.</li> </ol>								
<b>Exercises</b>								
<ol style="list-style-type: none"> <li>1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.</li> <li>2. Make the above web application responsive web application using Bootstrap framework.</li> <li>3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.</li> <li>4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.</li> <li>5. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.</li> <li>6. Create an xml for the bookstore. Validate the same using both DTD and XSD.</li> <li>7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.</li> <li>8. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism (Cookies, HTTP Session)</li> <li>9. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.</li> <li>10. Develop an express web application that can interact with REST API to perform CRUD operations on student data. (Use Postman)</li> <li>11. For the above application create authorized end points using JWT (JSON Web Token).</li> <li>12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.</li> <li>13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation using chart.js</li> <li>14. Create a TODO application in react with necessary components and deploy it into GitHub.</li> </ol>								
<b>REFERENCE BOOKS</b>								

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010.
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2<sup>nd</sup> Edition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node ,2nd Edition, APress

## ENVIRONMENTAL SCIENCE

<b>II.B.Tech.I.SEMESTER</b>								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
<b>A7BS12</b>	<b>MC</b>	1	0	0	1	50	-	50
<p><b>COURSE OBJECTIVES</b>  <b>The course should enable the students to:</b></p> <ol style="list-style-type: none"> <li>1. Understand the components, structure, and functions of ecosystems and their relevance to human society.</li> <li>2. Comprehend classification, sustainable management, and challenges of natural resources including water, minerals, land, forests, and energy.</li> <li>3. Grasp the significance, value, and conservation approaches for biodiversity, including threats and legislative frameworks.</li> <li>4. Analyze types, sources, and impacts of environmental pollution, and learn technological and policy measures for pollution prevention and control.</li> <li>5. Develop awareness about global environmental challenges, international agreements, and the role of policy, law, and Environmental Impact Assessment (EIA) in sustainable development.</li> </ol> <p><b>COURSE OUTCOMES</b></p> <ol style="list-style-type: none"> <li>1. Understand the structure, function, and significance of ecosystems, including energy flow, biogeochemical cycles, and biodiversity conservation through field experiences.</li> <li>2. Analyze the classification, utilization, and sustainable management of natural resources, along with alternative energy options.</li> <li>3. Evaluate biodiversity at genetic, species, and ecosystem levels, its values, threats, and conservation methods under national and international frameworks.</li> <li>4. Identify types, sources, and impacts of environmental pollution, and apply suitable control technologies while assessing global environmental challenges and protocols.</li> <li>5. Interpret environmental policies, legislation, and the EIA process to propose management plans addressing contemporary environmental and sustainability issues.</li> </ol>								
<b>UNIT-I</b>								
Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity, Field visits.								
<b>UNIT-II</b>								
Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.								
<b>UNIT-III</b>								
Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.								
<b>UNIT-IV</b>								

<p>Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-Gol Initiatives.</p>		
<b>UNIT-V</b>		
<p>Environmental Policy, Legislation &amp; EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socioeconomical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP). Contemporary Environmental Issues Climate change; Sustainable development goals (SDGs); Global environmental challenges; Environmental policies and international agreements.</p>		
<b>TEXT BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.</li> <li>2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.</li> <li>3. Environmental Studies by R. Rajagopalan, Oxford University Press.</li> </ol>		
<b>REFERENCE BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.</li> <li>2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.</li> <li>3. Environmental Science by Daniel B. Botkin &amp; Edward A. Keller, Wiley INDIA edition.</li> <li>4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.</li> <li>5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.</li> </ol>		

## **II B.TECH II SEMESTER**

## COMPUTER ORIENTED STATISTICAL METHODS

II Year II Semester								
Course Code:	Category	Hours / Week			Credits	Maximum Marks		
A7BS05	BSC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<p><b>Course Objectives :</b> To learn</p> <ol style="list-style-type: none"> <li>1. The theory of Random variable Probability distributions of single random variables</li> <li>2. The sampling theory, testing of hypothesis and making statistical inferences</li> <li>3. Stochastic process and Markov chains.</li> </ol> <p><b>Course Outcomes :</b> After learning the contents of this paper, the student must be able to</p> <ol style="list-style-type: none"> <li>1. Apply the concepts of Random variable and distributions to case studies.</li> <li>2. Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.</li> <li>3. Apply the concept of estimation to case studies.</li> <li>4. Apply the concept of testing of hypothesis to case studies.</li> <li>5. Correlate the concepts of one unit to the concepts in other units.</li> </ol>								
<b>UNIT-I</b>	<b>RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS</b>						<b>Classes: 08</b>	
Concept of a Random Variable – Discrete Probability Distributions – Continuous Probability Distributions – Mean of a Random Variable – Variance of a Random Variable <b>Discrete Probability Distributions:</b> Binomial Distribution – Poisson distribution								
<b>UNIT-II</b>	<b>CONTINUOUS DISTRIBUTIONS AND SAMPLING</b>						<b>Classes: 10</b>	
Uniform Distribution – Normal Distribution – Areas under the Normal Curve – Applications of the Normal Distribution – Normal Approximation to the Binomial Distributions. <b>Fundamental Sampling Distributions:</b> Random Sampling – Some Important Statistics – Sampling Distributions – Sampling Distribution of Means – Central Limit Theorem.								
<b>UNIT-III</b>	<b>ESTIMATION</b>						<b>Classes: 10</b>	
Introduction – Statistical Inference – Classical Methods of Estimation – Single Sample: Estimating the mean – Standard error of a point estimate. Two samples: Estimating the difference between two means– Single sample: Estimating a proportion – Two samples: Estimating the difference between two proportions– Two samples: Estimating the ratio of two variances.								
<b>UNIT-IV</b>	<b>TESTS OF HYPOTHESES (LARGE AND SMALL SAMPLES)</b>						<b>Classes: 10</b>	
Statistical Hypotheses: General Concepts – Procedure of Testing a Statistical Hypothesis. Single sample: Tests concerning a single mean. Two samples: Tests on two means. Single sample: Test on a single proportion (for Large Samples). Two samples: Tests on two proportions (for Large Samples). Two-sample tests concerning variances: F-distribution.								
<b>UNIT-V</b>	<b>STOCHASTIC PROCESSES AND MARKOV CHAINS</b>						<b>Classes: 10</b>	
Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n-step transition probabilities, Markov chain: Regular, Irreducible and Ergodic Markov Chains - Steady state condition.								
<b>TEXT BOOKS:</b>								
<ol style="list-style-type: none"> <li>1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability &amp; Statistics for Engineers &amp; Scientists, 9<sup>th</sup> Ed. Pearson Publishers.</li> <li>2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.</li> </ol>								

3. S.D.Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi.

**REFERENCE BOOKS:**

1. T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.
3. Miller and Freund's, Probability and Statistics for Engineers, 8<sup>th</sup> Edition, Pearson Educations.

**Web references:**

1. [https://www.efunda.com/math/math\\_home/math.cfm](https://www.efunda.com/math/math_home/math.cfm)
2. <https://www.sosmath.com/>
3. <https://www.wolframalpha.com/>

**E -Text Books:**

1. <https://www.e-booksdirectory.com/details.php?ebook=10166>
2. [Probability and Mathematical Statistics - Download link \(e-booksdirectory.com\)](#)
3. [A First Course In Mathematical Statistics - Download link \(e-booksdirectory.com\)](#)

**MOOCS Course:**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

## OPERATING SYSTEMS

II B.TECH - II SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7CS15	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<p><b>Prerequisites:</b></p> <ol style="list-style-type: none"> <li>1. A course on “Computer Programming and Data Structures”.</li> <li>2. A course on “Computer Organization and Architecture”.</li> </ol> <p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)</li> <li>2. Introduce the issues to be considered in the design and development of operating system</li> <li>3. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Will be able to control access to a computer and the files that may be shared</li> <li>2. Demonstrate the knowledge of the components of computers and their respective roles in computing.</li> <li>3. Ability to recognize and resolve user problems with standard operating environments.</li> <li>4. Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.</li> </ol>								
<b>UNIT - I</b>								
<p><b>Operating System - Introduction</b>, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls</p> <p><b>Process</b> - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads</p>								
<b>UNIT - II</b>								
<p><b>CPU Scheduling</b> - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec Deadlocks - System Model, <b>Deadlocks</b> Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock</p>								
<b>UNIT - III</b>								
<p><b>Process Management and Synchronization</b> - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors</p> <p><b>Interprocess Communication Mechanisms:</b> IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.</p>								
<b>UNIT - IV</b>								
<p>Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.</p>								
<b>UNIT - V</b>								

**File System Interface and Operations** -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

**TEXT BOOKS**

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

**REFERENCE BOOKS**

1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

## ALGORITHMS DESIGN AND ANALYSIS

II B.TECH - II SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7CS17	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
<p><b>Prerequisites:</b> Programming for problem solving and Data Structures</p> <p><b>Course Objectives</b></p> <ol style="list-style-type: none"> <li>1. Develop proficiency in evaluating algorithms using asymptotic notations, including best-, average-, and worst-case time/space complexities, and solving related recurrence relations.</li> <li>2. Master various algorithmic strategies—divide-and-conquer, greedy, dynamic programming, backtracking, and branch-and-bound—identifying suitable use cases and demonstrating their application.</li> <li>3. Critically assess and contrast different algorithms in terms of efficiency, scalability, and correctness through rigorous analytical reasoning and empirical evaluation.</li> <li>4. Differentiate between tractable (polynomial-time) and intractable (super-polynomial or exponential-time) problems</li> <li>5. Identify and classify problems as P, NP, NP-hard, or NP-complete, and assess their relationships through polynomial-time reductions and Cook's theorem.</li> </ol> <p><b>Course Outcomes</b></p> <ol style="list-style-type: none"> <li>1. Able to Apply space and time complexity analysis using asymptotic notations.</li> <li>2. Able to Design divide-and-conquer algorithms and critically assess their runtime and space trade-offs.</li> <li>3. Able to Device backtracking and dynamic programming solutions.</li> <li>4. Able to Apply greedy methods and graph traversal algorithms</li> <li>5. Able to Analyse and Design branch-and-bound algorithms for NP-hard problems</li> </ol>								
<b>UNIT - I</b>								
<p><b>Introduction:</b> Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation, and Little oh notation.</p> <p><b>Divide and conquer:</b> General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.</p>								
<b>UNIT - II</b>								
<p><b>Disjoint Sets:</b> Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heapsort</p> <p><b>Backtracking:</b> General method, applications, n-queens problem, sum of subsets problem, graph coloring, Hamiltonian cycles.</p>								
<b>UNIT - III</b>								
<p><b>Dynamic Programming:</b> General method, applications- Optimal binary search tree, 0/1 knapsack problem, All pairs shortest path problem, Traveling salesperson problem, Reliability design.</p>								
<b>UNIT - IV</b>								
<p><b>Greedy method:</b> General method, applications- Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.</p> <p><b>Basic Traversal and Search Techniques:</b> Techniques for Binary Trees, Techniques for Graphs, Connected components, Biconnected components.</p>								

<b>UNIT - V</b>		
<b>Branch and Bound:</b> General method, applications - Travelling salesperson problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution. <b>NP-Hard and NP-Complete problems:</b> Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.		
<b>TEXTBOOKS</b>		
1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni, and Rajasekaran, University Press.		
<b>REFERENCEBOOKS</b>		
1. Design and Analysis of algorithms, Aho, Ullman, and Hopcroft, Pearson education. 2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education. 3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and Sons.		

## COMPUTER NETWORKS

II B.TECH - II SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
A7CS18	PCC	3	0	0	3	40	60	100
<p><b>Prerequisites</b></p> <ol style="list-style-type: none"> <li>1. A course on "Programming for problem solving".</li> <li>2. A course on "Data Structures".</li> </ol> <p><b>Course Objectives</b></p> <ol style="list-style-type: none"> <li>1. Equip the students with a general overview of the concepts and fundamentals of computer networks.</li> <li>2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.</li> <li>3. Elucidate the students about working and implementation of protocols at various layers in protocols stack.</li> <li>4. Appreciating the protocol working by observing and analysing outputs of the packet sniffer,</li> </ol> <p><b>Course Outcomes</b></p> <ol style="list-style-type: none"> <li>1. Gain the knowledge of the basic computer network technology.</li> <li>2. Gain the knowledge of the functions of each layer in the ISO-OSI and TCP/IP reference model.</li> <li>3. Obtain the skills of subnetting and routing mechanisms.</li> <li>4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.</li> <li>5. Understanding working of the protocols through traces captured by a packet sniffer</li> </ol>								
<b>UNIT - I</b>								
<p><b>Introduction:</b> The Internet, Protocol, Network Edge, Access Networks, Network Core, Packet Switching, Circuit Switching, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol reference models: ISO-OSI, TCP/IP, Types of Network attacks, History of Computer Networking and the Internet.</p>								
<b>UNIT - II</b>								
<p><b>Application Layer:</b> Principles of Network Applications, Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet, Application-Layer Protocols, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, SMTP, DNS, Peer-to-Peer Applications, Socket Programming: Creating Network Applications.</p>								
<b>UNIT - III</b>								
<p><b>Transport Layer:</b> Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N (GBN), Selective Repeat (SR), Connection-Oriented Transport: TCP, The TCP Connection, Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control, TCP Congestion Control, Fairness.</p>								
<b>UNIT - IV</b>								

<p><b>Network Layer: Data and Control plane</b>, Forwarding and Routing 308, Network Service Models, Virtual Circuit and Datagram Networks, Router working, The Internet Protocol (IP): Forwarding and Addressing in the Internet, Datagram Format, IPv4 Addressing, Internet Control Message Protocol (ICMP), IPv6, IP Security, Routing Algorithms- The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing, Routing in the Internet-Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter-AS Routing: BGP, Broadcast and Multicast Routing, Broadcast Routing Algorithms, Multicasting.</p>		
<b>UNIT - V</b>		
<p><b>The Link Layer:</b> The Services Provided by the Link Layer, Error-Detection and -Correction Techniques-Parity Checks, Checksum Methods, Cyclic Redundancy Check (CRC), Hamming code, Multiple Access Links and Protocols, Channel Partitioning Protocols, Random Access Protocols, Taking-Turns Protocols, DOCSIS: The Link-Layer Protocol for Cable Internet Access, Switched Local Area Networks, Link-Layer Addressing and ARP, Ethernet, Link-Layer Switches, Virtual Local Area Networks (VLANs), Link Virtualization-Multiprotocol Label Switching (MPLS), Data Center Networking, A Day in the Life of a Web Page Request. Wireless network characteristics, Wireless LAN.</p>		
<b>TEXT BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Computer Networking: A Top-Down Approach – James F.Kurose, Keith W. Ross, Pearson</li> <li>2. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson/PHI</li> </ol>		
<b>REFERENCE BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.</li> </ol>		

## MACHINE LEARNING

### II B.TECH - II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
A7AI03	PCC	3	0	0	3	40	60	100
<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>To introduce students to the basic concepts and techniques of Machine Learning.</li> <li>To have a thorough understanding of the Supervised and Unsupervised learning techniques</li> <li>To study the various probability-based learning techniques</li> </ol> <p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>Distinguish between, supervised, unsupervised and semi-supervised learning.</li> <li>Understand algorithms for building classifiers applied on datasets of non-linearly separable classes</li> <li>Design an ensemble model to increase the classification accuracy</li> <li>Understand the principles of RL evolutionary computing algorithms</li> </ol>								
<b>UNIT - I</b>								
<p>Introduction to Machine Learning: Types of Human learning, machine learning process, Well-posed learning problem, Types of machine learning and comparison, applications of machine learning.            Model Preparation, Evaluation and feature engineering: Machine learning activities, Types of data in machine learning, dataset understanding, plotting and exploration, checking data quality, remediation, data pre-processing, selecting a model, predictive and descriptive models, supervised learning model training, cross-validation and boot strapping, lazy vs eager learner, interpreting the model- underfitting, overfitting, bias-variance trade-off. Parameter for evaluating performance of classification, regression, and clustering model. Improving performance of a model.</p>								
<b>UNIT - II</b>								
<p>Feature Engineering: Feature transformation - feature construction, feature extraction by PCA, SVD, LDA. Feature subset selection – feature relevancy and redundancy measures. Feature selection process and approaches.            Review of Probability concepts: joint probability, conditional probability, bayes rule, Common discrete and continuous distributions, dealing with multiple random variables, central limit theorem. Bayes classifier, Multi-class Classification, Naïve Bayes classifier, Bayesian belief network.</p>								
<b>UNIT - III</b>								
<p>Supervised Learning - Introduction to supervised learning,            Regression: Introduction of regression, Regression algorithms: Simple linear regression, Multiple linear regression, Polynomial regression model, Logistic regression, Maximum likelihood estimation.            Classification: Classification model and learning steps, Classification algorithms: Naïve Bayes classifier, Distance measures, k-Nearest Neighbor (kNN), Decision tree, Support vector machines, Kernel trick, Random Forest.</p>								
<b>UNIT - IV</b>								
<p>Unsupervised Learning: Introduction to unsupervised learning, Unsupervised vs supervised learning, Application of unsupervised learning, Clustering and its types, Partitioning method: k-Means and K-Medoids, Hierarchical clustering, Density-based methods – DBSCAN.</p>								
<b>UNIT - V</b>								

Artificial Neural Network: Biological neuron, Artificial neuron, Activation functions, neural network architecture, perceptron, learning process in ANN, Back propagation.  
Introduction to deep learning, overview of reinforcement learning, Representation learning, Evolutionary learning. Case-study of ML applications: Image recognition, Email spam filtering, Online fraud detection.

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**TEXT BOOKS**

1. Saikat Dutt, S. Chjandramouli, Das – Machine Learning, Frist Edition, Pearson
2. M N Murty, Anathanarayana V S – Machine Learning, First Edition, University Press
3. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.

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**REFERENCE BOOKS**

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition,
2. Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

## COMPUTATIONAL MATHEMATICS LAB (USING PYTHON/MATLAB SOFTWARE)

### II B.TECH - II SEMESTER: Common for All

Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7BS07	BSC	L	T	P	C	CIA	SEE	Total
		0	0	2	1	40	60	100

#### COURSE OBJECTIVES

To learn Software Testing has different goals and objectives:

1. To help students grasp the concepts objectives, Principles, Life Cycle and its Types.
2. To help students gain the concepts such as types of testing and its methodologies.
3. To learn the uses of integration testing methods and its applications.
4. To evaluate the concepts Test Selection & Minimization for Regression Testing and apply them.
5. To develop methods for Test Management and Automation Test Planning,

#### COURSE OUTCOMES

Upon successful completion of the course, the student is able to:

1. Understand software testing methods
2. apply various software testing techniques
3. Design and conduct a software test process for a software testing project
4. Designing solutions for various software testing problems by selecting appropriate software test model
5. Implement various practice oriented software testing projects

<b>UNIT – I</b>	<b>EIGEN VALUES AND EIGENVECTORS</b>	<b>Programs: 6</b>
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**Programs:**

- Finding real and complex Eigen values.
- Finding Eigen vectors.

<b>UNIT - II</b>	<b>SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS</b>	<b>Programs: 6</b>
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White Box And Black Box Testing, Static Testing, Static Analysis Tools, Structural Testing, Unit/Code functional, testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing.

<b>UNIT - III</b>	<b>LINEAR SYSTEM OF EQUATIONS</b>	<b>Programs: 6</b>
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Integration, System, and Acceptance Testing Top down and Bottom up integration, Functional versus Non-functional testing, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing

<b>UNIT - IV</b>	<b>FIRST-ORDER ODEs</b>	<b>Programs: 8</b>
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Test Selection & Minimization for Regression Testing Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic Slicing, Test Minimization, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

<b>UNIT - V</b>	<b>HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS</b>	<b>Programs: 6</b>
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Test Management and Automation Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection.

<b>TEXT BOOKS</b>
<ol style="list-style-type: none"><li>1. MATLAB and its Applications in Engineering, Rajkumar Basal, Ashok Kumar Geo, Manoj Kumar Sharama, Pearson publication.</li><li>2. Kenneth A. Lambert, The fundamentals of Python: First Programs, 2011, Cengage Learnings.</li><li>3. Think Python First Edition, by Allen B. Downey, Orielly publishing.</li><li>4. Introduction to Python Programming, William Mitchell, Povel Solin, Martin Novak etal., NCLab Public Computing, 2012.</li><li>5. Introduction to Python Programming, ©Jacob Fredslund, 2007.</li></ol>
<b>REFERENCE BOOKS</b>
<ol style="list-style-type: none"><li>1. An Introduction to Python, John C. Luth, The University of Alabama, 2011.</li><li>2. Introduction to Python, ©Dave Kuhlman, 2008.</li></ol>
<b>WEB REFERENCES:</b>
<ol style="list-style-type: none"><li>1. <a href="https://www.efunda.com/math/math_home/math.cfm">https://www.efunda.com/math/math_home/math.cfm</a></li><li>2. <a href="https://www.sosmath.com/">https://www.sosmath.com/</a></li><li>3. <a href="https://www.wolframalpha.com/">https://www.wolframalpha.com/</a></li></ol>
<b>E - TEXT BOOKS</b>
<ol style="list-style-type: none"><li>1. <a href="https://www.e-booksdirectory.com/details.php?ebook=10166">https://www.e-booksdirectory.com/details.php?ebook=10166</a></li><li>2. <a href="#">An Introduction to Python by Guido van Rossum - Download link (e-booksdirectory.com)</a></li><li>3. <a href="#">Introduction to Numerical: Methods - Download link (e-booksdirectory.com)</a></li><li>4. <a href="#">Ordinary Differential Equations (ODE) - Download link (e-booksdirectory.com)</a></li></ol>
<b>MOOCS COURSE</b>
<ol style="list-style-type: none"><li>1. <a href="https://swayam.gov.in/">https://swayam.gov.in/</a></li><li>2. <a href="https://onlinecourses.nptel.ac.in/">https://onlinecourses.nptel.ac.in/</a></li></ol>

## OPERATING SYSTEMS LAB

### II B.TECH - II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	SEE	Total
A7CS16	PCC	0	0	2	1	40	60	100

**Prerequisites:**

1. A course on "Programming for Problem Solving".
2. A course on "Computer Organization and Architecture".

Co-requisite: A course on "Operating Systems".

**Course Objectives:**

1. To provide an understanding of the design aspects of operating system concepts through simulation.
2. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.

**Course Outcomes:**

1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using Unix system calls.

**LIST OF EXPERIMENTS**

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) Round Robin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, lseek, stat, fork, exit)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques a) Paging b) Segmentation
7. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal

**TEXT BOOKS:**

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Advanced programming in the Unix environment, W. R. Stevens, Pearson education.

**REFERENCE BOOKS:**

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI.
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI.
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education.
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education.

## COMPUTER NETWORKS LAB

II B.TECH - II SEMESTER								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
A7CS19	PCC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100
<b>COURSE OBJECTIVES</b>								
<ol style="list-style-type: none"> <li>1. To understand the working principle of various communication protocols.</li> <li>2. To understand the network simulator environment and visualize a network topology and observe its performance</li> <li>3. To analyze the traffic flow and the contents of protocol frames</li> </ol>								
<b>COURSE OUTCOMES</b>								
<ol style="list-style-type: none"> <li>1. Implement data link layer framing methods</li> <li>2. Analyze error detection and error correction codes.</li> <li>3. Implement and analyze routing and congestion issues in network design.</li> <li>4. Implement Encoding and Decoding techniques used in presentation layer</li> <li>5. To be able to work with different network tools</li> </ol>								
<b>LIST OF EXPERIMENTS</b>								
<ol style="list-style-type: none"> <li>1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.</li> <li>2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP</li> <li>3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.</li> <li>4. Implement Dijkstra's algorithm to compute the shortest path through a network</li> <li>5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.</li> <li>6. Implement distance vector routing algorithm for obtaining routing tables at each node.</li> <li>7. Implement data encryption and data decryption</li> <li>8. Write a program for congestion control using Leaky bucket algorithm.</li> <li>9. Write a program for frame sorting techniques used in buffers.</li> <li>10. <b>Wireshark</b> <ol style="list-style-type: none"> <li>i. Packet Capture Using Wire shark</li> <li>ii. Starting Wire shark</li> <li>iii. Viewing Captured Traffic</li> <li>iv. Analysis and Statistics &amp; Filters.</li> </ol> </li> <li>1. How to run Nmap scan</li> <li>2. Operating System Detection using Nmap</li> <li>3. Do the following using NS2 Simulator           <ol style="list-style-type: none"> <li>I. NS2 Simulator-Introduction</li> <li>II. Simulate to Find the Number of Packets Dropped</li> <li>III. Simulate to Find the Number of Packets Dropped by TCP/UDP</li> <li>IV. Simulate to Find the Number of Packets Dropped due to Congestion</li> <li>V. Simulate to Compare Data Rate &amp; Throughput.</li> <li>VI. Simulate to Plot Congestion for Different Source/Destination</li> <li>VII. Simulate to Determine the Performance with respect to Transmission of Packets</li> </ol> </li> </ol>								
<b>TEXT BOOKS</b>								
<ol style="list-style-type: none"> <li>1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5<sup>th</sup> Edition. Pearson Education/PHI</li> </ol>								
<b>REFERENCE BOOKS</b>								

1. An Engineering Approach to Computer Networks, S.Keshav, 2<sup>nd</sup> Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

## MACHINE LEARNING LAB

<b>II B.TECH - II SEMESTER</b>								
Course Code:	Category	Hours/Week			Credits	Maximum Marks		
A7AI05	PCC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100
<b>COURSEOBJECTIVES</b>								
1. The objective of this lab is to get an overview of the various machine learning techniques and can demonstrate them using python.								
<b>COURSEOUTCOMES</b>								
1. Understand modern notions in predictive data analysis								
2. Select data, model selection, model complexity and identify the trends								
3. Understand a range of machine learning algorithms along with their strengths and weaknesses								
4. Build predictive models from data and analyze their performance								
<b>List of Experiments</b>								
1. Write a python program to compute Central Tendency Measures: Mean, Median, Mode, Measure of Dispersion: Variance, Standard Deviation								
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy								
3. Study of Python Libraries for ML application such as Pandas and Matplotlib								
4. Write a Python program to implement Simple Linear Regression								
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn								
6. Implementation of Decision tree using sklearn and its parameter tuning								
7. Implementation of KNN using sklearn								
8. Implementation of Logistic Regression using sklearn								
9. Implementation of K-Means Clustering								
10. Performance analysis of Classification Algorithms on a specific dataset (Mini Project)								
<b>TEXT BOOKS</b>								
1. Machine Learning – Tom M. Mitchell, - MGH.								
<b>REFERENCE BOOKS</b>								
1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.								

## DATA VISUALIZATION - R PROGRAMMING/ POWER BI

<b>II B.TECH - II SEMESTER</b>								
Course Code:	Category	Hours/Week			Credits	Maximum Marks		
A7DSC03	PCC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	0	100	100
<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1. Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization</li> <li>2. To discern patterns and relationships in the data.</li> <li>3. To build Dashboard applications.</li> <li>4. To communicate the results clearly and concisely.</li> <li>5. To be able to work with different formats of data sets.</li> </ol>								
<b>Course Outcomes:</b> At the end of the course a student should be able to <ol style="list-style-type: none"> <li>1. Understand How to import data into Tableau.</li> <li>2. Understand Tableau concepts of Dimensions and Measures.</li> <li>3. Develop Programs and understand how to map Visual Layouts and Graphical Properties.</li> <li>4. Create a Dashboard that links multiple visualizations. Use graphical user interfaces to create Frames for providing solutions to real world problems.</li> </ol>								
<b>WEEK - 1</b>	<b>Understanding Data and Creating Your First Visualization</b>							
Understanding Data, What is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?								
<b>WEEK - 2</b>	<b>Getting Started with Tableau for Data Visualization</b>							
Getting started with Tableau <u>Software</u> using Data file formats, connecting your Data to Tableau, creating basic charts(line, bar charts, Tree maps),Using the Show me panel								
<b>WEEK - 3</b>	<b>Working with Calculations and Aggregates in Tableau</b>							
Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields								
<b>WEEK - 4</b>	<b>Formatting and Applying Calculations in Tableau Visualizations</b>							
Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.								
<b>WEEK - 5</b>	<b>Editing Axes and Data Manipulation in Tableau</b>							
Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.								
<b>WEEK - 6</b>	<b>Structuring, Sorting, Filtering, and Pivoting Data in Tableau</b>							
Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.								
<b>WEEK - 7</b>	<b>Advanced Visualization Tools and Customization in Tableau</b>							
Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.								

<b>WEEK - 8</b>	<b>Creating Dashboards and Data Stories in Tableau</b>
Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization	
<b>WEEK - 9</b>	<b>Tableau File Types and Sharing Visualizations</b>
Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting	
<b>WEEK - 10</b>	<b>Creating Custom and Advanced Charts in Tableau</b>
Creating custom charts, cyclical data and circular area charts, Dual Axis charts.	
<b>TEXT BOOKS</b>	
1. Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master, Ryan Sleeper, Oreilly Publications, 2018	
<b>REFERENCE BOOKS</b>	
1. Microsoft Power BI cookbook, Brett Powell, 2nd edition. 2. R Programming for Data Science by Roger D. Peng (References) 3. The Art of R Programming by Norman Matloff Cengage Learning India.	

## VISION STATEMENT

To create and nurture competent Engineers and managers who would be enterprise leaders in all parts of the world with aims of reaching the skies and touching the stars and yet feet firmly planted on the ground - good human beings steeped in ethical and moral values.

## MISSION STATEMENT

MLR Institute of Technology is committed to providing a positive, professional and conducive learning environment where all students are inspired to achieve their potential and strive for excellence in a global society as dignified professionals with the cooperation of all stakeholders.

## QUALITY POLICY

We, at MLRIT, are committed to Educate, Enrich and Excel, in imparting Professional Education, by top-quality faculty; who endeavour to mentor the students as turn-key solution providers, while striving continually to improve through team work, innovation and research.

## GOALS OF MLRIT

Goals of engineering education at undergraduate/graduate level:

- Equip students with industry - accepted career and life skills
- To create a knowledge warehouse for students
- To disseminate information on skills and competencies that is in use and in demand by the industry.
- To create learning environment where the campus culture acts as a catalyst to student fraternity to understand their core competencies, enhance their competencies and improve their career prospects.
- To provide base for lifelong learning and professional development in support of evolving career objectives, which include being informed, effective, and responsible participants within the engineering profession and in society.
- To prepare students for graduate study in Engineering and Technology.
- To prepare graduates to engineering practice by learning from professional engineering assignments.