ACADEMIC REGULATIONS
AND
COURSE STRUCTURE

CHOICE BASED CREDIT SYSTEM

R-25

Computer Science & Engineering
(Artificial Intelligence and Machine Learning)

Bachelor of Technology (B.Tech)

B. Tech. - Regular Four Year Degree Programme

(For batches admitted from the academic year 2025-2026)

&

(For batches admitted Lateral Entry Scheme from the academic year 2026-2027)

MLR Institute of Technology

(Autonomous)
Laxman Reddy Avenue, Dundigal (V), Quthbullapur (M),
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COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

VISSION

- To create competent professionals and researchers in Artificial Intelligence and Machine Learning with the skills, entrepreneurial mindset, and a focus on higher education to drive innovation and address real-world challenges in the IT industry.

MISSION

- Impart strong foundational knowledge in Artificial Intelligence and Machine Learning through quality teaching and innovative pedagogy.
- Equip students to apply AI and ML technologies for solving societal problems through experiential learning, research, and ethical practices.
- Encourage interdisciplinary teamwork, leadership, and entrepreneurial mindset to promote innovation with social responsibility.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

PEO 1: Graduates will excel in their professional careers or higher education by acquiring in-depth knowledge and skills in Artificial Intelligence, Machine Learning, and related technologies.
PEO 2: Graduates will continuously enhance their knowledge and research capabilities to stay aligned with developments in the IT industry, ensuring they contribute to advancements in Artificial Intelligence and Machine Learning.
PEO 3: Graduates will exhibit professionalism, cultural awareness, teamwork, ethics, effective communication, and will pursue entrepreneurial initiatives to solve social and environmental problems using computer technology.

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

PROGRAM OUTCOMES

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

B.Tech – CSE (AI&ML): PROGRAM SPECIFIC OUTCOMES

PSO 1: Develop an in-depth knowledge and skill sets in human cognition, Artificial Intelligence, Machine Learning and data engineering for designing intelligent systems to address modern computing challenges.

PSO 2: Evaluate, analyse and synthesize solutions for real time problems in Artificial Intelligence and Machine Learning domain to conduct research in a wider theoretical and practical context.

FOREWORD

The autonomy is conferred on MLR Institute of Technology by UGC, based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own **curriculum, examination system and monitoring mechanism**, independent of the affiliating University but under its observance.

MLR Institute of Technology is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought, at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL

CONTENTS

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 2025-26 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for MLR 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, MLR Institute of Technology shall be the chairman Academic Council.

2.0 Eligibility for Admission

2.1 Admissions to the undergraduate (UG) programme shall be made either on the basis of the merit rank obtained by the qualified students at the entrance test conducted by Telangana Government (EAPCET) or the college or on the basis of any other order of merit approved by the college, subject to reservations as prescribed by the government from time to time.

2.2 The medium of instruction 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 **our** academic years and a maximum period of **eight** academic years starting from the date of commencement of first year first semester, failing which student shall for feitseat in B.Tech. course. Each student has to secure a minimum of 160 credits out of 164credits for successful 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.

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 15weeks 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 inthecoursestructure,theL:T:P:C(lectureperiods:tutorialperiods:practicalperiods:credits) pattern has been defined.

- One creditis allocated for one hour per week in a semester for lecture (L) or Tutorial (T) session.
- One creditis allocated for two hours per week in a semester for laboratory / Practical (P) session.
- One credit is allocated for three hours per week ina semester for Project/Mini-Project session.
- For example, a theory course with three credit weightage requires three hours of classroom instruction per week, to taling 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 (EℓC)	PE–Professional Electives	Include selective 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
7	Other Core Courses(OCC)	Industry Training/ Internship/Industry Oriented Mini-project/Skill Development Courses	Industry Training /Internship/Industry Oriented Mini-Project/Skill Development Courses
8			
9		Seminar	Seminar based on core contents related to parent branch of Engineering.
10	Skill Development Courses(SDC)	-	Courses designed to help individuals gain, improve, or refine specific skills
11	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,

4.0 ii) Creative Arts, iii) Imparting Universal Human Values, iv) Literary Activities, v) Lectures by EminentPeople,vi)VisitstoLocalAreasandvii)Familiarizationtodepartmentaswellasentire instituteandviii)MakingstudentsunderstandInnovativepracticesatthecollegepremisesetc

Course Registration

4.1 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.

4.2 The academic section of the college invites 'registration forms' from students before the beginningofthesemesterthrough'on-lineregistration',ensuring'dateandtimestamping'.The online registration requests for semester courses shall be completed two weeks before the commencement of SEEs (Semester End Examinations) of the preceding semester.

4.3 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.

4.4 A student shall register for all the courses offered in a semester as specified in the course structure.

4.5 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.

4.6 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.

4.7 **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.

4.8 **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 courses of.Similarly,Open Elective courses being studied should not match with any courses of the forthcoming semesters.

4.9 **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.

4.10 **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.

4.11 MOOCs are allowed only for professional elective courses and for a few Minors & Honors courses

4.12 **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.

5.0 Rules to offer Elective courses

5.1 An elective course may be offered to the students, only if a minimum of 25% of class strength opts for it.

5.2 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.

5.3 If the number of students registrations are more than the strength of one section, then it is choiceoftheconcernedDepartmenttoofferthesamecourseformorethanonesectionbased on the resources available in the department.

6.0 Attendance requirements:

6.1 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.

6.2 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.

6.3 A stipulated fee shall be payable for condoning of shortage of attendance as notified in the respective college websites.

6.4 **Two hours** of attendance for each theory course shall be considered, if the student appears for the mid-term examination of that course.

6.5 Shortage of attendance below 65% in aggregate shall in **no** case be condoned.

6.6 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.

6.7 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same semester

7.0 Criteria for Earning of Credits in a Course

7.1 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% (21marks 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.

7.2 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.

7.3 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.

8.0 Distribution of Marks and Evaluation

8.1 The performance of a student in every course (including Value Added Courses and Skill DevelopmentCourses,Laboratory/PracticalandProjectWork)willbeevaluatedfor100marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination), irrespective of the credits allocated.

8.2 Continuous Internal Evaluation(CIE)

8.2.1 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 30marks:
   a. Part-A: Objective / quizpaperfor10marks.
   b. Part-B: Descriptive paper for 20marks.

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.

There maining 10marks of Continuous Internal Evaluation are distributed as follows:

2. Five marks for the assignment for 5marks.Student shall submit two assignments and the **average of 2 Assignments** each for 5marks 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.

8.2.2 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 un avoidable 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.C B T exams shall be conducted by the College.

8.3 Semester End Examination for theory courses

8.3.1 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.

8.3.2 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.

8.3.3 Duration of SEE:

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

8.4 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. 10marksforviva-voce (or)tutorial(or)casestudy(or)application(or)posterpresentation 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. 10marksforwrite-up
2. 15forexperiment/program
3. 15forevaluationof results
4. 10marks for presentation on another experiment/program in the same laboratory course and
5. 10marks 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 60marks. No third change will be permitted.

8.5 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 besubmittedinareportformandpresentedbeforethecommitteeinIIIyearIsemester.Itshall 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.

8.6 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 be forethe 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.

8.6.1 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.

8.7 UG Project Work:

8.7.1 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.

8.7.2 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.

8.7.3 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 40marks. The distribution of marks is as follows:

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

Total -40Marks

8.7.4 The External Evaluation shall be conducted by the external examiner for a total of 60marks.It shall comprise the presentation of the work, communication skills, and viva-voce, with a weight age 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 are porton 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.

8.7.5 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.

8.7.6 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.

8.8 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.

8.9 Value-Added Courses:

TheevaluationofValue-AddedCoursesshallbesimilartothatoftheorycourses.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 forawarding 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,a10-pointgrading 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 equalto 90	O (Outstanding)	10
80andlessthan90	A^+(Excellent)	9
70andlessthan80	A(VeryGood)	8
60andlessthan70	B^+(Good)	7
50andlessthan60	B(Average)	6
40andlessthan50	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 ≥ 5)

10.5 A student whohasobtainedan'**F'**gradeinanycourseshallbedeemedtohave'**failed'**andis 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 tore-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□5**('C' grade or above).

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

Credit Points(C)=Grade Point(G)xCredits

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(□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

SGPA={ ∑ □□□}/{∑ □□}

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 thei^{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 tearns more than160 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 performanceofastudentinallsemestersconsideredforregistration.TheCGPAistheratioof 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 corresponds 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

$$CGPA=\{\sum_{j=1}^{M} C_jG_j\}/\{\sum^{M}{}_{j=1} C_j\}$$

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 indicat or 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
Course1	4	A	8	4x8=32
Course2	3	O	10	3x10=30
Course3	3	C	5	3x 5=15
Course4	3	B	6	3x6=18
Course5	3	A	8	3x8=24
Course6	2	A+	9	2x9=18
Course7	1	C	5	1x 5=5
Course8	1	O	10	1x10=10
	20			152

SGPA=152/20=7.6

TheCGPAoftheentireB.Tech.programmeshallbecalculatedconsideringthebest160credits earned by the student.

10.12 For merit ranking or comparison purposes or for any other listing,**only** the'**roundedoff'** 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 With holding 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 with held, 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 maybe 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 fulfillment 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) **Must have secured at least 25% of the total** credits upto 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 fulfillment 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) **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.
5	Third year first semester to Third Year second semester	Regular course of study of third year first semester And fulfillment of attendance requirement.
6	Third year second semester to Fourth year first semester	Regular course of study of third year second Semester and fulfillment of attendance requirement.
7	Fourth year first semester to Fourth year second semester	Regular course of study of fourth year first semester And fulfillment 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) Astudentdetainedduetoshortageofattendanceshallbeadmittedinthesamesemesterin 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, LaboratoryCourses,Seminars,ProjectWorkandFieldBasedResearchProject/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 160credits 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 AstudentwithfinalCGPA(attheendoftheundergraduateprogramme)**≥**7.5,andfulfillingthe 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 finalCGPA≥ 7.5shallbe placed in **'First Class'.**

17.4 Students with final CGPA(at the end of the undergraduate programme)□6.5but<7.5shallbe placed in **'First Class'.**

17.5 Students with final CGPA (at the end of the undergraduate programme) □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)□5.00but<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 tiere solution 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

Percentage (%)of Marks=(FinalCGPA–0.5)x10

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 form all y in form 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 exitoption, 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.

Inaddition,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.
- Ifastudentoptstocontinuehis/herstudieswithoutagapafterbeingawardedthediploma, they must register for the third-year courses before the commencement of class work.

21.4 Break in Study and Maximum Duration

Students are allowed to take a break of upto 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 with in twice the duration of the program (i.e., within8 years for a 4-year B.Tech. program).

22.0 TransitoryRegulationsforthestudentsre-admittedinR-25Regulations:

22.1 Transitory regulations are applicable to the students detaine 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 Astudentwhohasfailedinanycourseinaspecificregulationhastopassthosecoursesinthe same regulations.

22.5 If a student is readmitted toR-25Regulations and has any course with 80%of syllabus common with his/her previous regulations, that particular course inR-25Regulations 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 forgetting 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 are puted 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 there spective domains,
iv) A form al 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 chairman, academic councilis 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 Wherethewords“he”,“him”,“his”,occurintheregulations,theyinclude“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

ACADEMICREGULATIONSFORB.TECH.(LATERALENTRYSCHEME)FROMTHEAY2026-27

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 shallregisterfor123creditsandsecure120credits with CGPA≥ 5from 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. TheattendancerequirementsofB.Tech.(Regular)shallbeapplicabletoB.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 fulfillment of attendance requirement. (ii) Musthavesecuredatleast25%ofthetotal 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 fulfillment 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 applicabletoB.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

Rule	Nature of Malpractices/ Improper conduct	Punishment
	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 or ally 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.	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. 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 for feature of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

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.	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.
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.

* * * * *

4.0 Course Registration

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.

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.

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.

A student shall register for all the courses offered in a semester as specified in the course structure.

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.

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.

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.

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 courses of .Similarly, Open Elective courses being studied should not match with any courses of the forthcoming semesters.

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 thecollege 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.

COURSE STRUCTURE

Course Structure

B. TECH – Computer Science and Engineering CSE(AI&ML)

Regulations: R25

I B.Tech- I Semester

Induction program for one weeks

Code	Course Title	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A7BS01	Matrices and Calculus	BSC	3	1	0	4	40	60	100
A7BS08	Advanced Engineering Physics	BSC	3	0	0	3	40	60	100
A7CS01	Programming for Problem Solving	ESC	3	0	0	3	40	60	100
A7EE04	Basic Electrical Engineering	ESC	3	0	0	3	40	60	100
A7ME02	Computer Aided Engineering Drawing	ESC	2	0	2	3	40	60	100
A7BS09	Advanced Engineering Physics Lab	BSC	0	0	2	1	40	60	100
A7CS02	Programming for Problem Solving Lab	BSC	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
	Induction Program								
	TOTAL		**14**	**1**	**10**	**20**	**360**	**540**	**900**

I B.Tech- II Semester

Code	Course Title	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A7BS02	Ordinary Differential Equations and Vector Calculus	BSC	3	0	0	3	40	60	100
A7BS10	Engineering Chemistry	BSC	3	0	0	3	40	60	100
A7CS03	Data Structures	ESC	3	0	0	3	40	60	100
A7EC01	Electronic Devices and Applications	ESC	3	0	0	3	40	60	100
A7HS01	English for Skill Enhancement	HSMC	3	0	0	3	40	60	100
A7BS11	Engineering Chemistry Lab	BSC	0	0	2	1	40	60	100
A7CS04	Data Structures Lab	ESC	0	0	2	1	40	60	100
A7HS02	English Language and Communication Skills Lab	HSMC	0	0	2	1	40	60	100
A7ME03	Engineering Workshop	ESC	0	0	2	1	40	60	100
A7CS05	Python Programming Lab	ESC	0	0	2	1	40	60	100
	TOTAL		**15**	**0**	**10**	**20**	**400**	**600**	**1000**

II B.Tech- I Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A7BS03	Mathematical and Statistical Foundations	BSC	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 System	PCC	3	0	0	3	40	60	100
A7BS07	Computational Mathematics Lab	BSC	0	0	2	1	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	-	100	100
	TOTAL		**15**	**0**	**10**	**20**	**360**	**640**	**1000**

II B.Tech- II Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A7CS07	Discrete Mathematics	PCC	3	0	0	3	40	60	100
A7CS15	Operating Systems	PCC	3	0	0	3	40	60	100
A7CS17	Algorithms Design and Analysis	PCC	3	0	0	3	40	60	100
A7CS18	Computer Networks	PCC	3	0	0	3	40	60	100
A7AI01	Artificial Intelligence	PCC	3	0	0	3	40	60	100
A7HS08	Innovation and Entrepreneurship	HSMC	2	0	0	2	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
A7AI02	Artificial Intelligence Lab	PCC	0	0	2	1	40	60	100
A7DS03	Data Visualization- R Programming/ Power BI	PCC	0	0	2	1	-	100	100
A7HS05	Indian Knowledge System	MC	1	0	0	1	50	-	50
	TOTAL		**18**	**0**	**08**	**22**	**410**	**640**	**1050**

III B.Tech - I Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A7AI03	Machine Learning	PCC	3	0	0	3	40	60	100
A7CS20	Automata and Compiler Design	PCC	3	0	0	3	40	60	100
A7AI04	Natural Language Processing	PCC	3	0	0	3	40	60	100
	Professional Elective-I	PEC	3	0	0	3	40	60	100
	Open Elective-I	OEC	2	0	0	2	40	60	100
A7AI05	Machine Learning Lab	PCC	0	0	2	1	40	60	100
A7AI06	Natural Language Processing Lab	PCC	0	0	2	1	40	60	100
A7CS21	Compiler Design Lab	PCC	0	0	2	1	40	60	100
A7AI07	Field Based Research Project	PCC	0	0	4	2	-	100	100
A7CS45	UI Design–Flutter/Android Studio	PCC	0	0	2	1	-	100	100
A7HS04	Gender Sensitization Lab*/Human Values and Professional Ethics*	MC	1	0	0	1	50	-	50
	TOTAL		**15**	**0**	**10**	**21**	**370**	**680**	**1050**

III B.Tech.- II Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A7AI09	Generative AI	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
	Professional Elective-II	PEC	3	0	0	3	40	60	100
	Open Elective–II	OEC	2	0	0	2	40	60	100
A7AI11	Generative AI Lab	PCC	0	0	2	1	40	60	100
A7AI12	Deep Learning Lab	PCC	0	0	2	1	40	60	100
A7AI13	Chat bots 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	-	100	100
A7BS12	Environmental Science	MC	1	0	0	1	50	-	50
	TOTAL		**15**	**0**	**10**	**20**	**410**	**640**	**1050**

IV B.Tech.- I Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A7AI15	Reinforcement Learning	PCC	3	0	0	3	40	60	100
A7AI17	Data Analytics and Visualization	PCC	3	0	0	3	40	60	100
A7HS07	Fundamentals of Management	HSMC	3	0	0	3	40	60	100
	Professional Elective-III	PEC	3	0	0	3	40	60	100
	Professional Elective–IV	PEC	3	0	0	3	40	60	100
	Open Elective–III	OEC	2	0	0	2	40	60	100
A7AI16	Reinforcement Learning Lab	PCC	0	0	2	1	40	60	100
A7AI18	Data Analytics and Visualization Lab	PCC	0	0	2	1	40	60	100
A7AI19	Summer Internship	PCC	0	0	4	2	-	100	100
Total			**17**	**0**	**08**	**21**	**320**	**580**	**900**

IV B.Tech. - II Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
	Professional Elective-V	PCC	3	0	0	3	40	60	100
	Professional Elective-VI	PCC	3	0	0	3	40	60	100
A7AI26	Project Work	PCC	0	0	28	14	40	60	100
Total			**6**	**0**	**28**	**20**	**120**	**180**	**300**

SEM	I	II	III	IV	V	VI	VII	VIII	**Total**
Credits	20	20	20	22	21	20	21	20	**164**

PROFESSIONAL ELECTIVES			
PE - I		**PE – II**	
A7CS24	Computer Graphics	A7CS58	Image Processing
A7DS01	Introduction to Data Science	A7CS30	Block-chain Technology
A7CS25	Software Testing Methodologies	A7CS31	Software Project Management
A7AI08	Data Mining Techniques	A7DS18	Mining Massive Datasets
A7CS26	Web Programming	A7CS32	Full Stack Development
A7CS27	Distributed Systems	A7CS39	Cloud Computing
PE - III		**PE - IV**	
A7AI20	Computer Vision	A7AI21	Augmented Reality & Virtual Reality
A7CS28	Cryptography and Network Security	A7CS41	Agile Methodology
A7CS38	Vulnerability Assessment and Penetration Testing	A7DS08	BigData Technologies
A7DS07	Data Stream Processing	A7AI22	Quantum Computing
A7CS22	Devops	A7AI23	Robotic Process Automation
A7CS40	Information Retrieval Systems	A7CS42	Cyber Forensics
PE - V		**PE - VI**	
A7DS21	Social Media Mining	A7CS47	High Performance Computing
A7CS44	Nature Inspired Computing	A7CS48	Edge Computing
A7AI24	Ethics in AI	A7CS49	Graph Theory
A7AI25	Game Theory	A7CS50	Adhoc &Sensor Networks
A7CS45	Mobile Application Development	A7CS51	Sustainable Engineering
A7CS46	Human Computer Interaction	A7CS52	Distributed Databases

OPEN ELECTIVES

Open Elective I:

1. A7AI27:Fundamentals of AI
2. A7AI28:Machine Learning Basics

Open Elective II:

1. A7AI29: Introduction to Natural Language Processing
2. A7AI30 : AI Applications& Case Studies

Open Elective III:

1. A7AI31: Chat bots
2. A7AI32: Computer Vision with Open CV

I B.TECH I SEMESTER SYLLABUS

MATRICES AND CALCULUS

I B. TECH- I SEMESTER

Course Code:	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7BS01	BSC	3	1	0	4	40	60	100
Contact Classes: 48	Tutorial Classes: 08	Practical Classes: Nil				Total Classes: 56		

Pre-requisites: Mathematical Knowledge at pre-university level

COURSE OBJECTIVES

The course should enable the students to :

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems.
4. Finding maxima and minima of functions of two and three variables.
5. Evaluation of multiple integrals and their applications.

COURSE OUTCOMES

After learning the contents of this paper, the student must be able to:

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigenvalues and Eigen vectors, Reduce the quadratic form to canonical form using orthogonal transformations.
3. Solve the applications of the mean value theorems.
4. Find the extreme values of functions of two variables with/ without constraints.
5. Evaluate the multiple integrals and apply the concept to find areas, volumes.

UNIT-I	MATRICES	Classes: 08

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.

UNIT-II	EIGEN VALUES AND EIGENVECTORS	Classes: 10

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 Reducion of Quadratic form to canonical form by Orthogonal Transformation.

UNIT-III	SINGLE VARIABLE CALCULUS	Classes: 10

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).

Curve Tracing: Curve tracing in Cartesian coordinates.

UNIT-IV	MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)	Classes: 10

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.

UNIT-V	MULTIPLE INTEGRALS	Classes: 10

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, 36thEdition,2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5thEditon, 2016.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9thEdition, JohnWiley&Sons,2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
3. N.P.Baliand Manish Goyal, A textbook 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.
5. 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
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/

ADVANCED ENGINEERING PHYSICS

I B. TECH- I SEMESTER

Course Code:	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7BS08	BSC	3	0	0	3	40	60	100
Contact Classes: 50	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 50		

COURSE OBJECTIVES

The course should enable the students :

1. To study crystal structures, defects, and material characterization techniques like XRD and SEM.
2. To understand fundamental concepts of quantum mechanics and their applications in solids and nano materials.
3. To introduce quantum computing principles, quantum gates, and basic quantum algorithms.
4. To learn the properties and applications of magnetic and dielectric materials.
5. To explore the working and applications of lasers and fibre optics in modern technology

COURSE OUTCOMES

At the end of the course students will be able to :

1. Analyze crystal structures, identify defects, and apply XRD and SEM techniques for material characterization.
2. Apply quantum mechanical principles to explain particle behaviour and energy band formation in solids.
3. Apply quantum gates (Pauli –X, Y, Z, Hadamard, CNOT, SWAP) to construct basic quantum circuits for simple computational tasks.
4. Classify magnetic and dielectric materials and explain their properties, synthesis, and applications.
5. Explain the principles of lasers and fibre optics and their applications in communication and sensing.

UNIT-I	Crystallography & Materials Characterization	Classes: 10

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:Schottky and Frenkel 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.

UNIT-II	Quantum Mechanics	Classes: 10

Introduction, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics (qualitative), eigen values and eigen functions, expectation value (qualitative); 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.

UNIT-III	Quantum Computing	Classes: 10

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 (Pauli-X, Y, Z, Hadamard, CNOT, SWAP), challenges and advantages of quantum computing over classical computation, : quantum algorithms: Deutsch-Jozsa, Grover.

UNIT-IV	Magnetic and Dielectric Materials	Classes: 10

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.
Introduction to dielectric materials, types of polarization (qualitative): electronics, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM), load cell and fire sensor.

UNIT-V	Laser and Fibre Optics	Classes: 10

Introduction to laser, characteristics of laser, spontaneous and stimulated emission, Einstein coefficients and their relations, metastable state, population inversion, pumping, lasing action, Ruby laser, CO2 laser, semiconductor diode laser, applications: Bar code scanner, LIDAR for autonomous vehicle.
Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres-Step index, Graded Index, single mode step index, multimode step index, multimode graded index, losses in optical fibre, applications: optical fibre for communication system, sensor for structural health monitoring.

Text Books

1. Walter Borchardt-Ott, Crystallography: An Introduction, Springer.
2. Charles Kittel, Introduction to Solid State Physics, John Wiley & Sons, Inc
3. Thomas G. Wong, Introduction to Classical and Quantum Computing, Rooted Grove

Reference Books

1. Jozef Gruska, Quantum Computing, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
3. John M. Senior, Optical Fiber Communications Principles and Practice, Pearson Education Limited.

Web References

1. https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fibercommunications-principles-and-pr.pdf
2.https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf
3.https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles-Kittel.pdf
4.https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf
5.https://www.fi.muni.cz/usr/gruska/qbook1.pdf
6. https://profmcruz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-andquantum-information-nielsen-chuang.pdf

PROGRAMMING FOR PROBLEM SOLVING

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS01	ESC	3	0	0	3	40	60	100
Contact Classes: 50	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 50		

COURSE OBJECTIVES

The course should enable the students :

1. To familiarize with the syntax and semantics of C programming language.
2. To learn the usage of structured programming approach in solving problems.
3. To use arrays, pointers, strings and structures in solving problems.
4. To understand how to solve problems related to matrices, Searching and sorting.
5. To understand how to use files to perform read and write operations.

COURSE OUTCOMES

At the end of the course students will be able :

1. To demonstrate the ability to write and understand basic C programs using language elements, variable declarations, arithmetic expressions, and selection structures.
2. Develop computer programs using programming constructs and control structures and to use arrays to develop C programs
3. Decompose a problem into functions to develop modular reusable code and to use pointers to solve complex problems.
4. To utilize string manipulation functions and user-defined structures and unions to design and implement algorithms in C.
5. To perform file operations and implement searching and sorting algorithms.

UNIT-I	OVERVIEW OF C AND SELECTION STRUCTURES	Classes: 10

Overview of C: C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Arithmetic Expressions, Formatting Numbers in Program Output.
Selection Structures: Control Structures, Conditions, if Statement, if Statements with Compound Statements, Decision Steps in Algorithms.

UNIT-II	REPETITION, LOOP STATEMENTS AND ARRAYS	Classes: 10

Repetition and Loop Statements: 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.
Arrays: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Array Arguments, Parallel Arrays and Enumerated Types, Multidimensional Arrays.

UNIT-III	FUNCTIONS AND POINTERS	Classes: 10

Top-Down Design with Functions: 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.
Recursion: The Nature of Recursion, Tracing a Recursive Function, Recursive Mathematical Functions, storage classes.
Pointers and Modular Programming: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, Functions returning pointers, Dynamic memory allocation

UNIT-IV	STRINGS AND USER DEFINED DATA TYPES	Classes: 10

Strings: String Basics, String Library Functions: Assignment and Substrings, Longer Strings: Concatenation and Whole-Line Input, String Comparison, Arrays of strings.
Structure and Union Types: User- Defined Structure Types, Structure Type Data as Input and Output Parameters, Functions with Structured Result Values, Union Types.

UNIT-V	FILE HANDLING, SEARCHING AND SORTING	Classes: 10

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, 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.

Web References

1. 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
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
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

BASIC ELECTRICAL ENGINEERING

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7EE04	ESC	3	0	0	3	40	60	100
Contact Classes: 50	Tutorial Classes:	Practical Classes: Nil				Total Classes: 50		

Prerequisites: Mathematics

COURSE OBJECTIVES

The course should enable the students to:

1. Understand DC and Single & Three phase AC circuits
2. Study and understand the different types of DC, AC machines and Transformers.
3. Import the knowledge of various electrical installations and the concept of power, power factor and its improvement.

COURSE OUTCOMES

At the end of the course students will be able to:

1.Understand and analyze basic Electrical circuits
2.Study the working principles of Electrical Machines and Transformers
3.Introduce components of Low Voltage Electrical Installations.

UNIT-I	D.C. CIRCUITS	Classes: 10

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II	A.C. CIRCUITS	Classes: 10

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III	TRANSFORMERS	Classes: 10

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV	ELECTRICAL MACHINES	Classes: 10

Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator.

UNIT-V	ELECTRICAL INSTALLATIONS	Classes: 10

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

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, 2nd 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, 1st Edition, 2012.
4. Abhijit Chakrabarthi, 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.

COMPUTER AIDED ENGINEERING DRAWING

I B.TECH-ISEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7ME02	ESC	2	0	2	3	40	60	100
Contact Classes: 55	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 55		

COURSEOBJECTIVES

The course should enable the students:

1. To introduce the fundamentals of engineering drawing and projection systems.
2. To develop skills in constructing orthographic, isometric, and sectional views.
3. To train students in interpreting and creating technical drawings using CAD tools.
4. To familiarize students with dimensioning standards and drafting conventions.
5. To bridge manual drafting techniques with computer-aided drafting practices.

COURSEOUTCOMES

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

1. Understand and apply the principles of orthographic and isometric projections.
2. Create sectional views and dimensioned drawings using BIS standards.
3. Use CAD software to generate 2D engineering drawings.
4. Visualize and construct solid models from 2D views.
5. Interpret and produce engineering drawings of mechanical components and assemblies.
6. Demonstrate drafting skills for practical and industrial applications.

LISTOFEXPERIMENTS

UNIT-1	**Introduction to Engineering Graphics (Conventional)**	**Classes: 13**

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.

UNIT- 2	**Orthographic Projections (Conventional and Computer Aided)**	**Classes: 13**

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.

UNIT- 3	**Projections of Regular Solids (Conventional and Computer Aided)**	**Classes: 10**

Auxiliary Views, Sections or Sectional views of Right Regular Solids, Prism, Cylinder, Pyramid, Cone, Auxiliary views, Computer aided projections of solids, sectional views

UNIT- 4	**Development of Surfaces (Conventional)**	**Classes: 9**

Prism, Cylinder, Pyramid and Cone

UNIT-5	Isometric Projections (Conventional and Computer Aided)	Classes: 10

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.

TEXTBOOKS

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

REFERENCEBOOKS

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

ADVANCED ENGINEERING PHYSICS LAB

I B. TECH- I SEMESTER

Course Code:	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A7BS09	BSC	0	0	2	1	40	60	100
Contact Classes:	Tutorial Classes:	Practical Classes:				Total Classes:		

COURSE OBJECTIVES

The course should enable the students :

1. To provide practical exposure to advanced concepts in solid-state and modern physics.
2. To synthesize and study the physical properties of materials like semiconductors, Ferromagnetic and ferroelectric substances.
3. To perform semiconductor characterization using Hall effect and band gap experiments.
4. To explore the working principles of lasers and optical fibers through hands-on experiments.
5. To develop skills in data analysis, interpretation, and scientific reporting.

COURSE OUTCOMES

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

1. Synthesize and analyze nanomaterials such as magnetite (FesO4) using chemical methods.
2. Determine electrical, magnetic, dielectric, optical properties of functional materials and validation of quantum theory of radiation.
3. Characterize semiconductors using Hall effect and energy gap measurement techniques.
4. Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.
5. Apply scientific methods for accurate data collection, analysis, and technical report writing.

LIST OF EXPERIMENTS

Week-1	**Magnetite Powder**
To synthesize magnetite (Fe3O4) powder using sol-gel method (CO1)	
Week-2	**Energy gap of a semiconductor**
To determine the energy gap of a given semiconductor (CO3)	
Week-3	**Hall Effect**
To determine the Hall coefficient and carrier concentration of a given semiconductor. (CO3)	
Week-4	**Magnetic Moment**
To determine the magnetic moment of a bar magnet and horizontal earth magnetic field. (CO2)	

Week-5	B-H Curve
To study of B-H curve of a ferro magnetic material (CO2)	
Week-6	**Stewart Gee's Experiment**
To study the variation of magnetic field along the axis of a circular coil and calculation of magnetic flux. (CO2)	
Week-7	**Dielectric constant**
To determine the dielectric constant of a given material (CO2)	
Week-8	**Planck's Constant**
To determine value of Planck's constant by measuring radiation in fixed spectral range. (CO2)	
Week-9	**(a) Wavelength of Laser** **(b) V-I and L-I characteristics**
1. To determine the wavelength of a laser using diffraction grating (CO4) 2. To study of V-I & L-I characteristics of a given laser diode (CO4)	
Week-10	**(a)Numerical Aperture** **(b)Bending Loss**
To determine the numerical aperture of a given optical fiber (CO4) To determine the bending losses of a given optical fiber (CO4)	
Week-11	**Physics Project**
Students are required to design a prototypebased on one of the above experiments no 1-10 (CO).	

Text Books

1. Walter Borchardt-Ott,Crystallography: An Introduction, Springer.
2. Charles Kittel, Introduction to Solid State Physics, John Wiley & Sons, Inc.

Thomas G. Wong, Introduction to Classical and Quantum Computing, Rooted Grove

Reference Books

1. JozefGruska, Quantum Computing, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.

John M. Senior, Optical Fiber Communications Principles and Practice, Pearson Education Limited.

Web References

1. https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fiber-communications-principles-and-pr.pdf
2. https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf
3. https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles-Kittel.pdf
4. https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf
5. https://www.fi.muni.cz/usr/gruska/qbook1.pdf
6. https://profmcruz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf

MOOC Course

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

PROGRAMMING FOR PROBLEM SOLVING LAB

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A7CS02	BSC	0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes:24		

COURSE OBJECTIVES

The course should enable the students:

1) To be familiarize with basic programs to solve simple problems
2) To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3) To develop modularized, reusable and readable C Programs using the concepts like functions, arrays, strings, pointers and structures.
4) To develop programs to perform read and write operations on files.

COURSE OUTCOMES

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

1) Solve simple mathematical problems using basic c programs.
2) Correct syntax errors as reported by the compilers and logical errors encountered at run time and develop programs by using decision making and looping constructs.
3) Implement real time applications using the concept of array, pointers, functions and structures.

Develop programs to perform different operations on files in c.

LIST OF EXPERIMENTS

Week-1	BASIC PROGRAMS

1. You are a newly admitted student in MLRIT. During registration, the computer system prints your name, your branch of study and College Name.

So, your task is to print your information with college name it neatly just like the administration software would do for every student.

2. During an exam, the teacher wants to enter the roll numbers and marks of two students intothe computer. Instead of displaying them in a messy way, the output should appear in a neattable (like a result sheet).

We use formatted printing (%d with width specifiers) to align the output properly.

For example, instead of printing:

Roll Marks

1 5

2 50

3 100

The system should print them neatly aligned using spacing:

Roll Marks

1 5

2 50

3 100

To achieve this, we use format specifiers (%2d, %3d, etc.) in printf.

Week 2	BASIC DATA TYPES

1. In a rural banking ATM, due to power fluctuations, the server sometimes receives an incorrect denomination order. You're tasked to:

- Take two amounts a and b, where a is expected to be the withdrawal amount, but due to signal reversal, values may be swapped.
- Without using any extra variables, restore the actual order such that the larger number becomes the withdrawal amount (a should store larger value, b the smaller one).
- If they're equal, leave them unchanged.

2. You're building a personal health tracker. The app calculates a **Health Risk Index (HRI)** for a user based on three readings:

- x: Heart Rate Variability (HRV)
- y: Average Sleep Hours
- z: Stress Level Index

You must calculate:

1. HRI Score = (x + y + z) / (x - y - z)
2. Sleep-Adjusted Average = (x + y + z) / 3
3. Recovery Index = (x + y) × (x - y) × (y - z)

However, there's a rule:

If the denominator in expression 1 is 0, print: Invalid HRI Score

Week 3	OPERATORS

1. An industrial machine's heat dissipation unit generates a circular heat zone, and a monitoring system is used to evaluate safety.

The system should:

1. Accept:
    - Radius of the heat zone (r)
    - Temperature (T) in Celsius
2. Compute:
    - Area = π × r²
    - Perimeter = 2 × π × r
    - Use π = 3.1416
3. Based on area and temperature:
    - If T > 100AND area > 500 → "Critical Risk"
    - If T > 80OR perimeter > 150 → "Warning"
    - Else → "Safe"

2. In a smart electricity billing system, industrial customers are billed dynamically based on their usage slab.

You must:

1. Accept:
    - Consumer ID (consumer_id)
    - Units consumed (units)
    - Cost per unit (cost)
2. Compute:
    - Base amount = units × cost
    - Apply surcharge:
        - If units > 1000 → 18% surcharge
        - If 501–1000 → 10% surcharge
        - If 200–500 → 5% surcharge
        - Else → No surcharge
    - Final bill = base + surcharge

      Round the bill to nearest integer

Week 4	CONDITIONAL STATEMENTS

1. A multinational company has developed a multi-criteria evaluation system to automate candidate shortlisting. For a given applicant, the system records the following:

- score (integer): Test score (out of 100)
- exp (integer): Years of experience
- tier (integer): Tier of college (1 – Top, 2 – Mid, 3 – Other)

Based on the inputs, classify the candidate:

Logic:

- If score < 50 → "Rejected: Failed Assessment"
- Else if score ≥ 50:
    - If exp = 0 AND tier = 3 → "Rejected: Fresh from Tier 3"
    - If exp< 2 AND score < 75 → "Waitlist: Needs More Experience"
    - If tier = 1 AND score ≥ 90 → "Accepted: Fast Track"
    - If score ≥ 70 AND (exp ≥ 2 OR tier = 1) → "Accepted: Standard Track"
    - Otherwise → "Waitlist: Borderline Profile"

2. A company tracks the monthly sales performance of its three regional branches: North, South, and East.

You are tasked to:

- Accept the sales (in rupees) of each branch
- Determine which branch had the highest sales
- If two or more branches have the same highest sales, print: "Tie"

Otherwise, print the name of the branch with the highest sales

Week 5	LOOPING STATEMENTS

1. A smart city dashboard is simulating population growth over a number of years. The logic is adaptive:

- You are given:
  - Initial population (positive integer)
  - Growth rate percentage (float)
  - Number of years to simulate (integer)
- For each year:
  - Population increases by the growth rate on the current year's population
  - If in any year, the population crosses 1 million, stop simulation and print Population Limit Reached at Year X

Required:

- Print population year-wise up to the given year OR until the limit is reached.
- Output rounded to nearest integer.

2. You're working on an authentication layer for a secure login system. It accepts a number and does the following:

- Reverse the number using a loop
- Check:
  - If the number and reverse are equal → Palindrome
  - If the difference between number and its reverse is divisible by 11 → Near Palindrome
  - Otherwise → Not a Palindrome

Week-6	NESTED LOOPING STATEMENTS

1. You're building the seat map logic for a railway reservation system. Each compartment has:

- r rows
- c columns
- A few reserved seats (you'll receive their positions)
- You must generate a grid where:
  - R = Reserved seat
  - A = Available seat
- Rows are labeled from 1 to r
- Columns from 1 to c

2.In a warehouse, items are stacked in a number pyramid to maximize space. Each row has more boxes than the last.

You are given the number of rows n, and your system must:

- Print the item ID starting from 1001 and increasing across rows
- Format the rows like a pyramid — each row contains i items in row i

Week-7	ARRAYS

1. A warehouse stores product IDs in an inventory list.

You are required to:

- Accept n product IDs (integers) into an array
- Accept one search ID
- Check whether that ID exists in the array
- If found, print its position (starting from 1)
- If not found, print "Not Available"

2.A smart building tracks temperature across multiple rooms using a **square grid of sensors**.

You are given:

- Two square matrices A and B of size n × n, where each element represents the temperature reading of a room at **two different times**.

You must:

1. Read both matrices
2. Compute a **third matrix C**, where each element is:
    - The **maximum** of the corresponding values in A and B *(i.e., latest temperature reading per room)*
3. Print the final matrix C row by row.

Week-8	FUNCTIONS

1. You are building a backend evaluation service for a university grading server that computes factorials for different modules.

- The system offers two modes of evaluation:
    1. Recursive mode – used by the Mathematics Department
    2. Non-recursive mode – used by the Physics Department
- Your job is to:
    - Accept a student ID and module code (MATH or PHYS)
    - Accept an integer n (0 ≤ n ≤ 20)
    - Use:
        - Recursive function if module is MATH
        - Non-recursive function if module is PHYS
    - Output the factorial result (only the number)

The server does not print the method used — it only returns the final number. The complexity lies in your logic to select and compute the factorial correctly based on module.

2. You are developing a C-based control system that supports power and GCD calculations for signal processing in embedded hardware.

- The system receives:
  - a, b, c — all positive integers ≤ 100
- You must:
  1. Compute a^b using a custom power function (non-library)
  2. Compute GCD of b and c using recursion
- Output the power and GCD on two separate lines

No status messages or logic branching is shown — just exact numbers. Internally though, students must build and invoke multiple functions appropriately.

Week-9	STRINGS

1. In a multi-cloud setup, user IDs are fetched from different cloud providers. These IDs are inconsistent in format and need normalization before merging.

You are asked to design a function that does the following:

- Accept one user ID string (mixed case, up to 100 characters)
- Convert all letters to **lowercase**
- If the string contains more than 12 characters, **truncate it to 12 characters**
- Print the normalized user ID

2. In a dual-environment (production and testing) login system, credentials are fetched from two different databases. You need to ensure that both IDs match **exactly**, or raise an alert.

Your task:

- Accept two user ID strings
- Compare them using a case-sensitive match
- If they are equal, access is granted
- If not, deny access and alert

Week-10	POINTERS

1. An embedded serial buffer receives n integer bytes. Due to a wiring issue, the last received byte appears first, and the rest in reverse. Your job is to:

- Accept the n integers using a pointer
- Reverse the array using pointer arithmetic (no array indexing allowed)
- Output the corrected stream

2. A hardware diagnostic utility reads two system boot values (a and b) from memory. Before system startup, these values must be swapped for security validation.

The utility performs:

- Dynamic memory allocation for both values
- Swapping using **only pointers**
- Then prints the updated values in the new memory locations

Week-11	STRUCTURES

1. A satellite sends two 2D signal points from its tracking system. Each signal point has:

- x coordinate (int)
- y coordinate (int)

You must:

- Store both signal points using a structure
- Calculate:
  - Midpoint of the two coordinates
  - Distance between the points
  - If distance > 100 → "Signal Drift Detected"
  - Else → "Signal Stable"

2. A multinational corporation wants to audit salary data for HR, TECH, and OPS departments using a structured system.

Each employee record includes:

- ID (int)
- Name (string)
- Department (string)
- Basic, HRA, DA (float)

You must:

- Accept records for n employees
- Compute gross salary
- Apply tags based on rules:
  - If gross > 80000 and department = TECH → High Tech Earner
  - If gross < 30000 and department = OPS → Review Required
  - If HRA > 50% of basic → HRA Flagged
- Print all tags for each employee if applicable

Week-12	FILE HANDLING

1.An enterprise app stores user activity logs in a file called activity.txt. Each line records: <user_id><event_code><status>

You are required to:

- Read all lines from the file
- Count the number of events with status "FAIL"
- Print the **total number of lines** and **number of failures**

2. A university system maintains student records in a file named students.txt. Each line contains: <student_id><name><subject_code><mark>

The audit system performs:

1. Reads all student records from the file
2. Validates that mark is between 0 and 100 (skip invalid lines)
3. Classifies passed students (mark ≥ 50) into:
    - Excellent if mark ≥ 85
    - Good if 70 ≤ mark < 85
    - Average if 50 ≤ mark < 70
4. Writes only **passed students** and their **grade band** to a new file report.txt
5. Displays how many students fall into each band

Text Books

1) Riley DD, Hunt K.A. Computational Thinking for the Modern Problem Solver. CRC press, 2014 Mar 27.
2) B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition) YashavantKanetkar, "Let Us C", BPB Publications, New Delhi, 13th Edition, 2012.

Reference Books

1) Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer; 2018
2) King KN, "C Programming: A Modern Approach", Atlantic Publishers, 2nd Edition, 2015.
3) Kochan Stephen G, "Programming in C: A Complete Introduction to the C Programming Language", Sam's Publishers, 3rd Edition, 2004.
4) Linden Peter V, "Expert C Programming: Deep C Secrets", Pearson India, 1st Edition, 1994.

Web References

1. http://www.sanfoundry.com/c-programming-examples
2. http://www.geeksforgeeks.org/c
3. http://www.cprogramming.com/tutorial/c

BASIC ELECTRICAL ENGINEERING LAB

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A7EE05	ESC	0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes:24		

Prerequisites: Basic Electrical Engineering

COURSE OBJECTIVES

The course should enable the students :

1. To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
2. To study the transient response of various R, L and C circuits using different excitations.
3. To determine the performance of different types of DC, AC machines and Transformers.

COURSE OUTCOMES

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

1.Analyze the circuit using Kirchhoff's law and network simplification theorems
2. Evaluate the efficiency of single-phase Transformer
3. Evaluate the efficiency and critical speed and critical field resistance of DC Machine
4. Evaluate the efficiency of AC Machine

LIST OF EXPERIMENTS

Week-1	Verification of KVL and KCL
Week-2	Verification of Thevenin's and Norton's theorem
Week-3	Transient Response of Series RL and RC circuits for DC excitation
Week-4	Resonance in series RLC circuit
Week-5	Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
Week-6	Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
Week-7	Performance Characteristics of a DC ShuntMotor
Week-8	Torque-Speed Characteristics of a Three-phase Induction Motor.
Week-9	Verification of Superposition theorem.
Week-10	Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
Week-11	Load Test on Single Phase Transformer (Calculate Efficiency and Regulation) Measurement of Active and Reactive Power in a balanced Three-phase circuit
Week-12	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, 2nd 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, 1st Edition, 2012.
4. Abhijit Chakrabarthi, 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 & IT WORKSHOP

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS06	ESC	0	0	2	1	40	60	100
Contact Classes:0	Tutorial Classes: 0	Practical Classes: 24				Total Classes: 24		

COURSE OBJECTIVES

The course should enable the students to:

The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, PowerPoint and Publisher

COURSE OUTCOMES:

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

1.Perform Hardware troubleshooting
2. Understand Hardware components and inter dependencies
3. Safeguard computer systems from viruses/worms
4. Document/ Presentation preparation
5. Perform calculations using spreadsheets

LIST OF EXPERIMENTS

Week-1	
To interface LED /buzzer with Arduino board and write a program to turn ON LED for 1sec after every 2 sec.	
Week-2	
Interface IR sensor with Arshi I	
Week-3	
Interface ultrasonic sonic sensor with Arduino	
Week-4	
Interface LDR and temperature sensor with Arduino	
Week-5	
Interface LCD using Arduino and print the message in 16*2 LCD	
Week-6	
Interface servo motor with Arduino	
Week-7	
Interfacing HC-05 Bluetooth module with Arduino and write a program to control home automation using Bluetooth and android mobile	

Week-8	Introduction to ESP 8266 module
Week-9	Smart home andriod app development/ project
Week-10	Assembling and Disassembling Computers Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva
Week-11	OS installation 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.
Week-12	MS-Office: MS WORD, EXCEL, PowerPoint Case study

Text Books

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.

I B.TECH II SEMESTER SYLLABUS

ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7BS02	BSC	3	0	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: 08	Practical Classes: Nil				Total Classes: 56		

COURSE OBJECTIVES

The course should enable the students to:

1. Methods of solving first order ordinary differential equations.
2. Methods of solving higher order ordinary differential equations.
3. Solving ordinary differential equations using Laplace transform techniques.
4. The physical quantities involved in engineering field related to vector valued functions.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

COURSE OUTCOMES:

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

1. Determine whether the given differential equation of first order is exact or not.
2. Solve higher order differential equations and apply the concept of differential equations to real world problems.
3. Evaluate Ordinary differential equations using Laplace transforms.
4. Compute the gradient of a scalar field and evaluate directional derivatives at given points.
5. Evaluate the Line, Surface and Volume integrals and converting them from one to another.

UNIT-I	FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS	Classes: 08

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.

UNIT-II	ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER	Classes: 10

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.

UNIT-III	LAPLACE TRANSFORMS	Classes:10

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).

UNIT-IV	VECTOR DIFFERENTIATION	Classes: 10

Vector point functions and scalar point functions – Gradient – Directional derivatives - Divergence and Curl — Solenoidal and Irrotational vectors - Scalar potential functions –Vector operators and Identities.

UNIT-V	VECTOR INTEGRATION	Classes: 10

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, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition 2016.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Michael D. Greenberg, Advanced Engineering Mathematics, 2nd Edition, Prentice Hall, 2019.
3. ChurchilRuel V, Operational Mathematics, 2nd Edition, McGraw-Hill, 1972.
4. Goyal&Guptha, Integral Transforms, 18th Edition, PragatiPrakashan, 2014.
5. H. K. Dass and Er. RajnishVerma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

Web references

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.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/

ENGINEERING CHEMISTRY

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7BS10	BSC	3	0	0	3	40	60	100
Contact Classes: 40	Tutorial Classes: 0	Practical Classes: Nil				Total Classes: 40		

COURSE OBJECTIVES

The course should enable the students:

1. To develop adaptability to new advances in Engineering Chemistry and acquire the essential skills to become a competent engineering professional.
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.
3. To impart foundational knowledge of various energy sources and their practical applications in engineering.
4. To equip students with an understanding of smart materials, biosensors, and analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.

COURSE OUTCOMES:

By the end of this course, students will be able to:

1. Students will be able to understand the fundamental properties of water and its applications in both domestic and industrial purposes.
2. Students will gain basic knowledge of electrochemical processes and their relevance to corrosion and its control methods.
3. Students will comprehend the significance and practical applications of batteries and various energy sources, enhancing their potential as future engineers and entrepreneurs.
4. Students will learn the basic concepts and properties of polymers and other engineering materials.
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.

UNIT-I	WATER AND ITS TREATMENT	Classes: 8

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 breakpoint chlorination.

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.

UNIT-II	ELECTROCHEMISTRY AND CORROSION	Classes:8

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.

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.

UNIT-III	ENERGY SOURCES	Classes:8

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).

Fuels: Introduction and characteristics of a good fuel, Calorific value Units-HCV, LCV Dulongs formula Numerical problems.

Fossil fuels: Introduction, Classification, Petroleum Refining of Crudeoil, Cracking Types of cracking Moving bedcatalytic cracking.LPG and CNG composition and uses.

Synthetic Fuels: Fischer Tropschprocess, Introduction and applications of Hythane and Green Hydrogen.

UNIT-IV	POLYMERS	Classes: 8

Definition - Classification of polymers: Based on origin and tacticity with examples – Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization.

Plastics, Elastomers and Fibers: Definition and applications (PVC, Buna-S, Nylon-6,6). Differences between themoplastics and thermo setting plastics, Fiber reinforced plastics (FRP).

Conducting polymers: Definition and Classification with examples - Mechanism of conduction in trans-poly-acetylene and applications of conducting polymers.

Biodegradable polymers: Polylactic acid and its applications.

UNIT-V	ADVANCED FUNCTIONAL MATERIALS	Classes: 8

Smart materials: Introduction, Classification with examples - Shape Memory Alloys – Nitinol, Piezoelectric materials – quartz and their engineering applications.

Biosensor - Definition, Amperometric Glucose monitor sensor.

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.

Text Books

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010.
2. Engineering Chemistry by Rama Devi, Dr. P. Aparna and Rath, Cengage learning, 2025.

Reference Books

1. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.
5. Challenges and Opportunities in Green Hydrogen by Editors: Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. Raman Spectroscopy in Human Health and Biomedicine, https://www.worldscientific.com/ doi/epdf/10.1142/13094
7. E-Content- https://doi.org/10.1142/13094 | October 2023
8. E-books:
https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2u

DATA STRUCTURES

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS03	ESC	3	0	0	3	40	60	100
Contact Classes:53	Tutorial Classes:Nil	Practical Classes: Nil				Total Classes: 53		

COURSE OBJECTIVES

The course should enable the students to:

1. Exploring basic data structures such as stacks and queues.
2. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
3. Introduces sorting and pattern matching algorithms.

COURSE OUTCOMES

By the end of this course, students will be able to:

1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to assess efficiency trade offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for sorting and pattern matching.
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.

UNIT-I **Classes: 12**

IntroductiontoDataStructures:BasicTerminology,ClassificationofDataStructures,OperationonData 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.

UNIT-II **Classes: 10**

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.

UNIT-III **Classes: 10**

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

UNIT-IV **Classes: 10**

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,

UNIT-V **Classes: 11**

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

Text Books
1. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning 2. Data Structure using C– Reema Thareja, 3rd Edition, Oxford University Press.
Reference Books
1. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

ELECTRONIC DEVICES AND APPLICATIONS

I B. TECH- II SEMESTER

Course Code	Category	Hours/ Week			Credis	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7EC01	ESC	3	0	0	3	40	60	100
ContactClasses:45	Tutorial Classes: Nil	Practical Classes: Nil				Contact Classes:45		

COURSE OBJECTIVES

The course should enable the students to:

1. To introduce components such as diodes, BJTs, and FETs.
2. To know the applications of devices.
3. To know the basics of advanced devices for VLSI applications.

COURSE OUTCOMES

At the end of the course students will be able to:

1. Acquire knowledge of various electronic devices, such as diode, their characteristics, and their use in real life.
2. Know the Applications of the P-N diode, such as rectifiers and filter circuits.
3. Analyze the concept of Bipolar Junction Transistor, and compare it with BJT. MOSFET and its applications.
4. Know the concepts of special-purpose diodes and advanced FET devices.
5. Acquire knowledge about the role of special-purpose devices and Advanced FET devices.

UNIT - I	P-N JUNCTION DIODEAND ITS CHARACTERISTICS	CLASSES: 10

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, Piece wise Linear), Diode as a switch, diode's switching times.

UNIT - II	APPLICATIONS OF P-N JUNCTION DIODE	CLASSES:9

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.

UNIT - III	BIPOLAR JUNCTION TRANSISTOR(BJT) and UJT	CLASSES:9

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.

UNIT - IV	FIELD-EFFECT TRANSISTOR(FET) and MOSFET	CLASSES:9

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.

UNIT - V	SPECIAL PURPOSE DIODES and ADVANCED TRANSISTORS	CLASSES: 8

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.

TEXT BOOKS

1. Millman, Jacob, and Christos C. Halkias. Electronic Devices and Circuits. Tata McGraw-Hill,1991.
2. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. Pearson,11th ed., 2013.
3. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. Oxford University Press, 7th ed., 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.

ENGLISH FOR SKILL ENHANCEMENT

I B. TECH- II SEMESTER

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7HS01	HSMC	3	0	0	3	40	60	100
Contact Classes:52	Tutorial Classes:	Practical Classes:				Total Classes:52		

COURSE OBJECTIVES

This course aims:

1. To build a strong vocabulary base that enhances students' comprehension and ability to express ideas clearly and appropriately in academic, social, and professional contexts.Use appropriate sentence structures in their oral and written communication.
2. To strengthen students' understanding of English grammar for constructing syntactically correct and contextually appropriate sentences in both spoken and written communication.
3. To develop strategic reading skills such as skimming, scanning, and inferencing for better interpretation of texts and extraction of key information.
4. To enable students to write a range of academic and professional documents, ensuring coherence, organization, and purpose-driven content.
5. To develop their critical and cultural awareness through literary and non-literary texts, enabling students to analyze themes and reflect on ethical, cultural and societal issues.

COURSE OUTCOMES

At the end of the course students will be able to:

1. Students will be able to remember, understand, and apply an expanded range of vocabularies and their usages to comprehend texts and communicate ideas effectively in various academic, social, and professional contexts.
2. Students will be able to apply grammatical rules to produce error-free sentences for effective oral and written communication skills n professional and personal setups.
3. Students will be able to apply effective reading strategies such as skimming and scanning to extract essential information from texts and demonstrate improved comprehension.
4. Students will be able to compose well-structured and coherent written documents such as paragraphs, essays, letters, emails, reports, and resumes for academic and professional purposes
5. Students will be able to analyze and compare textual themes in relation to their socio-cultural and ethical contexts, and critically reflect on their implications.

UNIT-I		CLASSES: 10

Theme:	**Perspectives** **Lesson on 'The Generation Gap' by Benjamin M. Spock from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.**
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.

UNIT-II		CLASSES: 11

Theme: **Digital Transformation**

Lesson on '*Emerging Technologies*' from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Reading Strategies Guessing Meaning from Context Identifying Main Ideas Exercises for Practice

Writing: 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.

UNIT-III		CLASSES: 10

Theme: **Attitude and Gratitude**

Poems on '*Leisure*' by William Henry Davies and '*BeThankful*'- Unknown Author from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading Identifying Topic Sentence and Providing Supporting Ideas- Exercises for Practice.

Writing: 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.

UNIT-IV		CLASSES: 11

Theme: **Entrepreneurship**

Lesson on '*Why a Start-Up Needs to Find its Customers First*' by Pranav Jain from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Standard Abbreviations in English – Inferring Meanings of Words through Context Phrasal Verbs Idioms.

Grammar: Redundancies and Clichés in Written Communication Converting Passive to Active Voice and Vice Versa.

Reading: Prompt Engineering Techniques Comprehending and Generating Appropriate Prompts-Exercises for Practice

Writing: Writing Practices- Note Making Précis Writing.

UNIT-V		CLASSES: 10

Theme: **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.

Vocabulary: Technical Vocabulary and their Usage One Word Substitutes Collocations.

Grammar: Direct and Indirect Speech Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

Reading:	Survey, Question, Read, Recite and Review (SQ3R Method) – Inferring the Meaning and Evaluating a Text- Exercises for Practice
Writing:	***Report Writing Technical Reports Introduction Characteristics of Report Categories of Reports Formats Structure of Reports (Manuscript Format) Types of Reports Writing a Technical Report.***

Text Books

1. Board of Editors. 2025. English for the Young in the Digital World. Orient Black Swan Pvt. Ltd.

Reference Books

1. Swan, Michael. (2016). Practical English Usage. Oxford University Press. New Edition.
2. Karal, Rajeevan. 2023. English Grammar Just for You. Oxford University Press. New Delhi
3. 2024. Empowering with Language: Communicative English for Undergraduates. Cengage Learning India Pvt. Ltd. New Delhi
4. Sanjay Kumar & Pushp Lata. 2022. Communication Skills – A Workbook. Oxford University Press. New Delhi
5. Wood,F.T. (2007). Remedial English Grammar. Macmillan.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.

ENGINEERING CHEMISTRY LAB

I B. TECH-II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7BS11	BSC	0	0	2	1	40	60	100
Contact Classes: 0	Tutorial Classes: 0	Practical Classes: 24				Total Classes: 24		

COURSEOBJECTIVES

The course should enable the students:

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.
4. Students will gain hands-on experience in synthesizing polymers like Bakelite and Nylon 6, 6 in the laboratory.
5. Students will learn to determine the unknown concentration of potassium permanganate (KMnO4) using a calibration curve.

COURSEOBJECTIVES

At the end of the course students will be able to:

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 Water Analysis

1. Estimation of Hardness of water by EDTA Complexometry method.
2. Determination of Alkalanity of given water sample.

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+2ion by Potentiometry using KMnO4.

WEEK-4 pH Metry

Determination of an acid concentration using pH meter.

WEEK-5	Colorimetry

Verification of Lambert-Beer's law using KMnO4.

WEEK-6	Preparations

1. Preparation of Bakelite.
2. Preparation Nylon – 6, 6.

WEEK-7	Corrosion

Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

WEEK-8	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.

REFERENCES

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).

DATA STRUCTURES LAB

I B. TECH-II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS04	ESC	0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes:24		

COURSEOBJECTIVES

The course should enable the students:

1. It covers various concepts of C programming language
2. It introduces searching and sorting algorithms
3. It provides an understanding of data structures such as stacks and queues.

COURSEOBJECTIVES

At the end of the course students will be able to:

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.
2. Ability to Implement searching and sorting algorithms

List of Experiments

WEEK-1

Write a program that uses functions to perform the following operations on singly linked list
i) Creation ii) Insertion iii) Deletion iv) Traversal.

WEEK-2

Write a program that uses functions to perform the following operations on doubly linked list
i) Creation ii) Insertion iii) Deletion iv) Traversal

WEEK-3

Write a program that uses functions to perform the following operations on circular linked list
i) Creation ii) Insertion iii) Deletion iv) Traversal

WEEK-4

Write a program that implement stack (its operations) using

i) Arrays ii) ADT

WEEK-5

Write a program that implement Queue (its operations) using

i) Arrays ii) ADT

WEEK-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

WEEK-7	
Write a program to implement the tree traversal methods (Recursive and Non-Recursive).	
WEEK-8	
Write a program to implement i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVL trees v) Red - Black trees	
WEEK-9	
Write a program to implement the graph traversal methods	
WEEK-10	
Write a program to implement the following Hash Functions: i) Division Method, ii) Multiplication Method, iii) Mid-square Method, iv) Folding Method	
TEXTBOOKS	
1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press. 2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.	
REFERENCES	
1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.	

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

I B. TECH- II SEMESTER

Course Code:	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7HS02	HSMC	0	0	2	1	40	60	100
Contact Classes:nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes: 24		

COURSEOBJECTIVES

The course should enable the students:

1. To expose students to varied listening materials in English, including native speaker audio inputs, with the aim of improving their concentration, comprehension, and interpretive skills.
2. To provide practice-oriented training in spoken English focusing on pronunciation, stress, and intonation patterns through both structured tasks and spontaneous speaking opportunities.
3. To develop students' reading comprehension abilities by introducing a range of texts and training them in effective reading strategies such as skimming, scanning, and critical analysis.
4. To enhance students' writing skills by engaging them in academic and professional writing tasks that focus on clarity, coherence, grammar, and appropriate formatting.

COURSE OUTCOMES

At the end of the course students will be able to:

1. Demonstrate improved listening skills and comprehend English spoken in native accents with enhanced focus and accuracy.
2. To apply appropriate pronunciation, intonation, and stress patterns while speaking English through participating in structured and spontaneous speaking activities.
3. Interpret and analyze a variety of written texts accurately using effective reading strategies.
4. Compose clear, coherent, and grammatically correct written texts for academic and professional purposes.

List of Experiments

WEEK-1

CALL Lab:

Instruction: Speech Sounds-Listening Skill - Importance – Purpose - Types- Barriers- Active Listening

Practice: Listening to Distinguish Speech Sounds (Minimal Pairs) **-** *Testing Exercises*

ICS Lab:

❖ **Diagnostic Test – Activity titled '*Express Your View*'**

Instruction: Spoken and Written language- Formal and Informal English -Greetings - Introducing Oneself and Others

Practice: Any Ice-Breaking Activity

WEEK-2 **BASIC DATA TYPES**

CALL Lab:

Instruction: Listening vs. Hearing - Barriers to Listening

Practice: Listening for General Information -Multiple Choice Questions *-Listening Comprehension Exercises(It is essential to identify a suitable passage with exercises for practice.)*

ICS Lab:
Instruction: Features of Good Conversation – Strategies for Effective Communication
Practice: Role Play Activity -Situational Dialogues –Expressions used in Various Situations –Making Requests and Seeking Permissions – Taking Leave - Telephone Etiquette

WEEK-3	

CALL Lab:
Instruction: Errors in Pronunciation – Tips for Neutralizing Mother Tongue Influence (MTI)
Practice: Differences between British and American Pronunciation *–Listening Comprehension Exercises*
ICS Lab:
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.*

WEEK-4	CONDITIONAL STATEMENTS

CALL Lab:
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.)
ICS Lab:
Instruction: How to Tell a Good Story -Story Star- Sequencing-Creativity
Practice: Activity on Telling and Retelling Stories -Collage

WEEK-5	

CALL Lab:
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.)
ICS Lab:
Instruction: Understanding Non-Verbal Communication
Practice: Silent Speech Dumb Charades Activity

❖ **Post-Assessment Test on 'Express Your View**

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration
ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

TEXTBOOKS

1. Board of Editors. 2025. English for the Young in the Digital World. Orient BlackSwan Pvt. Ltd.

REFERENCES

1. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
2. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient BlackSwan Pvt. Ltd.
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- IISEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7ME03	ESC	0	0	2	1	40	60	100
Contact Classes:Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes: 24		

COURSE OBJECTIVES

The course should enable the students :

1. To introduce students to basic manufacturing processes and workshop practices.
2. To provide hands-on training in carpentry, fitting and sheet metal.
3. To develop skills in using hand tools and measuring instruments.
4. To enhance safety awareness and proper handling of workshop equipment.
5. To build a foundational understanding of industrial production and fabrication.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Understand the basic manufacturing processes and operations.
2. Use hand tools and equipment safely and efficiently.
3. Perform basic operations in carpentry, fitting and sheet metal work.
4. Read and interpret workshop drawings
5. Develop teamwork, time management, and quality awareness in a workshop environment.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

WEEK:1	**Carpentry**
T- Lap Joint, Dovetail Joint, Mortise and Tenon Joint	
WEEK:2	**Fitting**
V- Fit, Dovetail Fit and L - FIT	
WEEK:3	**Tin Smithy**
Square Tin, Rectangular Tray and Conical Funnel	
WEEK:4	**Soldering**
Parallel and Series, Wheat stone bridge circuit.	
WEEK:5	**House wiring**
Parallel and Series, Two-way Switch and Tube Light	

2. TRADES FOR DEMONSTRATION AND EXPOSURE:
Black Smithy: Round to Square and S – Hook Plumbing: PVC Pipe Fittings
TEXT BOOKS
1. Workshop Practice, B. L. Juneja, Cengage Learning India, 1st edition, 2015. 2. Workshop Practice Manual, K. Venkata Reddy, BS Publication, 6th Edition, Rpt.2025.
REFERENCE BOOKS
1. Workshop Manual, K. Venugopal, Anuradha Publications, 2012th edition, 2012.

PYTHON PROGRAMMING LAB

I B. TECH- II SEMESTER

Course Code:	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS05	ESC	0	0	2	1	40	60	100
Contact Classes:Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes: 24		

COURSE OBJECTIVES

The course should enable the students :

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

Week-1

1. i) Use a web browser to go to the Python website http://python.org. 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 help() to start the online help utility.

2. Start a Python interpreter and use it as a Calculator.

Week-2

1. Writeaprogramtocalculatecompoundinterestwhenprincipal,rateandnumberofperiodsare given.
2. Readthename,address,emailandphonenumberofapersonthroughthekeyboardandprint the details.
3. Printthebelowtriangleusingforloop

. 5
44
333
2222
11111

Week-3	

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.

Week-4	

1. Write a program to find common values between two arrays.
2. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built in functionlen to check the length of a string.
3. Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.

Week-5	

1. Write a function called has duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
2. Write a function called remove duplicates 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.
3. The word list I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.

Week-6	

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.
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?
3. 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 lowercase without using a built-in function?

Week-7	

1. Writes are cursive function that generates all binary strings of n-bit length
2. Write a python program that defines a matrix and prints
3. Write a python program to perform multiplication of two square matrices

Week-8	

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.
2. Use the structure of exception handling all general purpose exceptions.
3. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.

Week-9	

1. Add an attribute named color to your Rectangle objects and modify draw rectangle so that it uses the color attribute as the fill color.
2. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
3. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.

Week-10	

1. Write a python code to read a phone number and email-id from the user and validate it for correctness.
2. Write a Python code to merge two given file contents into a third file.
3. 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.

Week-11	

1. Write a Python code to Read text from a text file, find the word with most number of occurrences
2. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.
3. Import numpy, Plotpy and Scipy and explore their functionalities.

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.Super charged Python: Take your code to the next level, Overland
2. Learning Python, MarkLutz, 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, GowrishakarS,VeenaA,CRCPress
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 ,Dream techpress
7. Introduction to Python, Gowrishankar S,VeenaA., CRCPress

II B.TECH I SEMESTER SYLLABUS

MATHEMATICAL AND STATISTICAL FOUNDATIONS

II B. TECH- ISEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7BS03	BSC	3	0	0	3	40	60	100
Contact Classes:48	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 48		

COURSE OBJECTIVES

The course should enable the students to:

1. The Number Theory basic concepts useful for cryptography etc.
2. The theory of Probability, and probability distributions of single random variables.
3. The sampling theory and testing of hypothesis and making inferences.
4. The curve fitting, correlation and regression for the given data.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Apply the number theory concepts to cryptography domain.
2. Apply the concepts of probability and distributions to some case studies.
3. Correlate the material of one unit to the material in other units.
4. Resolve the potential misconceptions and hazards in each topic of study.
5. Fit the curve, correlation and regression for the given data.

UNIT - I	BASICS OF NUMBER THEORY	CLASSES: 10

Greatest Common Divisors and Prime Factorization: Greatest common divisors The Euclidean algorithm The fundamental theorem of arithmetic Factorization of integers and the Fermat numbers.
Congruences: Introduction to congruences Linear congruences.

UNIT - II	RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS	CLASSES: 8

Concept of a Random Variable Discrete Probability Distributions Continuous Probability Distributions Mean of a Random Variable Variance of a Random Variable
Discrete Probability Distributions: Binomial Distribution Poisson distribution.

UNIT - III	CONTINUOUS DISTRIBUTIONS AND SAMPLING	CLASSES: 10

Uniform Distribution Normal Distribution Areas under the Normal Curve Applications of the Normal Distribution Normal Approximation to the Binomial Distributions.
Fundamental Sampling Distributions: Random Sampling Some Important Statistics Sampling Distributions Sampling Distribution of Means Central Limit Theorem.

UNIT - IV	TESTS OF HYPOTHESES (LARGE AND SMALL SAMPLES)	CLASSES: 10

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.

UNIT - V	APPLIED STATISTICS	CLASSES: 10

Curve fitting by the method of least squares Fitting of straight lines Second degree parabolas and Exponential curves Correlation and Regression Rank correlation.

TEXT BOOKS

1. Kenneth H. Rosen, Elementary Number Theory & its Applications, sixth edition, Addison Wesley, ISBN 978 0-321-50031-1.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
3. S C Gupta and V K Kapoor, Fundamentals of Mathematical Statistics, Khanna publications

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. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

Web references:

1. 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/

COMPUTER ORGANIZATION AND ARCHITECTURE

II B.TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS08	PCC	3	0	0	3	40	60	100
Contact Classes:48	Tutorial Classes:0	Practical Classes: Nil				Total Classes: 48		

COURSE OBJECTIVES

The course should enable the students to:

1. The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
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.
3. Topics include computer arithmetic, instruction set design, microprogrammed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

COURSE OUTCOMES

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

1. Understand the basics of instruction sets and their impact on processor design.
2. Demonstrate an understanding of the design of the functional units of a digital computer system.
3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
4. Design a pipeline for consistent execution of instructions with minimum hazards.
5. Recognize and manipulate representations of numbers stored in digital computers

UNIT – I	BOOLEAN ALGEBRA AND LOGIC GATES	CLASSES: 10

Boolean Algebra and Logic Gates: Binary codes, Binary Storage and Registers, Binary logic.
Digital logic gates. Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation
Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

UNIT-II	COMBINATIONAL AND SEQUENTIAL LOGIC	CLASSES: 8

Combinational Logic: Combinational Circuits, Analysis procedure Design procedure, Binary AdderSubtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers,HDL for combinational circuits.
Sequential Logic: 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.

UNIT-III	REGISTER TRANSFER LANGUAGE AND MICRO OPERATIONS	CLASSES: 10

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.
Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt

UNIT-IV	MICRO PROGRAMMED CONTROL AND CPU	CLASSES: 10

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.
Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.
Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT-V	INPUT-OUTPUT ORGANIZATION AND MEMORY ORGANIZATION	CLASSES: 10

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

TEXT BOOKS

1. Digital Design – M. Morris Mano, Third Edition, Pearson/PHI.
2. Computer System Architecture – M. Morris Mano, Third Edition, Pearson/PHI

REFERENCE BOOKS

1. Switching and Finite Automata Theory, ZVI. Kohavi, Tata Mc Graw Hill.
2. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
4. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson

Web references:

1. 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/

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS09	PCC	3	0	0	3	40	60	100
Contact Classes:48	Tutorial Classes:Nil	Practical Classes: Nil				Total Classes:48		

COURSE OBJECTIVES

The course should enable the students:

1. To Understand the basic object-oriented programming concepts and apply them in problem solving.
2. To Illustrate inheritance concepts for reusing the program.
3. To Demonstrate multitasking by using multiple threads and event handling
4. To Develop data-centric applications using JDBC.
5. To Understand the basics of java console and GUI based programming

COURSE OUTCOMES

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

1. Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
2. Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords
3. Use multithreading concepts to develop inter process communication.
4. Understand the process of graphical user interface design and implementation using AWT or swings.
5. Develop applets that interact abundantly with the client environment and deploy on the server.

UNIT – I	Object Oriented Thinking and Java Basics	CLASSES: 10

Introduction to Object-Oriented Programming (OOP) Concepts: The need for the OOP paradigm, a summary of OOP concepts, and coping with complexity through abstraction mechanisms.

Java Basics and Program Structure: The history of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, and type conversion. Writing a simple Java program structure.

Core Java Constructs: Concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, method and constructor overloading, parameter passing, recursion, nested and inner classes. Exploration of the String class.

UNIT - II	INHERITANCE, PACKAGES AND INTERFACES	CLASSES: 8

Inheritance and Its Types: Hierarchical abstractions, base class, subclass, subtype, substitutability, forms of inheritance such as specialization, specification, construction, extension, limitation, and combination. Benefits and costs of inheritance. Member access rules, super keyword usage, polymorphism, and method overriding.

Working with Packages: Defining, creating, and accessing packages, understanding CLASSPATH, importing packages.

Interfaces in Java: Differences between classes and interfaces, defining and implementing an interface, applying interfaces, variables in interfaces, and extending interfaces.

UNIT - III	EXCEPTION HANDLING AND MULTITHREADING	CLASSES: 10

Exception Handling Concepts: The benefits of exception handling, exception hierarchy in Java, and the usage of try, catch, throw, throws, and finally. Built-in exceptions and the creation of custom exception subclasses.

Multithreading Concepts: The differences between multithreading and multitasking, thread lifecycle, creating threads, thread priorities, synchronizing threads, inter-thread communication, thread groups, and daemon threads.

UNIT – IV	EXPLORING STRING CLASS, OBJECT CLASS, JAVA.UTIL PACKAGE, AND EVENT HANDLING	CLASSES:10

Exploring Core Java Classes: Detailed exploration of the String class and Object class, and exploration of the java.util and java.io packages.

Event Handling in Java: Handling events, event sources, event classes, and event listeners, along with the delegation event model. Handling mouse and keyboard events, and understanding adapter classes.

Layout Management and Graphics: Introduction to layout managers such as Border, Grid, Flow, Card, and GridBag layouts. Basic graphics handling in Java.

UNIT – V	SWING	CLASSES: 10

Introduction to Swing: The limitations of AWT compared to Swing, understanding MVC architecture, and exploring Swing components and containers.

Swing Controls and Layouts: Components such as JFrame, JComponent, JLabel, ImageIcon, JTextField, JButton, JCheckBox, JRadioButton, JList, JComboBox, tabbed panes, scroll panes, trees, and tables.

Menu and Popup Handling in Swing: Understanding the basics of menus, JMenuBar, JMenu, JMenuItem, JCheckBoxMenuItem, JRadioButtonMenuItem, JSeparator, and creating popup menus.

TEXT BOOKS

1. Java the complete reference, 13th edition, Herbert schildt, Dr. Denny Coward, Mc Graw Hill.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

REFERENCE BOOKS

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, third edition, T. Budd, Pearson education.
3. Introduction to Java programming, Y. Daniel Liang, Pearson education.
4. An introduction to Java programming and object-oriented application development, R.A. Johnson-Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education
7. Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.
8. Java and Object Orientation, an introduction, John Hunt, second edition, Springer.
9. Maurach's Beginning Java2 JDK 5, SPD.

Web references
1. https://www.oracle.com/java/ - Official Java Documentation 2. https://www.w3schools.com/java/ - W3Schools Java Tutorials 3. https://www.geeksforgeeks.org/java/ - Geeks for Geeks Java Programming Articles
E -Text Books
4. https://www.e-booksdirectory.com/details.php?ebook=10166 5. https://www.e-booksdirectory.com/details.php?ebook=10168 6. https://www.e-booksdirectory.com/details.php?ebook=10169
MOOCS Course
1. https://swayam.gov.in/ 2. https://onlinecourses.nptel.ac.in/

SOFTWARE ENGINEERING

II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS11	PCC	3	0	0	3	40	60	100
Contact Classes:48	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 48		

COURSE OBJECTIVES

The course should enable the students to:

1. The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
2. Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Ability to translate end-user requirements into system and software requirements, using e.g.
2. UML, and structure the requirements in a Software Requirements Document (SRD).
3. Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
4. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

UNIT-I	Introduction to Software Engineering and Process Models	Classes: 10

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.

A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI).

Process models: The waterfall model, Spiral model, Incremental Process Models, Concurrent Models, Component based development and Agile Development.

UNIT-II	Software Requirements and Requirements Engineering Process	Classes: 8

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

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

UNIT-III	Design Engineering and Architectural Design	Classes: 10

Design Engineering: Design process and design quality, design concepts, the design model.

Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, use case diagrams, class diagrams, sequence diagrams, collaboration diagrams, activity diagrams and component diagrams.

UNIT-IV	Software Testing Strategies and Metrics	Classes: 10

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.

Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT-V	Risk Management and Quality Management	Classes: 10

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, 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. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.
4. Fundamentals of Software Engineering-Rajib Mall, PHI.

DATABASE MANAGEMENT SYSTEM

II B. TECH- I SEMESTER

Course Code	Category	Hours/ Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS13	PCC	3	0	0	3	40	60	100
Contact Classes:48	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 48		

COURSEOBJECTIVES

The course should enable the students:

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

COURSEOUTCOMES

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

1. Gain knowledge of fundamentals of DBMS, database design and normal forms
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiarity with database storage structures and access techniques.

UNIT-I	Introduction to Database Systems and Database Design	CLASSES: 10

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.

Introduction to Database Design: 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.

UNIT-II	Relational Model and Relational Algebra	CLASSES:8

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.

Relational Algebra and Calculus:

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT-III	SQL Queries, Constraints, and Triggers	CLASSES:10

SQL QUERIES and CONSTRAINTS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL.

Triggers and Active Databases:

Introduction to triggers, active databases, and their use cases..

Schema Refinement: 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.

UNIT-IV	Transaction Management and Concurrency Control	CLASSES:10

Transaction Concept: Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation.

Concurrency Control: Testing for serialize ability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity.

Recovery and Atomicity: Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT-V	Data Storage, Indexing, and File Organization	CLASSES:10

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.

B+ Trees: A dynamic index structure, Indexed Sequential Access Methods (ISAM), and their applications.Curve fitting by the method of least squares – Fitting of straight lines –Second degree parabolas and Exponential curves – Correlation and Regression– Rank correlation.

TEXTBOOKS

1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill

REFERENCE BOOKS

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

Web references

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.sosmath.com/
3. https://www.wolframalpha.com/

E -Text Books

1. Database System Concepts (5th Edition)
2. Link: https://www.db-book.com
3. Database Management Systems (3rd Edition)
4. Link: https://www.acs.com
5. Fundamentals of Database Systems
6. Link: https://www.pearson.com

MOOCS Course

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

COMPUTATIONAL MATHEMATICS LAB

II B.TECH-I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7BS07	BSC	0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes:24		

Pre-requisites: Matrices, Iterative methods and ordinary differential equations

COURSEOBJECTIVES

The course should enable the students to:

1. Solve problems of Eigen values and Eigen Vectors using Python/MATLAB.
2. Solution of Algebraic and Transcendental Equations using Python/MATLAB
3. Solve problems of Linear system of equations
4. Solve problems of First-Order ODEs Higher order linear differential equations with constant coefficients

COURSEOUTCOMES

The course should enable the students to:

1. Develop the code to find the Eigen values and Eigen Vectors using Python/MATLAB.
2. Develop the code find solution of Algebraic and Transcendental Equations and Linear system of equations using Python/MATLAB
3. Write the code to solve problems of First-Order ODEs Higher order linear differential equations with constant coefficients

Week-1	EIGEN VALUES AND EIGENVECTORS

Finding real and complex Eigen values.

Week-2	EIGEN VECTORS

Finding Eigen vectors.

Week-3	BISECTION METHOD

Root of a given equation using Bisection method.

Week-4	NEWTON RAPHSON METHOD

Root of a given equation Newton Raphson Method.

Week-5	JACOBI'S ITERATION METHOD

Solution of given system of linear equations using Jacobi's method

Week-6	GAUSS-SEIDAL ITERATION METHOD
Solution of given system of linear equations using Gauss-Seidal method	
Week-7	**EXACT AND NON-EXACT EQUATIONS.**
Solving exact and non-exact equations	
Week-8	**EXPONENTIAL GROWTH/DECAY, NEWTON'SLAW OF COOLING.**
Solving exponential growth/decay and Newton's law of cooling problems	
Week-9	**EXACT AND NON-EXACT EQUATIONS**
Write a program to check whether a given first-order ODE is exact or not. 1. If non-exact, implement an integrating factor to convert it to an exact equation. 2. Solve the exact equation and output the solution.	
Week-10	**SOLVING EXACT AND NON-EXACT ODES**
1. Program to solve exact first-order differential equations numerically or symbolically. 2. Program to solve a given non-exact equation after making it exact using an integrating factor.	
Week-11	**APPLICATIONS: EXPONENTIAL GROWTH/DECAY, NEWTON'S LAW OF COOLING**
1. Write programs to solve problems based on exponential growth and decay models. 2. Implement a program to solve Newton's law of cooling and predict temperature at given times.	
Week-12	**HIGHER-ORDER LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS**
1. Program to solve homogeneous higher-order linear ODEs with constant coefficients. 2. Program to solve non-homogeneous higher-order linear ODEs (using methods like undetermined coefficients or variation of parameters).	

Text Books

1. MATLAB and its Applications in Engineering, Rajkumar Basal,Ashok Kumar Geo,Manoj Kumar Sharma, Pearson publication.
2. Kenneth A.Lambert,The fundamentals of Python:First Programs,2011,CengageLearnings.
3. Think Python First Edition,byAllenB.Downey,Oriellypublishing.
4. Introduction to Python Programming,William Mitchell,PovelSolin,MartinNovak etal., NCLab Public Computing, 2012.

Introduction to Python Programming,©JacobFredslund,2007

Reference Books

1. An Introduction to Python,JohnC.Lusth,The University of Alabama,2011.
2. Introduction to Python,©DaveKuhlman,2008.

Web References

1. https://guides.lib.uchicago.edu/cam
2. https://www.simonsfoundation.org/flatiron/center-for-computational-mathematics/
3. https://www.nist.gov/itl/math

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	Total
A7CS10	PCC	0	0	2	1	40	60	100
Contact Classes:Nil	Tutorial Classes:Nil	Practical Classes:24				Total Classes:24		

COURSEOBJECTIVES:

The course should enable the students:

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:

At the end of the course the students are:

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.

LIST OF EXPERIMENTS

Week-1	BASIC PROGRAMS

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.

Week-2	(OPERATIONS)

1. 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

Week-3	APPLETS

A) Develop an applet in Java that displays a simple message.
B) Develop an appletin Java that receives an integer in one text field, and computes its factorial

Week-4	EXCEPTIONS

1. Value and returns it in another text field,when the button named“Compute” is clicked.

2. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1andNum2.The division of Num1and 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.

Week-5	MULTI-THREADING

1. Write a Java program that implements a multi-thread application that has three threads. First thread generates 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.

Week-6	LINKED LISTS

1. Write a Java program for the following: Create a doubly linked list of elements.

A) Delete a given element from the above list.
B) Display the contents of the list after deletion.

Week-7	BUTTONS

Write a Java program that simulates atrafficlight.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.

Week-8	FUNCTIONS

1. 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.
2.Suppose that at able named Table .txtisstoredina 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.

Week-9	EVENT HANDLING

1. Write a java program to display het able using Labels in Grid Layout.

2. 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).

Week-10	HASH TABLES

1. Write a Java program that loads names and phone numbers from at ext file where the datais organized as one line per record and each field in a record are separated bya tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint:usehash tables).

Week-11	INTER THREAD COMMUNICATION

1.Write a Java program that correctly implements the producer– consumer problem using the Concept of inter thread communication.

Week-12	FILE HANDLING

1.WriteaJavaprogram to list all the files in a directory including the files present in all its Sub directories.

Text Books

Java for Programmers,P.J.DeitelandH.M.Deitel,10th Edition Pearson education.

Thinking in Java, BruceEckel,Pearson Education.

Reference Books

1. Java Programming,D.S.Malik and P.S.Nair,Cengage Learning.
2.CoreJava, Volume1,9thedition, CayS.HorstmannandGCornell, Pearson

Web References

1. https://www.cengage.co.in/book-list/ebook/object-oriented-programming-using-java-mu?.com
2.https://horstmann.com/corejava/?.com

SOFTWARE ENGINEERING LAB

II B.TECH I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS12	PCC	0	0	2	1	40	60	100
Contact Classes:Nil	Tutorial Classes:Nil	Practical Classes:24				Total Classes:24		

COURSEOBJECTIVES:

The course should enable the students :

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.

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Ability to translate end-user requirements into system and software requirements
2. Ability to generate a high-level design of the system from the software requirements
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.

LIST OF EXPERIMENTS

Week-1	**Development of Problem Statements**
Passport Automation System, Book Bank	
Week-2	**Preparation of Software Requirement Specification (SRS)**
Online Exam Registration, Stock Maintenance System	
Week-3	**Preparation of High-Level Design (HLD) Documents**
Online Course Reservation System, E-ticketing	
Week-4	**Preparation of Low-Level Design (LLD) and Test Planning**
Software Personnel Management System, Credit Card Processing	
Week-5	**Preparation of Software Configuration Management (SCM) and Risk Management Documents**
E-book Management System, Recruitment System	
Week-6	**Study and Usage of Design Phase CASE Tools**
Passport Automation System, Book Bank	
Week-7	**Performing Design using CASE Tools**
Online Exam Registration, Stock Maintenance System	

Week-8	Development and Execution of Unit Testing Test Cases
Online Course Reservation System, E-ticketing	
Week-9	**Development and Execution of Integration Testing Test Cases**
Software Personnel Management System, Credit Card Processing	
Week-10	**Development and Execution of White Box Testing Techniques**
E-book Management System, Recruitment System	
Week-11	**Development and Execution of Black Box Testing Techniques**
Passport Automation System, Book Bank	
Week-12	**Preparation of Final Testing Report and Project Review**
All projects - compile documentation and present final reports	

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 Rambaugh, Ivar Jacobson, Pearson Education.

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

Web References

1. http://www.sanfoundry.com/c-programming-examples
2. http://www.geeksforgeeks.org/c
3. http://www.cprogramming.com/tutorial/c

DATABASE MANAGEMENT SYSTEMS LAB

II B.TECH I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS14	PCC	0	0	2	1	40	60	100
Contact Classes:Nil	Tutorial Classes:Nil	Practical Classes:				Total Classes:		

COURSE OBJECTIVES

The course should enable the students to:

1. Apply the basic concepts of Database Systems and Applications.
2. Use the basics of SQL and construct queries using SQL in database creation and interaction
3. Design a commercial relational database system (Oracle,MySQL) by writing SQL using the system.
4. Analyze and Select storage and recovery techniques of database system.

COURSE OUTCOMES

At the end of the course the students are able to:

1. Apply the basic concepts of Database Systems and Applications.
2. Develop an ER model for a given database.
3. Use the basics of SQL and construct queries using SQL in database creation and interaction.
4. Design a commercial relational database system (Oracle,MySQL)by writing SQL using the system.
5. Analyze and Select storage and recovery techniques of database system.

LIST OF EXPERIMENTS

WEEK- 1 **DDL COMMANDS**

Creation of Tables using SQL-Overview of using SQL tool and Data types in SQL

a) Altering Tables b) Dropping Tables

WEEK- 2 **CREATE TABLE WITH PRIMARY KEY AND FOREIGNKEY & DMLCOMMANDS**

CreatingTables (along with Primary and Foreignkeys),Practicing DMLcommands-

a) Insert b) Update c) Delete

WEEK- 3 **SELECTION QUERIES**

Practicing Select command using following operations

a) AND,OR b) ORDERBY c) BETWEEN d) LIKE e)Apply CHECK constraint

WEEK- 4 **AGGREGATE FUNCTIONS AND VIEWS**

Practice Queries using following functions

a) COUNT b) SUM c)AVG d)MAX e)MIN

Apply constrain tonaggregation using

a)GROUPBY b)HAVING VIEWS Create,Modify and Drop

WEEK- 5 **NESTED QUERIES**

Practicing Nested Queries using UNION,

a) INTERSECT b) CONSTRAINTS c)IN

WEEK- 6	**CO-RELATED NESTED QUERIES**
PracticingCo – Related Nested Queries using a) EXISTS b)NOTEXISTS c)ANY d)ALL	
WEEK- 7	**JOIN QUERIES**
Practicing Join Queries using a)Innerjoin b) Outerjoin c)Equijoin d)Naturaljoin	
WEEK- 8	**TRIGGERS**
Practicing Triggers Creation of trigger,Insertion using trigger, Deletion using trigger, Updating using trigger.	
WEEK- 9	**PROCEDURES**
Procedures-Creation of Stored Procedures, Execution of Procedure, and Modification of Procedure	
WEEK- 10	**CURSORS**
Cursors-Declaring Cursor,Opening Cursor, Fetching the data,closing the cursor	
WEEK- 11	**PL/SQLPart1**
PracticePL/SQL a) Block structure b)Variables c) data types	
WEEK- 12	**PL/SQLPart2**
PracticePL/SQL a) Operators b)Controlstructures	
Casestudy1: CollegeManagement **Case study 2:**An Enterprise/Organization **Casestudy3**:LibraryManagementsystem **Case study 4:** Sailors and shipment	

TEXT BOOKS

1. Database Management Systems, Raghurama Krishnan,JohannesGehrke,TataMcGrawHill, 3rd Edition
2. Database System Concepts,Silberschatz,Korth,McGrawHill,5thedition.

REFERENCE BOOKS

1. Database Systems design, Implementation, and Management, PeterRob & Carlos Coronel7th Edition.
2. Fundamentals of Database Systems,Elmasri Navrate,Pearson Education
3. Introduction to Database Systems,C.J.Date, Pearson Education
4. Oracle for Professionals,TheXTeam,S.ShahandV.Shah,SPD.
5. Database Systems Using Oracle:A Simplified guide toSQLandPL/SQL,Shah,PHI.
6. Fundamentals of Database Management Systems, M.L.Gillenson,WileyStudentEdition.

WEB TECHNOLOGY LAB

II B.TECH-I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS53	PCC	0	0	2	1	-	100	100

COURSEOBJECTIVES

1. Introduce students to the basic concepts of web technologies such as HTML, CSS, JavaScript, and Bootstrap.
2. Enable students to design and develop static and responsive web pages.
3. Familiarize students with client-side scripting using JavaScript for interactivity.
4. Demonstrate the use of CSS layouts (Flexbox, Grid) and Bootstrap components for responsive design.
5. Prepare students with the foundational skills required for advanced courses in Full Stack Development.

COURSEOUTCOMES

The Students can able to learn:

1. Develop structured and semantic web pages using HTML.
2. Apply CSS styling and layouts (Flexbox/Grid) to enhance the presentation of web pages.
3. Implement JavaScript for dynamic behaviour and form validation.
4. Design responsive web interfaces using Bootstrap framework and components.
5. Integrate HTML, CSS, JavaScript, and Bootstrap to create interactive and responsive websites.

Week 1

1. Create a webpage with headings, paragraphs and links using HTML.
2. Design a student registration form with different input types (text, password, radio, checkbox, dropdown).

Week 2

1. Create a webpage that displays a nested list of programming languages (Frontend and Backend categories with their respective items).
2. Create a webpage that displays at least three images with different sizes and add alternative text (alt) for each image. Also, make one of the images a clickable link that opens another webpage.

Week 3

1. Create a timetable webpage using HTML tables with proper row/column spans.
2. Create a webpage that displays another webpage inside it using an <iframe>. The iframe should be of size 600 × 400 pixels and should display the website https://www.wikipedia.org.

Week 4

1. Create a webpage that applies internal, inline, and external CSS to style a webpage.
2. Design a personal profile/portfolio webpage using CSS (backgrounds, borders, fonts, colors).

Week 5

1. Design a webpage where a box changes its background color and size when the mouse hovers over it.
2. Design a webpage where all the hyperlinks (<a> tags) are styled with custom colors, no underline, and change appearance when visited or active.

Week 6

1. Create a webpage layout with a header, navigation bar, content section, and footer using CSS Flexbox.
2. Design a simple image gallery webpage where images are displayed in rows and columns using HTML tables and basic CSS styling (borders, spacing, hover effect).

Week 7

1. Create a webpage that shows a random image (from a set of 5 images) every time a button is clicked.
2. Write a program to display the multiplication table of a number entered by the user.

Week 8

3. Write a JavaScript program to validate form fields (email, password length, mobile number).
4. Develop a webpage to display the current date and time dynamically using JavaScript.

Week 9

1. Implement a simple JavaScript calculator (addition, subtraction, multiplication, division).
2. Create an image slider or simple animation using JavaScript DOM manipulation.

Week 10

1. Create a webpage that shows a success alert message and a styled button using Bootstrap components.
2. Create a webpage using Bootstrap that displays different types of buttons (primary, secondary, success, danger, warning, info, light, dark) along with badges showing notification counts.

Week 11

1. Write an HTML program to design a responsive navigation bar using Bootstrap. The navbar should contain a brand name/logo and at least three menu items (e.g., Home, About, Contact). The menu should collapse into a hamburger menu on smaller screens (mobile view).
2. Write an HTML program to design a webpage using Bootstrap components. The page should display at least two cards (each with an image, title, description, and button).

Week 12

1. Develop a responsive portfolio/e-commerce product page using Bootstrap grid system.
2. Mini Project – Build a responsive website (personal portfolio / college event page / small e-commerce site) integrating HTML, CSS, JavaScript, and Bootstrap.

Text Books

1. Duckett, Jon. *HTML & CSS: Design and Build Websites*. Wiley, 2011.
2. Duckett, Jon. *JavaScript and jQuery: Interactive Front-End Web Development*. Wiley, 2014.
3. Haverbeke, Marijn. *Eloquent JavaScript: A Modern Introduction to Programming*. 3rd ed. No Starch Press, 2018.

Reference Books

1. Bootstrap Team. *Bootstrap 5 Documentation*. https://getbootstrap.com/
2. Mozilla Developer Network (MDN). *HTML, CSS, and JavaScript Web Docs*. https://developer.mozilla.org/
3. Eduonix Learning Solutions. *Learning Bootstrap 4 by Building Projects: Develop 5 Real-World Bootstrap 4.x Projects from Scratch*. Packt Publishing, 2018.

II B.TECH II SEMESTER SYLLABUS

DISCRETE MATHEMATICS

II B. TECH- II SEMESTER:

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A7CS07	PCC	3	0	0	3	40	60	100
Contact Classes-50	Tutorial Classes- Nil	Practical Classes-Nil				Total Classes-50		

COURSE OBJECTIVES

The course should enable the students :

1. To familiarize students with **mathematical logic**, including statements, connectives, normal forms, and inference techniques for propositional and predicate calculus.
2. To develop an understanding of **set theory concepts**, relations, orderings, and functions for representing and analyzing discrete structures.
3. To analyze and apply **algebraic structures** such as semigroups, monoids, lattices, and Boolean algebra in solving computational problems.
4. To build competency in **counting principles, permutations, combinations, and binomial theorems** for solving combinatorial and enumeration problems.
5. To explore **graph theory fundamentals** including trees, spanning trees, planar graphs, circuits, and coloring for modeling and solving real-world computational challenges.

COURSE OUTCOMES

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

1. Apply rules of inference and predicate calculus to analyze and solve logical problemsApply rules of inference and normal forms to solve logical problems.
2. Use set theory, relations, and functions to represent and evaluate discrete structures..
3. Analyze algebraic structures such as semigroups, monoids, lattices, and Boolean algebra for computational applications.
4. Apply counting principles, permutations, and combinations to solve combinatorial problems
5. Evaluate and apply graph theory concepts, including trees, circuits, and graph coloring, to model real-world problems

UNIT-I	MATHEMATICAL LOGIC	Classes :10

Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT-II	SET THEORY	Classes-10

Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures,Relations and Ordering, Functions.

UNIT-III	ALGEBRAICSTRUCTURES	Classes:10

Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.

UNIT-IV	ELEMENTARY COMBINATORICS	Classes:10

Elementary Combinatorics: 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.

UNIT-V	GRAPH THEORY	Classes:10

Graph Theory: 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 l. Mott, Abraham Kandel, Teodore 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

WEB REFERENCES

1.https://ocw.mit.edu/courses/6-042j-mathematics-for-computer-science-fall- 2010/?utm_source=chatgpt.com
2. https://nptel.ac.in/courses/106/104/106104128/
3. https://web.stanford.edu/class/cs103x/?utm_source=chatgpt.com
4. http://discrete.openmathbooks.org/dmoi4.html

E-TEXT BOOKS

1. https://discrete.openmathbooks.org/pdfs/dmoi4.pdf?utm_source=chatgpt.com
2. https://www.cis.upenn.edu/~jean/discmath-root-b.pdf?utm_source=chatgpt.com

MOOC COURSE:

1. https://onlinecourses.nptel.ac.in/noc20_cs82/preview?utm_source=chatgpt.com
2. https://nptel.ac.in/courses/106108227?utm_source=chatgpt.com
3. https://www.coursera.org/specializations/discrete-mathematics?utm_source=chatgpt.com
4. https://www.coursera.org/learn/discrete-mathematics?utm_source=chatgpt.com
5. https://nptel.ac.in/courses/106103205?utm_source=chatgpt.com

OPERATING SYSTEMS

II B. TECH- II SEMESTER

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS15	PCC	3	0	0	3	40	60	100
Contact Classes-50	Tutorial Classes-Nil	Practical Classes-Nil				Total Classes-50		

COURSEOBJECTIVES:

The course should enable the students to:

1. **Understand** the fundamental concepts, structures, and services of operating systems, including process and thread management.
2. **Analyze** CPU scheduling, system calls for process management, and deadlock handling methods.
3. **Explain and apply** synchronization techniques and interprocess communication mechanisms for reliable process coordination.
4. **Explore** memory management and virtual memory techniques for efficient resource utilization.
5. **Understand and use** file system interfaces, operations, and related system calls for data organization and access.

COURSEOUTCOMES:

At the end of the course, the student will:

1. **Describe** the architecture, components, and services of operating systems, and **apply** process/thread concepts in simple scenarios.
2. **Evaluate** CPU scheduling algorithms, **use** system calls for process management, and **analyze** strategies for preventing and recovering from deadlocks.
3. **Implement** synchronization mechanisms such as semaphores and monitors and **analyze** interprocess communication methods.
4. **Apply** memory management strategies (paging, segmentation, demand paging) and **assess** virtual memory performance.
6. **Develop** programs for file handling using system calls and **demonstrate** understanding of file system structures and protection methods.

UNIT-I	OPERATING SYSTEM - INTRODUCTION	CLASSES: 10

Operating System: Introduction, Structures Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT-II	CPU SCHEDULING , DEADLOCKS	CLASSES: 10

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

Deadlocks-System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

UNIT-III	PROCESSMANAGEMENTANDSYNCHRONIZATION	CLASSES:

Process Management and Synchronization: The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory

UNIT-IV	MEMORY MANAGEMENT AND VIRTUAL MEMORY	CLASSES: 10

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.

UNIT-V	FILESYSTEMINTERFACEANDOPERATIONS	CLASSES: 10

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.

TEXTBOOKS

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.

REFERENCEBOOKS

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

Web References

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/
2. https://nptel.ac.in/courses/106106144
3. https://www.geeksforgeeks.org/operating-systems/
4. https://www.tutorialspoint.com/operating_system/index.htm
5. https://www.javatpoint.com/operating-system

E-Text Books

1. https://pages.cs.wisc.edu/~remzi/OSTEP/
2. https://codex.cs.yale.edu/avi/os-book/OS9/
3. https://nptel.ac.in/courses/106106144
4. https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf

MOOC Course

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/
2. https://onlinecourses.nptel.ac.in/noc22_cs33/preview
3. https://www.coursera.org/learn/os-power-user
4. https://www.udemy.com/course/operating-systems-from-scratch/
5. https://www.edx.org/course/introduction-to-operating-systems

ALGORITHMS DESIGN AND ANALYSIS

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS17	PCC	3	0	0	3	40	60	100
Contact Classes: 50	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 50		

COURSE OBJECTIVES

The course should enable the students to:

1. Develop proficiency in evaluating algorithms using asymptotic notations, including best-, average-, and worst-case time/space complexities, and solving related recurrence relations.
2. Master various algorithmic strategies—divide-and-conquer, greedy, dynamic programming, backtracking, and branch-and-bound—identifying suitable use cases and demonstrating their application.
3. Critically assess and contrast different algorithms in terms of efficiency, scalability, and correctness through rigorous analytical reasoning and empirical evaluation.
4. Differentiate between tractable (polynomial-time) and intractable (super-polynomial or exponential-time) problems;
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.

COURSE OUTCOMES

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

1. Able to Apply space and time complexity analysis using asymptotic notations.
2. Able to Design divide-and-conquer algorithms and critically assess their runtime and space trade-offs.
3. Able to Device backtracking and dynamic programming solutions.
4. Able to Apply greedy methods and graph traversal algorithms
5. Able to Analyse and Design branch-and-bound algorithms for NP-hard problems

UNIT- I	DIVIDEAND CONQUER	CLASSES: 10

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation, and Little oh notation.

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

UNIT - II	DISJOINT SETS , BACKTRACKING	CLASSES: 10

Disjoint Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heapsort

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

UNIT - III	DYNAMIC PROGRAMMING	CLASSES: 10

Dynamic Programming: General method, applications- Optimal binary search tree, 0/1 knapsack problem, All pairs shortest path problem, Traveling salesperson problem, Reliability design.

UNIT - IV	GREEDY METHOD BASICTRAVERSALANDSEARCHTECHNIQUES	CLASSES: 10

Greedy method: General method, applications Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected components, Biconnected components.

UNIT - V	BRANCH AND BOUND , NP-HARD AND NP-COMPLETE PROBLEMS	CLASSES:10

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

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

TEXT BOOKS

Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni, and Rajasekaran, University Press.

REFERENCE BOOKS

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.

Web References

1. https://nptel.ac.in/courses/106106183
2. https://www.geeksforgeeks.org/fundamentals-of-algorithms/
3. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
4. https://www.javatpoint.com/design-and-analysis-of-algorithms
5. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-introduction-to-algorithms-sma-5503-fall-2005/

E-Text Books

1. https://www.cs.princeton.edu/~wayne/kleinberg-tardos/pdf/
2. https://www.geeksforgeeks.org/fundamentals-of-algorithms/
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-introduction-to-algorithms-sma-5503-fall-2005/
4. https://nptel.ac.in/courses/106106183
5. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.ht

MOOC Course

1. https://onlinecourses.nptel.ac.in/noc22_cs34/preview
2. https://www.coursera.org/learn/algorithmic-toolbox
3. https://www.edx.org/course/algorithm-design-and-analysis
4. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-introduction-to-algorithms-sma-5503-fall-2005/
5. https://www.udemy.com/course/design-and-analysis-of-algorithms/

COMPUTER NETWORKS

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS18	PCC	3	0	0	3	40	60	100

Contact Classes-50	Tutorial Classes-Nil	Practical Classes-Nil	Total Classes-50

COURSE OBJECTIVES

The course should enable the students to:

1. **Understand** the fundamentals of computer networks, including protocols, network structures, and packet/circuit switching.
2. **Explain** the application layer concepts, network application architectures, and implement basic socket programming.
3. **Analyze** transport layer protocols (TCP/UDP), reliable data transfer methods, and congestion control mechanisms.
4. **Understand and apply** network layer concepts including IP addressing, routing algorithms, and intra/inter-domain routing protocols.
5. **Explore** link layer services, error detection/correction techniques, LAN protocols, VLANs, MPLS, and wireless networking.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the ISO-OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.
5. Understanding working of the protocols through traces captured by a packet sniffer.

UNIT-I	INTRODUCTION TO PROTOCOLS	Classes: 10

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.

UNIT-II	APPLICATION LAYER	Classes: 10

Application Layer: 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.

UNIT-III	TRANSPORT LAYER	Classes: 10

Transport Layer: 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.

UNIT-IV	NETWORKLAYER	Classes: 10

Network Layer: Data and Control plane, 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 DistanceVector (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.

UNIT-V	LINK LAYER	Classes:

The Link Layer: 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.

Text Books

1. Computer Networking: A Top-Down Approach – James F.Kurose, Keith W. Ross, Pearson
2. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson/PHI

Reference Books

1. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

Web References

1. https://nptel.ac.in/courses/106106144
2. https://www.geeksforgeeks.org/computer-network-tutorials/
3. https://www.tutorialspoint.com/computer_fundamentals/computer_networks.htm
4. https://www.javatpoint.com/computer-network-tutorial
5. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-829-computer-networks-fall-2002/

E-Text Books

1. https://intronetworks.cs.luc.edu/current2/ComputerNetworks.pdf
2. https://www.tutorialspoint.com/computer_network/computer_network_tutorial.pdf
3. https://www.geeksforgeeks.org/wp-content/uploads/computer-network.pdf
4. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-829-computer-networks-fall-2002/lecture-notes/
5. https://www.cs.uic.edu/~jbell/CourseNotes/ComputerNetworks.pdf

MOOC Course

1. https://onlinecourses.nptel.ac.in/noc22_cs34/preview
2. https://www.coursera.org/learn/computer-networking
3. https://www.edx.org/course/computer-networking
4. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-829-computer-networks-fall-2002/
5. https://www.udemy.com/course/computer-networks-course/

ARTIFICIAL INTELLIGENCE

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7AI01	PCC	3	0	0	3	40	60	100
Contact Classes: 68	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 68		

COURSE OBJECTIVES

The course should enable the students to:

1. The difference between optimal reasoning vs human like reasoning
2. Understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
3. Different knowledge representation techniques
4. Understand the applications of AI: namely Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

COURSE OUTCOMES

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

1. Apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning.
2. Formulate an efficient problem space for problem solving and Represent knowledge using the appropriate technique
3. Design and develop expert systems using Prolog and solve uncertainty problems.
4. Analyze real world problems and implement using ANN, CNN and AI techniques.
5. Implement the concepts of AI in Healthcare, Robotics and Agriculture

UNIT- I	INTRODUCTION & PROBLEM SOLVING	CLASSES: 14

Introduction: History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications. Problem Solving – State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-Deepening A*, Constraint Satisfaction, Game Playing, Alpha-Beta Pruning

UNIT - II	LOGIC PROGRAMMING & KNOWLEDGE REPRESENTATION	CLASSES: 12

Logic Concepts and Logic Programming: Introduction, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.
Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT - III	EXPERT SYSTEMS & PROLOG	CLASSES: 16

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems Vs Traditional Systems, Application of Expert Systems, **Uncertainty Measure**: Bayesian Belief Networks, Certainty Factor Theory, Dempster - Shafer Theory.
Prolog: Basics of Prolog, Applications of Prolog, Representation, Structure, Backtracking, Type of Prolog, variables in Prolog, Operators in Prolog, Input and Output Terms in Prolog.

UNIT - IV	ANN, CNN	CLASSES: 14

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed Forward Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.
Convolutional Neural Networks: Pooling, Padding, Layers used to build ConvNets,Working of CNN,

Python Libraries used for AI: Tensor flow, Keras, Theano, Pytorch, Scikit Learn, Pandas, Image Classification using CNN with Python

UNIT - V	APPLICATIONS AND CASE STUDIES OF AI	CLASSES: 12

Applications of AI in real world, Future of AI, Benefits and Risks of AI.
Case Studies: *AI in Healthcare*: Medical Imaging and Diagnostic, *AI in Agriculture:* Autonomous Tractors, Controlling Pest Infestations, Soil and Crops Health Monitoring, AI in Robotics: Use of Artificial Intelligence in Robotics

TEXT BOOKS

1. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011
2. Russell, Norvig: Artificial intelligence, A Modern Approach, Pearson Education, Second Edition. 2004

REFERENCE BOOKS

1.Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition 2009.
2.Introduction to Artificial Intelligence by Eugene Charniak, Pearson.
3.Introduction to Artificial Intelligence and expert systems Dan W.Patterson. PHI.
4.Artificial Intelligence by George Fluger rearson fifth edition.

INNOVATION AND ENTREPRENEURSHIP

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7HS08	HSMC	2	0	0	2	40	60	100
Contact Classes-50	Tutorial Classes-Nil	Practical Classes-Nil				Total Classes-50		

COURSE OBJECTIVES

The course should enable the students to:

1. To familiarize on the basic concepts of innovation, entrepreneurship and its importance.
2. To Identify and analyze the process of problem-opportunity identification, market segmentation, and idea generation techniques.
3. To initiate prototype development and understand minimum viable product.
4. To develop initial Business and financial planning and Go-to-Market strategies
5. To impart knowledge on establishing startups, venture pitching and IPR

COURSE OUTCOMES

At the end of this course students will be able to:

1. Understand the entrepreneurship and the entrepreneurial process and its significance in economic development.
2. Assess the problem from an industry perspective and generate solutions using the design thinking principles.
3. Assess market competition, estimate market size, and develop a prototype.
4. Analyze Business and financial planning models and Go-to-Market strategies.
5. Able to build a start-up, register IP and identify funding opportunities.

UNIT-I	Fundamentals of Innovation and Entrepreneurship	Classes: 10

Innovation: Introduction, need for innovation, Features, Types of innovations, innovations in manufacturing and service sectors, fostering a culture of innovation, planning for 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.

Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students 16 industries to choose from), Venture Activity.

UNIT-II	Problem and Customer Identification	Classes: 10

Identification of gap, problem, analyzing the problem from a industry perspective, real-world problems,market and customer segmentation, validation of customer problem fit, Iterating problem-customer fit, Competition and Industry trends mapping and assessing initial opportunity, Porter's Five Force Model. Idea generation, Ideation techniques: Brainstorming, Brain writing, Round robin, and SCAMPER, Design thinking principles, Mapping of solution to problem.

Core Teaching Tool: Several types of activities including: Class, game, Gen AI, 'Get out of the Building' and Venture Activity.

UNIT-III	Opportunity assessment and Prototype development	Classes: 10

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 validation.

Core Teaching Tool: Venture Activity, no-code Innovation tools, Class activity

UNIT- IV	Business & Financial Models	Classes: 10

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.

UNIT-V	Startups and IPR	Classes: 10

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.

Text Books

1. JohnRBessant,JoeTidd, InnovationandEntrepreneurship,4E,Wiley,LatestEdition.
2. AjayBatra,TheStratupLaunchBook-APracticalGuideforLaunchingCustomerCentric Ventures, Wiley, 2020. (For Core Teaching Tool).
3. Entrepreneurship Development and Small Business Enterprises, Poornima M Charantimath, 3E, Pearson, 2018.

Reference Books

1. D.F.KuratkoandT.V.Rao,Entrepreneurship:ASouth-AsianPerspective,CengageLearning, 2013.
2. RobertD.Hisrich,MichaelP.Peters,DeanA.Shepherd,SabyasachiSinha(2020). Entrepreneurship, McGrawHill, 11th Edition.
3. NISP-Brochureinsidepages- startup_policy_2019.pdf

Web References

1. https://www.inc.com/guides/2010/06/defining-your-innovation-strategy.html
2. https://www.entrepreneur.com/encyclopedia/innovation
3. https://www.managementstudyguide.com/entrepreneurship.htm
4. https://www.tutorialspoint.com/entrepreneurship/index.htm
5. https://nptel.ac.in/courses/110/107/110107134/

E-Text Books

1. https://link.springer.com/book/10.1007/978-981-10-7996-1
2. https://www.researchgate.net/publication/324834287_Innovation_and_Entrepreneurship_Textbook
3. https://www.pdfdrive.com/innovation-and-entrepreneurship-pdf-e184942004.html
4. https://www.sciencedirect.com/book/9780128159172/innovation-and-entrepreneurship

MOOC Course

1. https://www.coursera.org/learn/wharton-entrepreneurship
2. https://www.edx.org/course/entrepreneurship-in-emerging-economies
3. https://onlinecourses.nptel.ac.in/noc22_mg18/preview
4. https://www.udemy.com/course/entrepreneurship-startup-innovation-course/
5. https://www.futurelearn.com/courses/innovation-entrepreneurship

OPERATING SYSTEMS LAB

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS16	PCC	0	0	2	1	40	60	100
Contact Classes-Nil	Tutorial Classes-Nil	Practical Classes-				Total Classes-24		

Course Objectives

The course should enable the students to:

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

At the end of this course students will be able to:

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

WEEK-1	CPU SCHEDULING ALGORITHMS
Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) Round Robin d) priority	
WEEK-2	I/O SYSTEM CALLS
Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, lseek, stat, fork, exit)	
WEEK-3	BANKERS ALGORITHM
Write a C program to simulate Bankers Algorithm for Deadlock Avoidance.	
WEEK-4	PRODUCER – CONSUMER PROBLEM
Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.	
WEEK-5	IPC MECHANISMS
Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs c) Message Queues d) Shared Memory	
WEEK-6	MEMORY MANAGEMENT TECHNIQUES
Write C programs to simulate the following memory management techniques a)Paging b) Segmentation	

WEEK-7	PAGE REPLACEMENT

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 –Internal sand Design Principles, William Stallings, FifthEdition–2005, Pearson Education/PHI.
2. Operating System-ADesignApproach-Crowley,TMH.
3. ModernOperatingSystems,AndrewSTanenbaum,2ndedition, Pearson/PHI.
4. UNIX Programming Environment,KernighanandPike,PHI/Pearson Education.
5. UNIX Internals: The New Frontiers,U.Vahalia,Pearson Education.

Web References

1. https://www.geeksforgeeks.org/c-programs-for-operating-system-concepts/
2. https://www.tutorialspoint.com/operating_system/os_lab_experiments.htm
3. https://www.javatpoint.com/c-programs-for-operating-system
4. https://www.studytonight.com/operating-system/c-programs
5. https://www.includehelp.com/c-programs/c-programs-for-operating-system.aspx

COMPUTER NETWORKS LAB

II B.Tech II SEMESTER:

Course Code	Category	Hours / Week			credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7CS19	PCC	0	0	2	1	40	60	100
Contact Classes-Nil	Tutorial Classes-Nil	Practical Classes-24			Total Classes-24			

COURSE OBJECTIVES

The course should enable the students to:

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology and observe its performance
3. To analyze the traffic flow and the contents of protocol frames

COURSE OUTCOMES

At the end of this course students will be able to:

1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

LIST OF EXPERIMENTS

WEEK-1	DATA LINK LAYER FRAMING
Implement the data link layer framing methods such as character, character-stuffing and bitstuffing.	
WEEK-2	CRC CODE FOR THE POLYNOMIALS
Write a program to compute CRC code for the polynomials CRC-12,CRC-16 and CRC CCIP	
WEEK-3	SLIDING WINDOW PROTOCOL
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.	
WEEK-4	DIJSKTRA'SALGORITHM
Implement Dijsktra's algorithm to compute the shortest path through a network	
WEEK-5	SUBNETOF HOSTS
Take a n example sub net of hosts and obtaina broad casttree for the subnet.	

WEEK-6	DISTANCE VECTOR ROUTING ALGORITHM

Implement distance vector routing algorithm for obtaining routing tables at each node.

WEEK-7	DATA ENCRYPTION AND DATA DECRYPTION

Implement data encryption and data decryption

WEEK-8	LEAKY BUCKET ALGORITHM.

Write a program for congestion control using Leaky bucket algorithm.

WEEK-9	FRAMESORTING TECHNIQUES

Write a program for frame sorting techniques used in buffers.

WEEK-10	NS2 SIMULATOR

I.WIRESHARK

1. Packet Capture Using Wire Shark
2. Starting Wire Shark
3. Viewing Captured Traffic
4. Analysis And Statistics & Filters.
5. How To Run NmapScan

II. Operating System Detection Using Nmap

III. DoTheFollowingUsingNS2Simulator

1. NS2Simulator-Introduction
2. Simulate To Find The Number Of Packets Dropped
3. Simulate To Find The Number Of Packets Dropped By Tcp/Udp
4. Simulate To Find The Number Of Packets Dropped DueToCongestion
5. Simulate To Compare Data Rate &Throughput.
6. Simulate To Plot Congestion For Different Source/Destination
7. Simulate To Determine The Performance With Respect To Transmission Of Packets

Text Books

Computer Networks,AndrewSTanenbaum,David.j.Wetherall,5thEdition.Pearson Education/PHI

Reference Books

5) An Engineering Approach to ComputerNetworks,S.Keshav,2ndEdition,PearsonEducation
6) Data Communications and Networking–BehrouzA. Forouzan.3rdEdition, TMH.

Web References

1. https://www.geeksforgeeks.org/computer-network-lab-experiments/
2. https://www.tutorialspoint.com/computer_network/computer_network_laboratory.htm
3. https://www.javatpoint.com/computer-network-lab
4. https://www.studytonight.com/computer-networks/computer-network-lab-experiments
5. https://www.includehelp.com/computer-network-lab/computer-network-lab-programs.aspx

ARTIFICIAL INTELLIGENCE LAB

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7AI02	PCC	0	0	2	1	40	60	100
Contact Classes-Nil	Tutorial Classes-Nil	Practical Classes-36				Total Classes-36		

Course Objectives:

1. Study the concepts of Artificial Intelligence.
2. Learn the methods of solving problems using Artificial Intelligence
3. Learn the knowledge representation techniques, reasoning techniques and planning
4. Identify and Apply Artificial Intelligence concepts to solve real world problems.
5. Introduce the concepts of Expert Systems and machine learning.

Course Outcomes:

At the end of this course students will be able to:

1. Apply the good programming skills to formulate the solutions for computational problems
2. Design and develop solutions for informed and uninformed search problems in AI.
3. Utilize advanced package like NLTK for implementing artificial intelligence.
4. Demonstrate and enrich knowledge to select and apply AI tools to synthesize information and develop models within constraints of application area
5. Develop a minor project in multidisciplinary areas to demonstrate team work through reports and presentation.

LIST OF EXPERIMENTS

Week-1	
Write a Program to Implement Breadth First Search using Python.	
Week-2	
Write a Program to Implement Depth First Search using Python	
Week-3	
Write a Program to Implement Tic-Tac-Toe game using Python.	
Week-4	
Write a program to implement hill climbing Algorithm	
Week-5	
Write a program to solve Tower of Hanoi	

Week-6	
Write a program to solve 8-Puzzle problem	
Week-7	
Write a Program to Implement Alpha-Beta Pruning using Python.	
Week-8	
Write a program to solve traveling salesman problem.	
Week-9	
Write a program to solve water jug problem	
Week-10	
Write a program to solve the Monkey Banana problem	
Week-11	
Write a Program to Implement 8-Queens Problem using Python	
Week-12	
Write a program to implement the expert system to diagnosis a particular disease	

DATA VISUALIZATION- R PROGRAMMING/ POWER BI

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7DS03	PCC	0	0	2	1		100	100
Contact Classes: 50	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 50		

COURSE OBJECTIVES

The course should enable the students to:

1. Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization
2. To discern patterns and relationships in the data.
3. To build Dashboard applications.
4. To communicate the results clearly and concisely.
5. To be able to work with different formats of data sets.

COURSE OUTCOMES

At the end of this course students will be able to:

1. Understand How to import data into Tableau.
2. Understand Tableau concepts of Dimensions and Measures.
3. Develop Programs and understand how to map Visual Layouts and Graphical Properties.
4. Create a Dashboard that links multiple visualizations.
5. Use graphical user interfaces to create Frames for providing solutions to real world problems.

UNIT-I	UNDERSTANDING DATA	Classes: 10
Understanding Data, What is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?		
UNIT-II	**INTRODUCTION TO TABLEAU**	**Classes: 10**
Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts(line, bar charts, Tree maps),Using the Show me panel		
UNIT-III	**AGGREGATE FUNCTIONS IN TABLEAU**	**Classes: 10**
Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields.		
UNIT-IV	**VISUALIZATION**	**Classes: 10**
Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.		

UNIT-V	PIVOTING TABLEAU DATA	Classes: 10

Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.

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. Micro soft Power BI cook book, 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.

Web References

1. https://www.tutorialspoint.com/tableau/index.htm
2. https://www.geeksforgeeks.org/tableau-tutorial/
3. https://www.javatpoint.com/tableau-tutorial
4. https://www.analyticsvidhya.com/blog/2020/03/tableau-data-visualization-tutorial/
5. https://www.simplilearn.com/tutorials/tableau-tutorial

E-Text Book

1. https://www.packtpub.com/product/learning-tableau-2020/9781801077685
2. https://www.pdfdrive.com/tableau-for-dummies-pdf-e186507260.html
3. https://www.springer.com/gp/book/9783030645600
4. https://www.tutorialspoint.com/tableau/tableau_tutorial.pdf
5. https://www.datapine.com/blog/tableau-tutorial-for-beginners/

MOOC Course

1. https://www.coursera.org/learn/data-visualization-with-tableau
2. https://www.edx.org/course/data-visualization-with-tableau
3. https://www.udemy.com/course/tableau-data-visualization/
4. https://onlinecourses.nptel.ac.in/noc22_cs80/preview

INDIAN KNOWLEDGE SYSTEM

II B. TECH - II SEMESTER

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A7HS05	MC	1	0	0	1	50		50
Contact Classes:50	Tutorial Classes:Nil	Practical Classes:Nil				Total Classes:50		

COURSE OBJECTIVES

The course should enable the students :

1. To provide a tribune of the rich culture and traditions of Indian knowledge system to students of various disciplines.
2. To introduce historical account on the education and scientific literature available in ancient Indian traditions and its connections with ancient Indian Philosophy
3. To give insights about the applications of Bharatiya Jnana Parampara
4. To introduce Indian approach towards health and wellbeing
5. To elaborate vast contribution of ancient Indian researchers, engineers, scientists and architects to the modern world.

COURSE OUTCOMES

At the end of the course the students are able to:

1. Understand nature, scope and related fields of Indian knowledge system.
2. Demonstrate the scientific literature available in ancient Indian traditions
3. Understanding the application of Bharatiya Jnana Parampara
4. Understand Indian approach towards Wellbeing
5. Appreciate vast contribution of ancient Indian researchers, engineers, scientists and architects to the modern world

UNIT-I	Introduction to Indian Knowledge Systems	CLASSES: 10

Meaning, Nature, Scope and Salient Aspects of Bharatiya Jnana Parampara - Introduction to Vedas, Upanishads, Vidya, Kala, Jnana, Shastra - Practices and Continuity of Tradition

UNIT-II	Overview of History of Indian Education and Scientific Literature	CLASSES: 10

Gurukul System - Role of Sanskrit in Natural Language Processing - Scientific Literature - Vedic Literature - Available Scientific Treatises - Interlinkings

UNIT-III	Introduction to Scientific Theories from Pure Sciences from Ancient Indian Knowledge Systems	CLASSES: 10

Overview of theories from available ancient Indian Literature about Physics, Chemistry and Mathematics - Inter linkings and applications

Pointers and Modular Programming: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, Functions returning pointers, Dynamic memory allocation

UNIT-IV	Introduction to Ancient Indian Wellness Systems	CLASSES: 10

Concept of Wellness – Yoga System - Ayurveda System - Ancient Indian Aesthetics

UNIT-V	Development of Engineering, Science, Technology & Fine Arts in India	CLASSES: 10

Various Industries Silk, Cotton and Ship Building - Evolution of Indian Fine Arts – Cave and Temple Architecture, Vastu Vidya, Sculpture, Forts and Step wells, Observatories and Paintings - Music and Natyakala - Cultural Traditions & Folk Arts

Suggested Readings

1. B. Mahadevan, Bhat Vinayak and Nagendra Pavan R.N., (2022) 'Introduction to Indian Knowledge Systems: Concepts and Applications' PHI learning PVT, New Delhi ISBN [9789391818203]
2. Dharmapal (1971) 'Indian Science and Technology in the Eighteenth Century'. Other India Press, Goa.
3. Kapil Kapoor, Singh Avdhesh Kumar, (2005) 'Indian Knowledge Systems' D.K. Printworld (P) Ltd. ISBN 10: 8124603367 / ISBN 13: 9788124603369
4. Chakradeo, Ujwala, Temples of Bharat, Aayu Publications, New Delhi, 2024.
5. D.N. Bose, S.N. Sen and B. V. Subbarayappa, A Concise History of Science in India, Indian National Science Academy, New Delhi, 2009.
6. Datta B. and A. N. Singh, History of Hindu Mathematics: Parts I and II, Asia Publishing House, Bombay, 1962.
7. Kapoor, K. (2021), Indian Knowledge System: Nature, Philosophy, Character in Indian Knowledge System, vol. 1, Pub. Indian Institute of Advanced Studies, Shimla
8. Mahadevan, B., Bhat, V.R., Pavana, N. (2022), Philosophical Systems, in Introduction to Indian Knowledge System, Pub. PHI Learning, New Delhi.
9. Mahadevan, B., Bhat, V.R., Pavana, N. (2022), Knowledge: Framework and Classification, in Introduction to Indian Knowledge System, Pub. PHI Learning, New Delhi.

Video Resources

1. Introductory lectures by Prof. Gauri Mahulikar
2. Introductory lectures by Prof. Kapil Kapoor

Websites

1. https://iksin dia.org/index.php
2. Official Website of IKS- Indian Knowledge System
3. https://www.youtube.com/watch?v=uKcf-hSlcUE
4. Address by Prof Kapil Kapoor | Indian Institute of Advanced Study (FDP 2021)
5. https://www.youtube.com/watch?v=MDJTXNiH2_A
6. Mukul Kanitkar on Bharatiya Knowledge System
7. https://www.youtube.com/watch?v=uARMhv97pjk
8. https://www.youtube.com/watch?v=oTwgf56GbsA
9. Scientific History of India | Mukul Kanitkar Lecture in DTU
10. https://youtu.be/gNJNmPJqXJc?si=WFBbuUT65mLZzpOW
11. Ancient India's Scientific Achievements & Contribution in Mathematics, Astronomy, Science & Medicine