



# **SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES**

**(AUTONOMOUS)**

**Dr. Visweswaraiah Road, (Bangalore-Tirupathi Bye-pass Road),  
Murukambattu, Chittoor – 517127, Andhra Pradesh, India**

## **B.Tech Course Structures and Syllabi Under R20 Regulations**

**(Applicable for 2020-2021 Regular Students & 2021-2022 Lateral Students)**

**Department of Computer Science and Engineering  
(Artificial Intelligence and Machine Learning)**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES**  
**(Autonomous)**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**INSTITUTE VISION**

To emerge as a Centre of Excellence for Learning and Research in the domains of engineering, computing and management.

**INSTITUTE MISSION**

- Provide congenial academic ambience with state-art of resources for learning and research.
- Ignite the students to acquire self-reliance in the latest technologies.
- Unleash and encourage the innate potential and creativity of students.
- Inculcate confidence to face and experience new challenges.
- Foster enterprising spirit among students.
- Work collaboratively with technical Institutes / Universities / Industries of National and International repute

**DEPARTMENT VISION**

To contribute for the society through excellence in Computer Science and Engineering (Artificial Intelligence and Machine Learning) with a deep passion for wisdom, culture and values.

**DEPARTMENT MISSION**

- M 1: Provide congenial academic ambience with necessary infrastructure and learning resources.
- M 2: Inculcate confidence to face and experience new challenges from industry and society.
- M 3: Ignite the students to acquire self-reliance in State-of-the-Art Technologies.
- M 4: Foster Enterprising spirit among students.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

After few years of graduation the, graduates of Computer Science and Engineering (Artificial Intelligence and Machine Learning) shall

- PEO1:** Expertise with computer science and Engineering, artificial intelligence and machine learning disciplines through quality studies, enabling success in IT industries. **(Professional Competency)**
- PEO2:** Establish start-up companies or employed in reputed computing industries or government sectors or pursue higher studies in the domain of CSE (AI & ML) **(Successful Career Goals)**
- PEO3:** Enhance knowledge by updating advanced technological concept for facing the rapidly changing world and contribute to society through innovations and creativity. **(Continuing Education and Contribution to Society)**



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**PROGRAMME OUTCOMES (PO's)**

On Successful completion, the graduate will be able to,

- PO1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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**PROGRAM SPECIFIC OUTCOMES (PSO's)**

On Successful completion, the graduate will be able to,

**PSO1:**Demonstrate and analyse the mathematical methodologies to develop computer programs using networking, web design, big data analytics, machine learning algorithms, data science, neural networks and deep learning techniques.

**PSO2:**Deploy the artificial intelligence techniques to perform human intelligence in creating innovative products and solutions.



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**ACADEMIC REGULATIONS (R-20) FOR B.TECH**

**(Regular-Full Time)**

**(Effective for the students admitted into I year from the Academic Year 2020-2021 and II year lateral entry from the Academic year 2021-2022 onwards)**

**Curriculum for Regular and Honors/Minors B.Tech Program of all Branches**

**1. Eligibility for Admission**

- 1.1 Admission of the B.Tech program shall be made subjects to the eligibility qualifications and Specialization prescribed by the University for each Program from time to time and also as per the guidelines of Andhra Pradesh State Council of Higher Education (APSCHE).
- 1.2 Admission shall be made either on the basis of Merit / Rank Obtained by the Qualifying candidates in EAMCET/ECET or otherwise specified whichever is relevant.

**2. Award of the Degree: A student will be declared eligible for the award of B. Tech. degree if he/she fulfills the following:**

- i. For regular entry students, shall pursue a course of study in not less than four and not more than eight academic years.
- ii. For lateral entry students, shall pursue a course of study for not less than three academic years and in not more than six academic years.
- iii. For regular entry students, after eight academic years from the year of their admission, he/she shall forfeit their seat in B.Tech course and their admission stands cancelled.
- iv. For lateral entry students, after six academic years from the year of their admission, he/she shall forfeit their seat in B.Tech course and their admission stands cancelled.
- v. For regular entry students shall register for 160 credits and must secure all the 160 credits. For lateral entry students shall register for 121 credits and secure all 121 credits
- vi. A student shall be eligible for the award of B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 160 credits for Regular entry students /121 credits for lateral entry students.
- vii. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

**3. Structure of the Undergraduate Engineering program:**

All subjects / courses offered for the under graduate program in B.Tech. Degree programs are broadly classified as follows.



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S.No	Course Classification	Course Category	Course Code
1	Foundation Courses	Humanities and Social Science including Management Courses	HSM
		Basic Science Courses	BSC
		Engineering Science Courses	ESC
2	Core Courses	Professional Core Courses	PCC
3	Elective Courses	Professional Elective Courses	PEC
		Open Elective Courses	OEC
4	Employability Enhancement Courses	Internship, Seminar and Project Work	PROJ
		Skill Oriented Courses / Skill Advanced Courses	SOC/SAC
5	Audit Courses	Mandatory Audit Courses	MAC
6	Minor / Honor Courses	Minor Courses / Honor Courses	MR/HR

**4. Assigning of Credits:**

- i. 1 Hr. Lecture (L) per week – 1 Credit
- ii. 1 Hr. Tutorial (T) per week – 1 Credit
- iii. 1 Hr. Practical (P) per week – 0.5 Credits
- iv. 2 Hours Practical (Lab) per week – 1 Credit

**5. Induction Program for I. B.Tech Program**

- i. There shall be mandatory student induction program for fresher's, with a three-week duration before the commencement of first semester.
- ii. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Department / Branch and Innovations etc., shall be included in the guidelines issued by AICTE.

**6. Assessment**

- i. The performance of a student in each semester shall be evaluated subjectwise with a maximum of 100 marks for theory as well as for practical subject and project work.
- ii. The audit courses shall be evaluated for a maximum of 30 internal marks.
- iii. For theory and practical subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End Semester Examinations.



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- iv. A student has to secure not less than 35% of marks in the end semester examination and minimum 40% of marks in the sum total of Internal Examination and End Semester Examinations marks to earn the credits allotted to each course.

**6.1 Internal Examination**

6.1.1 For theory subjects, during the semester, there shall be two Mid-Term Examinations will be conducted.

6.1.2 Each Mid-Term Examination consists of objective paper for 10 marks and subjective paper for 15 marks with the duration of 1 hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper).

6.1.3 The subjective paper shall contain 3 either-or type questions with equal Weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 15 marks; any fraction shall be rounded off to the next higher mark.

6.1.4 If the student is absent for the any internal examination, no re-exam or make up exam shall be conducted and marks for that examination shall be considered as zero.

6.1.5 First Mid-Term Examination shall be conducted for I & II units of syllabus and second Mid-Term Examinations shall be conducted for III, IV & V units.

6.1.6 However 5 marks are awarded for 5 Assignments (unit-wise).

6.1.7 Final Internal marks shall be arrived at by considering the marks secured by the student in both the Mid-Term examinations with 80% weightage to the better mid exam and 20% to the other

For Example:

- Marks obtained in First Mid-Term: 25
- Marks obtained in Second Mid-Term: 25
- Internal Marks:  $(25 \times 0.8) + (25 \times 0.2) = 25$
- Final internal marks = Internal Marks + Assignment marks

6.1.8 If the student is absent for any one Mid-Term Examinations, the final internal marks shall be arrived at by considering 80% Weightage to the marks secured by the student in the appeared examination and zero to the other.

For Example:

- Marks obtained in First Mid-Term: Absent
- Marks obtained in Second Mid-Term: 25
- Internal Marks:  $(25 \times 0.8) + (0 \times 0.2) = 20$
- Final internal marks = Internal Marks + Assignment marks

6.1.9 For practical courses there shall be 30 internal marks. 15 marks allotted for Internal Practical Examination to be conducted before the last working day and 15 marks for Day-to-Day work in the laboratory shall be evaluated by the concerned



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laboratory teacher based on the regularity / record / viva-voce.

6.1.10 In a practical subject consisting of two parts (ex: Engineering Workshop & IT Workshop), Internal examination shall be evaluated as above for 30 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

6.1.11 The evaluation of the practical courses is done based on the rubrics designed for that curriculum component.

## **6.2 Semester End Examination**

6.2.1 End examination of theory courses shall have the following pattern:

- i. There shall be two parts, Part-A and Part-B.
- ii. Part-A shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit.
- iii. Part-B Shall be either-or type questions of 10 marks each. Student shall answer any one of it.
- iv. Each of these questions from Part-B shall cover each unit of the syllabus.

6.2.2 End examination of practical courses shall have the following pattern:

- i. End Semester Examination shall be for 70 marks.
- ii. The end examination shall be conducted by the concerned laboratory teacher and senior expert in the same subject of the department.
- iii. In a practical subject consisting of two parts (ex: Engineering Workshop & IT Workshop), the End Semester Examination shall be conducted for 35 marks in each part.
- iv. The evaluation of the practical courses is done based on the rubrics designed for that curriculum component.

## **6.3 Drawing Courses**

6.3.1 For the subject having design and/or drawing, such as Engineering Drawing / Graphics.

6.3.2 The distribution shall be 30 marks for internal evaluation (15 marks for Day- to-Day work (unit wise chart work / Assignment) and for another 15 marks there shall be a two MID Term exams will be conducted) and 70 marks for semester end examinations.

6.3.3 There shall be two Mid-Term examinations in a semester for duration of 2hrs each for 15 marks with weightage of 80% to better mid marks and 20% for the other.





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- 6.3.4 The internal subjective paper shall contain 3 either-or type questions with equal Weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 15 marks; any fraction shall be rounded off to the next higher mark and there shall be no objective paper in internal examination.
- 6.3.5 The sum of Day-to-Day work evaluation / assignments and the internal MID Term test marks will be the final internal marks for the course.
- 6.3.6 In the end examination pattern for Engineering Drawing / Graphics there shall be 5 questions, either-or type, of 14 marks each.

**6.4 Mandatory Audit Courses**

- 6.4.1 Courses like Human Values and Ethics, Environmental Sciences, Constitution of India and Design Thinking for Innovation shall be included in the curriculum as non-credit mandatory audit courses.
- 6.4.2 However, attendance in the audit courses shall be considered while calculating aggregate attendance. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course.
- 6.4.3 The Internal Marks will be calculated similar to that of Theory course.
- 6.4.4 In grade sheet the completion of the course indicated as Pass – "P", and No marks or letter grade shall be allotted, for all non-credit mandatory audit courses.
- 6.4.5 Re-exam shall be conducted for failed candidates for every semester at a mutual convenient date of institution.

**6.5 Professional Elective Courses**

- 6.5.1 Students have to choose Professional Elective Courses PEC-I in V semester, PEC-II in VI semester and PEC-III, PEC-IV, PEC-V in VII semester, from the list of elective courses given.
- 6.5.2 Registration forms are invited from the students 10 days prior to the last instructional day of the preceding semester for registration process for offering the Professional Elective Courses.
- 6.5.3 There shall be a limit on the minimum and maximum number of registrations based on class/section strength.
- 6.5.4 The assessments of Professional Elective Courses are same as regular theory courses.

**6.6 Open Elective Courses**

- 6.6.1 A student shall opt for any 4 courses from the list given by the institute from time to time, complying with the requirement of the prerequisite course(s), if any.



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- 6.6.2 Students have to choose Open Elective Courses OEC-I in V semester, OEC-II in VI semester and OEC-III, OEC-IV in VII semester, from the list of elective courses given.
- 6.6.3 All Open Elective Courses are offered to the students of across all branches in general.
- 6.6.4 Registration forms are invited from the students 10 days prior to the last instructional day of the preceding semester for registration process for offering the Open Elective Courses.
- 6.6.5 However, a student shall choose an open Elective from the list in such a manner that he/she has not studied the same course in any form during their Program.
- 6.6.6 There shall be a limit on the minimum and maximum number of registrations based on class/section strength.

**6.7 Massive Online Open Courses**

- 6.7.1 MOOC courses under Professional Elective / Open Elective
- 6.7.2 A student shall be permitted to pursue up to a maximum of two elective courses (Professional Elective Courses or Open Elective Courses) under MOOCs during the Program. Each of the courses must be of minimum 12 weeks in duration for 3 credits. Attendance will not be monitored for MOOC courses.
- 6.7.3 Student has to pursue and acquire a certificate for a MOOC course only from the organizations / agencies approved by the BoS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

**6.8 Mandatory Internships**

- 6.8.1 Students shall undergo two mandatory summer internships for a minimum of four weeks duration at the end of second and third year of the Program.
- 6.8.2 The internship can be done by the students at Local Industries, Government Organizations, Public Sector Companies, Research Laboratories, Construction agencies, Power Plants and also in software MNCs.
- 6.8.3 A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the Department Evaluation Committee nominated by the Principal at the end of the semester for the evaluation of summer internship.
- 6.8.4 The performance of a student in each mandatory summer internships shall be evaluated with a maximum of 100 marks.



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6.8.5 The report and the oral presentation shall carry 40% and 60% weightage respectively.

**6.9 Project work and Internships**

- 6.9.1 In the final semester, the student should undergo Internship / Project Work with well-defined objectives.
- 6.9.2 Students Project Batch will have maximum of four students comprising the fast and slow learners.
- 6.9.3 Every student shall be required to undertake a Project Work in the Institution / Internship cum Project Work in Local Industries / Government Organizations / Public Sector Companies / Research Laboratories / Construction agencies / Power Plants and also in software MNCs in consultation with Head of the Department and Department Project Evaluation Committee.
- 6.9.4 The Department project evaluation committee continuously monitors and evaluates the progress of the Project Work / Internship cum Project Work by conducting three reviews including abstract review during the project period.
- 6.9.5 During the project review meetings, batch presentation and individual contributions are monitored to assess individual student performance and also team performance.
- 6.9.6 The evaluation of the project is done based on the rubrics designed for that curriculum component.
- 6.9.7 At the end of the semester the candidate shall submit an Internship cum Project completion certificate along with project report on the work carried out during the project work at the industry.
- 6.9.8 A student shall be permitted to submit project report on the work carried out during the project work at the institution/department.
- 6.9.9 The project work submitted to the department shall be evaluated for 100 marks, out of which 30 marks are for internal evaluation and 70 marks for external viva-voce.
- 6.9.10 The internal evaluation shall be made by the Department Project Evaluation Committee, on the basis of three reviews given by each students / batch on the topic of his/her project.
- 6.9.11 The final viva-voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the Principal at the end of the Semester.



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6.9.12 In case a student fails in viva voce he /she shall reappear as and when supplementary examinations are conducted.

6.9.13 The distribution of marks for the Internal assessment and End Semester Examination is given below:

<b>Internal Assessment (30 Marks)</b>			<b>End Semester Examination (70 Marks)</b>		
Review - I	Review - II	Review - III	Supervisor	Internal Examiner	External Examiner
10	10	10	20	25	25

### **6.10 Eligibility to appear for Semester End Examinations**

6.10.1 A student shall be eligible to appear for Semester End Examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

6.10.2 Condonation for shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

6.10.3 Students whose shortage of attendance is not condoned in any semester are not eligible to take their Semester End Examination of that class and their registration shall stand cancelled.

6.10.4 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester when offered next.

6.10.5 A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

### **6.11 Issue of Photocopy of Answer Script**

6.11.1 A student can request for the photo copy of answer script of any theory examination within one week after the declaring the results by paying fee.

6.11.2 The examination section shall issue a notification inviting applications for the issue of photocopy of answer script after publishing the results.

6.11.3 The application forms can be obtained from the examination section.

### **6.12 Revaluation**

6.12.1 A candidate can apply for revaluation of his / her end examination answer paper in a theory courses.

6.12.2 The examination section shall issue a notification inviting applications for the revaluation after publishing the results.



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6.12.3 The application forms can be obtained from the examination section.

6.12.4 A candidate can apply for revaluation of answer scripts in not more than 5 courses at a time.

6.12.5 No revaluation for practical courses, comprehensive viva-voce / Examination and project work.

### **6.13 Challenge Valuation**

6.13.1 A student can apply for challenge valuation by prescribed fee.

6.13.2 Challenging valuation shall be carried out by an external subject expert.

6.13.3 The challenging valuation should be done strictly as per the scheme of valuation supplied by the examination section in the presence of Principal.

6.13.4 The examination section shall issue a notification inviting applications for the challenging valuation after publishing the revaluation results.

6.13.5 The application forms can be obtained from the examination section.

## **7. Promotion Rules**

7.1 A student shall be promoted from first year to second year if he fulfills the minimum attendance requirements.

7.2 A student will be promoted from II year to III year if he fulfills the academic requirement of 40% of credits up to II year IV Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year IV semester.

i. **One** regular and **three** supplementary examinations of I B.Tech I Semester.

ii. **One** regular and **two** supplementary examinations of I B.Tech II Semester.

iii. **One** regular and **one** supplementary examinations of II B.Tech III Semester.

iv. **One** regular examination of II B.Tech IV semester.

7.3 A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to III year 6<sup>th</sup> semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year 6<sup>th</sup> semester.

i. **One** regular and **five** supplementary examinations of I B.Tech I Semester.

ii. **One** regular and **four** supplementary examinations of I B.Tech II Semester.



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- iii. **One** regular and **three** supplementary examinations of II B.Tech III Semester.
  - iv. **One** regular and **two** supplementary examinations of II B.Tech IV Semester.
  - v. **One** regular and **one** supplementary examinations of III B.Tech V Semester.
  - vi. **One** regular examination of III B.Tech VI Semester.
- 7.4 For Lateral entry student promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to III year VI semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year VI semester.
- i. One regular and three supplementary examinations of II B.Tech III Semester.
  - ii. One regular and two supplementary examinations of II B.Tech IV Semester.
  - iii. One regular and one supplementary examinations of III B.Tech V Semester.
  - iv. One regular examination of III B.Tech VI Semester.

**8. Extra Curricular Activities**

- i. Students shall enroll, on admission, in any one of the personality and character development programs (NSS/YRC etc.) and undergo training and attend a camp.
- ii. The training shall include classes on hygiene and health awareness and also training in first-aid.
- iii. National Service Scheme (NSS) and Youth Red Cross (YRC) will have social service activities in and around the Institution.
- iv. A student will be required to participate in an activity for an hour in a week during their second and third years.

**9. Skill Oriented / Skill Advanced Courses**

- i. There shall be 05 Mandatory Skill-Oriented Courses offered during III to VII semesters.
- ii. The list of such courses shall be included in the curriculum structure of each branch of Engineering.



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**10. Curricular Framework for Honors Program**

- i. Under Graduate degree with Honors shall be issued by the Institution to the students who fulfill all the academic eligibility requirements for the B.Tech program and Honors program.
- ii. Students of a Department are eligible to opt for Honors Program offered by the same Department / Discipline, subject to a maximum of two additional courses per semester.
- iii. A student shall be permitted to register for Honors program at the beginning of IV semester provided that the student must have acquired a minimum average of 8.0 SGPA upto the end of II semester without any backlogs. In case of the declaration of the III semester results after the commencement of the IV semester and if a student fails to score the required minimum of 8.0 SGPA, his/her registration for Honors Program stands cancelled and he/she shall continue with the regular Program.
- iv. Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. In addition to fulfilling all the requisites of a Regular B.Tech . Program, a student shall earn 20 additional credits to be eligible for the award of B.Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160/121 credits).
- v. Of the 20 additional Credits to be acquired, and 16 credits (four courses) shall be earned by undergoing specified courses listed as pools (two courses per pool either theory course or theory with lab component), and each carrying 4 credits. The remaining 4 credits (two courses) must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12 weeks as recommended by the Board of studies.
- vi. The courses offered in each pool (two courses per pool) shall be domain specific courses and advanced courses.
- vii. MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the academic council.
- viii. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course.



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- ix. The concerned BoS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
- x. The concerned BoS shall also consider courses listed under professional Elective Courses of the respective B.Tech programs for the requirements of B.Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.
- xi. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Honors will be shown in the transcript. None of the courses done under the dropped Honors will be shown in the transcript.
- xii. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- xiii. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

### **11. Curricular Framework for Minor Program**

- i. Under graduate Degree with Minor Program shall be issued by the Institution to the students who fulfill all the academic eligibility requirements for the B.Tech program and Minor Program.
- ii. Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Computer Science Engineering under this scheme; he/she will get Major degree of Mechanical Engineering with minor degree of Computer Science Engineering. Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.





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- iii. The concerned BOS shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE, CE, ME etc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Virtual Realty, VLSI etc.
- iv. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.
- v. The concerned BoS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
- vi. A student shall be permitted to register for Minors program at the beginning of IV semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8.0 SGPA (Semester Grade point average) upto the end of II semester without any history of backlogs. It is expected that the III semester results may be announced after the commencement of the IV semester. If a student fails to acquire 8.0 SGPA upto III semesters or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8.0 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.
- vii. A student shall earn additional 20 credits in the specified area to be eligible for the award of B.Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160/121 credits).
- viii. Of the 20 additional Credits to be acquired and 16 credits shall be earned by undergoing specified courses listed in course structure and each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies.
- ix. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the BoS.
- x. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.



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- xi. If a student drops or terminated from the Minor program, they cannot convert the earned credits into open or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a “pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.
- xii. In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- xiii. Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor’s degree.

## 12. Grading

After each subject is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Marks Range	Level	Letter Grade	Grade Point
≥ 90	Outstanding	S	10
80-89	Excellent	A	9
70-79	Very Good	B	8
60-69	Good	C	7
50-59	Fair	D	6
40-49	Satisfactory	E	5
< 40	Fail	F	0
-	Absent	Ab	0

## 13. Calculation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

- i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

where,  $C_i$  is the number of credits of the  $i^{\text{th}}$  subject and  $G_i$  is the grade point scored by the student in the  $i^{\text{th}}$  course



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- ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \frac{\sum(C_j \times S_j)}{\sum C_j}$$

where ' $S_j$ ' is the SGPA of the  $j^{\text{th}}$  semester and  $C_j$  is the total number of credits in that semester

- iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- iv. While computing the SGPA/CGPA, the subjects in which the student is awarded Zero grade points will also be included.
- v. *Grade Point*: It is a numerical weight allotted to each letter grade on a 10-point scale.
- vi. *Letter Grade*: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.
- vii. As per AICTE regulations, conversion of CGPA into equivalent percentage as follows:
- viii. Equivalent Percentage = (CGPA – 0.50) x 10.

#### 14. Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and are eligible for the award of B.Tech. Degree, he/she shall be placed in one of the following:

<b>Class Awarded</b>	<b>CGPA Secured</b>
First Class with Distinction	$\geq 7.5$
First Class	$\geq 6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 4.0 < 5.5$

#### 15. With-Holding the Result

If the candidate has any dues not paid to the institution or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.



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**16. Transitory Regulations and Gap – Year**

- i. Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment of academic regulations. Candidates who have been detained for attendance shortage or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered and they will be in the academic regulations into which they get readmitted.
- ii. Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I year/ II year/ III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation.
- iii. An evaluation committee at university level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.
- iv. Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B.Tech from the date of commencement of class work and they will be in the academic regulations into which the candidate is presently rejoining.

**17. Industrial Collaborations**

- i. Institution-Industry linkages refer to the interaction between firms and universities or public research centers with the goal of solving technical problems, working on R&D, innovation projects and gathering scientific as well as technological knowledge.
- ii. The Departments are permitted to design any number of Industry oriented minor tracks as the respective BoS feels necessary. In this process the departments can plan to have industrial collaborations in designing the minor tracks and to develop the content and certificate programs.

**18. Community Service Project**

- i. Community Service Project should be an integral part of the curriculum, as an alternative to the Internships, whenever there is an exigency when students cannot pursue their internships.
- ii. Every student should put in a minimum of 144 hours for the Community Service Project during the summer vacation. Each class/section should be assigned with a mentor.



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- iii. Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc
- iv. A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded. The log book has to be countersigned by the concerned mentor/faculty in-charge.
- v. Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member. The final evaluation to be reflected in the grade memo of the student. The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc. Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college. Award of marks shall be made as per the guidelines of Internship.
- vi. A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.
- vii. The Community Service Project is a twofold one – First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers; rather, it could be another primary source of data.
- viii. Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like – Agriculture, Health, Marketing and Cooperation Animal Husbandry, Horticulture, Fisheries, Sericulture, Revenue and Survey, Natural Disaster Management, Irrigation, Law & Order, Excise and Prohibition, Mines and Geology, Energy, Internet, Free Electricity, Drinking Water etc.,

**19. Transfer Details**

- i. Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.

**20. Preservation of Records**

- i. The laboratory records, internal test papers and end examination answer booklets shall be preserved for minimum of 2 years from the date of completion of their degree in the institution.



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**21. Amendments to Regulations**

The Academic Council of SITAMS (Autonomous) reserves the right to revise, amend or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the concerned Board(s) of Studies.

**22. General**

- i. The academic regulations should be read as a whole for purpose of any interpretation. Malpractices rules- nature and punishments are appended.
- ii. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.

**23. Conduct and Discipline**

- i. Students shall conduct themselves within and outside the precincts of the Institute in a manner befitting the students of an Institute of National importance.
- ii. As per the order of the Hon'ble Supreme Court of India, ragging in any form is banned: acts of ragging will be considered as gross indiscipline and will be severely dealt with.
- iii. The following additional acts of omission and /or commission by the students within or outside the precincts of the college shall constitute gross violation of code of conduct and are liable to invoke disciplinary measures
  - a. Ragging
  - b. Lack of courtesy and decorum: indecent behaviour anywhere within or outside the campus.
  - c. Willful damages or stealthy removal of any property /belongings of the Institute / Hostel or of fellow students
  - d. Possession, consumption of distribution of alcoholic drinks or any kind of hallucinogenic drugs
  - e. Mutilation or unauthorized possession of library books
  - f. Hacking in computer systems
  - g. Furnishing false statements to the disciplinary committee, or willfully withholding information relevant to an enquiry
  - h. Organizing or participation in any activity that has potential for driving fellow students along lines of religion caste batch of admission hostel or any other unhealthy criterion.
  - i. Resorting to noisy and unseemly behavior, disturbing studies of students.
  - j. Physical or mental harassment of fresher through physical contact or oral abuse



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- k. Adoption of unfair means in the examination
  - l. Organizing or participating in any group activity except purely academic and scientific Programmers in company with others in or outside campus without prior permission of the Principal
  - m. Disturbing in drunken state or otherwise an incident in academic or students function or any other public event.
  - n. Not obeying traffic rules in campus not following safety practices or causing potential danger to oneself or other persons in any way.
  - o. Any other act or gross indiscipline
- iv. Commensurate with the gravity of the offence the punishment may be reprimand fine and expulsion from the hostel debarment from an examination rustication for a specified period or even outright expulsion from the College.
  - v. The reprimanding Authority for an offence committed by students in the Hostel and in the Department or the classroom shall be respectively, the managers of the Hostels and the Head of the concerned Department
  - vi. In all the cases of offence committed by students in jurisdictions outside the purview the Principal shall be the Authority to reprimand them.
  - vii. All Major acts of indiscipline involving punishment other than mere reprimand shall be considered and decided by the Principal Students Disciplinary Committee appointed by the Principal.
  - viii. All other cases of Indiscipline of Students like adoption of unfair means in the examinations shall be reported to the Vice-Principal for taking appropriate action and deciding on the punishment to be levied.
  - ix. In all the cases of punishment levied on the students for any offence committed the aggrieved party shall have the right to appeal to the Principal who shall constitute appropriate Committees to review the case.



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<b>NATURE OF MALPRACTICES/ IMPROPER CONDUCT PUNISHMENT</b>	<b>PUNISHMENT</b>
<p>1. (a) possesses or keeps access 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/ practical) in which he/she is appearing but has not made use of (material shall include any marks on the body of the candidate 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.</p>	<p>Expulsion from the examination hall and cancellation of the performance in that subject Only.</p>
<p>1. (b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons inside 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 candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him/her.</p>	<p>Expulsion from the examinations hall and cancellation of the performance in that subject only of all the candidates involved in case of an outsider He / She will be handed over to the police and a case is registered against him/her.</p>





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<p>2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</p>	<p>Expulsion from the examinations hall and cancellation of the performance in that subject and all other subjects the candidates has already appeared including practical examinations and projects work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/Year. The Hall Ticket of the candidate will be cancelled and retained by the CE.</p>
<p>3. Impersonates any other candidate in connection with the examination.</p>	<p>The candidate who has impersonated shall be expelled from examination hall and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>



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<p>4. Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper or answer book or additional sheet, during or after the examination.</p>	<p>If the imposter is an outsider, he/shewill be handed over to the police and a case is registered against him/her. Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidateis subject to the academic regulations in connection with forfeiture of seat.</p>
<p>5. Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</p>	<p>Cancellation of the performance in that subject.</p>
<p>6. Refuses to obey the orders of theChief - Superintendent / Assistant- Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall or causesany injury to his person or to any of his relatives whether by offensive words spoken or written or by signs or by visible representation or assaults the officer-in-charge, or any person on duty inside or outside the examination hall or any of his relatives, or indulges in any other act of misconduct or mischief which results in</p>	<p>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 candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</p>



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<p>damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</p>	
<p>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.</p>	<p>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all the external examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>
<p>8. Possesses any lethal weapon or firearm in the examination hall.</p>	<p>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</p>



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<p>9. Belongs to college, who is not a candidate for the particular examination or any person not connected with the college but indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</p>	<p>Student of the college will be expelled from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</p> <p>Person(s) who do not belong to the college will be handed over to police and, a Police case will be registered against them.</p>
<p>10. Comes in a drunken state to the examination hall.</p>	<p>Expulsion from the examination hall and cancellation of the performance.</p>
<p>11. Copying is detected on the basis of internal evidence, such as, during valuation or during special scrutiny</p>	<p>Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that Semester / year examinations.</p>
<p>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 suitable punishment.</p>	

Note: Failing to read the regulation is not considered as an excuse



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**B.Tech R20 - COURSE STRUCTURE AND SYLLABI**

**Semester I (First Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20HSM111	Communicative English for Engineers	3	0	0	3	30	70	100
2	20BSC111	Algebra and Calculus	2	1	0	3	30	70	100
3	20ECE111	Electronic Devices and Circuits	3	0	0	3	30	70	100
4	20ESC113	Basic Electrical Engineering	2	1	0	3	30	70	100
5	20CSE111	C & Data Structures	2	1	0	3	30	70	100
6	20HSM112	Communicative English Language Lab	0	0	3	1.5	30	70	100
7	20ESC117	Fundamentals of Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
8	20CSE112	C & Data Structures Lab	0	0	3	1.5	30	70	100
Contact hours per week			12	3	9	-	-	-	-
Total hours per week			24			-			
Total credits (5 Theory + 3 Labs)						19.5	-	-	-
Total Marks							240	560	800

**Semester II (First Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20BSC121	Differential Equations and Transformation techniques	2	1	0	3	30	70	100
2	20BSC112	Applied Chemistry	3	0	0	3	30	70	100
3	20BSC113	Applied Physics	3	0	0	3	30	70	100
4	20ESC111	Engineering Graphics	1	0	4	3	30	70	100
5	20ESC115	Programming with Python	2	1	0	3	30	70	100
6	20BSC114	Engineering Chemistry Lab	0	0	2	1	30	70	100
7	20BSC115	Engineering Physics Lab	0	0	2	1	30	70	100
8	20ESC112	Engineering Workshop & IT workshop Lab	0	0	2	1	30	70	100
9	20ESC118	Programming with Python Lab	0	0	3	1.5	30	70	100
10	20MAC121	Human Values and Ethics	2	0	0	0	p	-	p
Contact hours per week			13	2	13	-	-	-	-
Total hours per week			28			-	-	-	-
Total credits (5 Theory + 4 Labs)						19.5			
Total Marks							270	630	900



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**Semester III (Second Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks			
			L	T	P	C	I	E	Total	
1	20BSC233	Mathematical Foundations of Computer Science	2	1	0	3	30	70	100	
2	20ESC237	Digital Logic Design and Microprocessor	2	1	0	3	30	70	100	
3	20CSM231	Advanced Data Structures and Algorithms	3	0	0	3	30	70	100	
4	20CSE231	Computer Organization and Architecture	3	0	0	3	30	70	100	
5	20CSE233	Programming with JAVA	2	1	0	3	30	70	100	
6	20CSM232	Web Programming	0	1	2	2	30	70	100	
7	20ESC238	Digital Logic Design and Microprocessor Lab	0	0	3	1.5	30	70	100	
8	20CSM233	Advanced Data Structures and Algorithms Lab	0	0	3	1.5	30	70	100	
9	20CSE236	Programming with JAVA Lab	0	0	3	1.5	30	70	100	
Contact Hours per week			12	4	11	-	-	-	-	
Total Hours per week			27				-	-	-	-
Total credits							21.5	-	-	-
Total Marks							270	630	900	

**Semester IV (Second Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks			
			L	T	P	C	I	E	Total	
1	20BSC231	Numerical Methods and Probability Theory	3	1	0	4	30	70	100	
2	20HSM241	Principles of Management	3	0	0	3	30	70	100	
3	20CSM241	Artificial Intelligence: Principles and Techniques	3	0	0	3	30	70	100	
4	20CSE241	Database Management Systems	3	0	0	3	30	70	100	
5	20CSE242	Operating Systems	3	0	0	3	30	70	100	
6	20CSE244	Data Analytics using R	0	1	2	2	30	70	100	
7	20CSM242	Artificial Intelligence: Principles and Techniques Lab	0	0	3	1.5	30	70	100	
8	20CSE245	Database Management Systems Lab	0	0	3	1.5	30	70	100	
9	20CSE246	Operating Systems Lab	0	0	3	1.5	30	70	100	
10	20MAC231	Environmental Sciences	2	0	0	0	P		-	
11		Internship during summer vacation	-	-	-	-	-	-	-	
Contact Hours per week			17	2	11	-	-	-	-	
Total Hours per week			30				-	-	-	-
Total credits							22.5	-	-	-
Total Marks							270	630	900	
1		<b>Honors / Minor Courses*</b>	4	0	0	4	30	70	100	



I B.Tech. – I Semester

20HSM111	COMMUNICATIVE ENGLISH FOR ENGINEERS	L	T	P	C
	(Common to All Branches)	3	0	0	3

PRE-REQUISITES: Nil

EDUCATIONAL OBJECTIVES:

1. To Provide Knowledge on developing Vocabulary and communicating in a verbal manner.
2. To understand in using of technology for societal aspects.
3. To recognize the importance on constructing Entrepreneurship Skills.
4. To Execute Contextual knowledge to recognize the need of ability to engage in independent and life-long learning in the broadest context of technological change.
5. To support and identify the earlier Medical Life Sciences used in India

**UNIT-1: COMMUNICATION SKILLS FOR PROFESSIONALS (9)**

Listening: Identifying the topic, specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions; introducing oneself and others.

Reading: Skimming to get the main idea of a text, scanning to look for specific information.

Reading for writing: Beginnings and endings of paragraphs

Grammar and Vocabulary: Articles and prepositions and word formation. Content words and function words.

**UNIT- 2: TECHNOLOGY WITH A HUMAN FACE A LECTURE BY E.F.SCHUMACHER (9)**

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics.

Reading: . Identifying sequence of ideas recognizing verbal techniques.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writings.

Grammar and Vocabulary: Word formation (Derivtion, Borrowing-coinage-compounding)

Tenses.

**UNIT-3: AZIM PREMJI -AN ENTREPRENEUR (9)**

Listening: Identifying the topic, specific pieces of information by listening to short audio texts.

Speaking: Discussing daily routine activities.

Reading: Phrasal verbs often used in daily conversations.

Writing: Beginnings and endings of paragraphs

Grammar and Vocabulary: Letter writing (official) - voice of verbs

**UNIT -4: REFLECTIONS OF FUTURE THE YEAR –BY THEODORE J.GORDON (9)**

Listening: Identifying the topic, specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions; introducing oneself and others.

Reading: Skimming to get the main idea of a text, scanning to look for specific information.

Reading for writing: Beginnings and endings of paragraphs

Grammar and Vocabulary: Direct and Indirect speech-Email writing.

**UNIT -5: Y.SUBBA ROW (9)**

Listening: Identifying the topic, specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions; introducing oneself and others.

Reading: Skimming to get the main idea of a text, scanning to look for specific information.

Reading for writing: Beginnings and endings of paragraphs introducing the topic summarizing the main idea and providing a transition to the next paragraph.

Grammar and Vocabulary: Subject verb agreement- Report writing.

**TOTAL HOURS: 45**



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(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**COURSE OUTCOMES:**

On successful completion of the course, student will be able to		POs related to COs
<b>CO1</b>	Understand the concepts on developing vocabulary and communicating in a verbal manner.	<b>PO1</b>
<b>CO2</b>	Understand and develop knowledge on the use of Technology for social aspects.	<b>PO5</b>
<b>CO3</b>	Understand Acquiring skills to become an able Entrepreneur	<b>PO2</b>
<b>CO4</b>	Understand contextual knowledge to recognize the need of ability to engage in independent and life-long learning in the broadest context of technological change.	<b>PO6</b>
<b>CO5</b>	Understand the importance of Medical advancement and its uses on Human life in India.	<b>PO4</b>

**TEXT BOOKS:**

1. V.N.Sudheer, S.Riyaz Ahammed, N.R Tulasi Prasad, N.Lakshmi Sailaja, "Functional English 1" The Department of English of SITAMS ,1/e. 2016
2. V.N.Sudheer, S.Riyaz Ahammed, N.R Tulasi Prasad, N.Lakshmi Sailaja, "Functional English 2" The Department of English of SITAMS ,1/e. 2016

**REFERENCE BOOKS:**

1. K.Srinivasa Krishna , B.Kuberudu , "Business communication and softskills", Excel Books ,1/e 2008.
2. K.R. Lakshminarayana , "English for Technical communication" ,Scitech Publishers, 2/e, 2009.
3. R.K. Bansal ,J.B. Harrison, "Spoken English", Orient Longman, Mumbai, 2/e,2009.
4. Raymond Murphy ,Murphys English Grammar, Raymond Murphy Publishers , 2/e, 2006. Cambridge English Dictionary for advanced Learners.
5. Inspiring Lives by Dr. Jandhyala Ravindranath,Dr.M.Sarath Babu.

**REFERENCE BOOKS:**

1. [www.englishclub.com](http://www.englishclub.com)
2. [www.easyworldofenglish.com](http://www.easyworldofenglish.com)
3. [www.languageguide.org/english/](http://www.languageguide.org/english/)
4. [www.bbc.co.uk/learningenglish](http://www.bbc.co.uk/learningenglish)
5. [www.eslpod.com/index.html](http://www.eslpod.com/index.html)
6. [www.myenglishpages.com](http://www.myenglishpages.com)

**CO-PO MAPPING**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-
<b>CO2</b>	-	-	-	-	3	-	-	-	-	-	-	-
<b>CO3</b>	-	3	-	-	-	-	-	-	-	-	-	-
<b>CO4</b>	-	-	-	-	-	3	-	-	-	-	-	-
<b>CO5</b>	-	-	-	3	-	-	-	-	-	-	-	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>-</b>	<b>3</b>	<b>3</b>	<b>3</b>						





I B.Tech. – I Semester

20BSC111

**ALGEBRA AND CALCULUS**  
(Common to All Branches)

L T P C  
2 1 0 3

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To familiarize the students with the theory of matrices.
2. To explain the series expansion using means value theorem and basic concepts of partial derivatives and its applications
3. To learn the methods of evaluation of double and triple integrals
4. To explain the concept of vector differentiation
5. To explain the concept of vector integration

**UNIT -1: MATRICES**

**(9)**

Rank - Echelon form and Normal form - Solution of linear system of homogeneous and non-homogeneous equations - Direct method: Gauss elimination method - Eigen values and Eigen vectors of a matrix and properties (without proofs) - Cayley-Hamilton theorem (without proof): Inverse and powers of a matrix. – Diagonalization of a matrix using similarity transformation only.

**UNIT – 2: DIFFERENTIAL CALCULUS AND ITS APPLICATIONS**

**(9)**

Rolle's Theorem, Lagrange's Theorem(without proof) - Taylor's and Maclaurin's series for single variable (simple examples) - Functions of several variables - Jacobian – Taylor's and Maclaurin's series for two variables - Maxima and minima of functions of two variables - Lagrangian method of undetermined multipliers with three variables only.

**UNIT -3: MULTIPLE INTEGRALS**

**(9)**

Double and triple integrals: Evaluation of Double integrals (Cartesian and polar coordinates), Change of order of integration (Cartesian form only), Change of variables: double integration from Cartesian to polar coordinates, Evaluation of Triple integrals (Cartesian coordinates).

**UNIT -4: VECTOR DIFFERENTIAL CALCULUS**

**(9)**

Introduction to Vector Differentiation, Scalar and Vector point functions - Gradient of a Scalar function, directional derivative, Divergence of a Vector function, Solenoidal vector, Curl of a Vector function, Irrotational vector, Laplacian operator.

**UNIT -5: VECTOR INTEGRAL CALCULUS**

**(9)**

Line Integral - Potential function - Surface and volume integrals - Green's, Stoke's and Gauss divergence theorem (without proofs) - Verification of Green's, Stoke's and Gauss divergence theorems.

**TOTAL HOURS: 45**



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**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		POs related to COs
<b>CO1</b>	To solve system of homogenous and non-homogenous linear equations, find the Eigen values and Eigen vectors of a matrix and identify special properties of a matrix.	<b>PO1,PO2,PO3</b>
<b>CO2</b>	Illustrate series expansion of functions using mean value theorems, Interpret partial derivatives as a function of several variables, Apply Jacobean concept to deal with the problems in change of variables, Evaluate maxima and minima of functions.	<b>PO1,PO2,PO3</b>
<b>CO3</b>	To evaluate double and triple integrals of functions of several variables	<b>PO1,PO2,PO3</b>
<b>CO4</b>	To illustrate the physical interpretation of gradient, divergence and curl and apply operator del to scalar and vector point functions.	<b>PO1,PO2,PO3</b>
<b>CO5</b>	To find line, surface, volume integrals and the work done in moving a particle along the path over a force field and apply Green's, Gauss divergence and Stokes theorem in evaluation of line, surface and volume integrals.	<b>PO1,PO2,PO3</b>

**TEXT BOOKS:**

1. T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, "Engineering Mathematics-I", S. Chand and Company Ltd, New Delhi.
2. T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad . "Mathematical Methods", S. Chand and Company Ltd, New Delhi.
3. Dr. B. S. Grewa, "Higher Engineering Mathematics", Khanna Publishers, Delhi, , 44/e, 2017

**REFERENCE BOOKS:**

1. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishers, New Delhi.
2. N.P.Bali , "A Text Book of Engineering Mathematics", Laxmi publications (P)Ltd, Delhi.
3. Dr. M. K. Venkata Ramana , "Higher Engineering Mathematics", National Pub, Madras
4. E.Rukmangadachari, E.Keshava Reddy, "Engineering Mathematics-I", Pearson Educations, Chennai.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/110/105/111105111/>
2. <https://www.youtube.com/watch?v=8D3WViAyJvc>
3. <https://www.youtube.com/watch?v=fKzDjtjg0ks4>
4. <https://www.youtube.com/watch?v=wMd4YRyBmjA>
5. <https://www.youtube.com/watch?v=ArkDa6d5h9I>
6. <https://www.youtube.com/watch?v=KglTZSst2sU>
7. <https://www.youtube.com/watch?v=-l3HUeHi1Ys>
8. <https://www.youtube.com/watch?v=SZCsFS9izfQ>
9. <https://www.youtube.com/watch?v=ma1QmE1SH3I>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO2</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO3</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO4</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO5</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>2</b>	-	-	-	-	-	-	-	-	-



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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**I B.Tech. – I Semester**

**20ECE111**

**ELECTRONIC DEVICES AND CIRCUITS**

**L T P C  
3 0 0 3**

**PRE-REQUISITES: Nil**

**Course Educational Objectives:**

1. To study the basic concepts and characteristics of the PN Junction diodes.
2. To understand and analyze the working principle of Rectifier & Filter circuits and their application
3. To study and analyze the working principle and characteristics of BJT
4. To study and analyze the working principle and characteristics of FET
5. To understand the working principle and characteristics of special devices.

**UNIT-1: Junction Diode Characteristics**

**(9)**

Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance and its application, Zener diode – V-I Characteristics.

**UNIT-2: Rectifiers and Filters**

**(9)**

Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, comparison of various filter circuits in terms of ripple factors, Zener diode regulator.

**UNIT-3: BJT Transistor Characteristics:**

**(9)**

Junction transistor, transistor current components, transistor configurations, Characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through.

**UNIT-4: FET Transistor Characteristics:**

**(9)**

Construction and principle of operation and characteristics of JFET & MOSFET (Enhancement & Depletion mode). Biasing of FET, FET act as voltage variable resistor, comparison of BJT and FET

**UNIT-5: Special Semiconductor Devices**

**(9)**

Principle of operation, characteristics and applications of - Varactor diode, Tunnel diode, Uni Junction Transistors, Silicon Controlled Rectifier, Scottky diode, LED, Photo transistor.

**Total hours: 45**

**Course Outcomes**

<b>On successful completion of the course, students will be able to</b>		<b>POs related to COs</b>
<b>CO1</b>	Demonstrate concepts and Analyze the characteristics of the PN Junction diodes.	<b>PO1, PO2</b>
<b>CO2</b>	Design and Analyze of Rectifiers & Filters circuits and its application.	<b>PO1,PO2,PO3</b>
<b>CO3</b>	Design and investigate the working of BJT transistor and its configurations and characteristics	<b>PO1,PO2,PO3,PO4</b>
<b>CO4</b>	Design and analyze the working of FET, MOSFET and special diodes.	<b>PO1, PO2,PO3,PO4</b>
<b>CO5</b>	Demonstrate knowledge on special devices and analyze their VI characteristic.	<b>PO1, PO2</b>



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**TEXT BOOKS :**

1. J. Millman, C. Halkias, Tata Mc-Graw Hill, "Electronic Devices and Circuits", 2e
2. Jacob Millman, C. Halkies, C.D.Parikh, "Integrated Electronics", Tata Mc-Graw Hill, 2009.

**REFERENCE BOOKS:**

1. K. Satya Prasad, "Electronic Devices and Circuits", VGS Book Links.
2. Salivahanan, Kumar, Vallavaraj , "Electronic Devices and Circuits", Tata Mc-Graw Hill, 2e.
3. David Bell , "Electronic Devices and Circuits" ,Oxford Press.

**REFERENCE WEBSITES:**

1. <https://nptel.ac.in/courses/117/103/117103063>
2. <https://nptel.ac.in/courses/108/101/108101091>
3. <http://www.vidyarthiplus.in/2011/11/electronic-device-and-circuits-edc.html>
4. <https://www.allaboutcircuits.com/video-lectures>

**CO-PO Mapping**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-
CO*	3	2.8	2	2	-	-	-	-	-	-	-	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES  
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**I B.Tech - I Semester**

**20ESC113**

**BASIC ELECTRICAL ENGINEERING  
(Common to CSM, CSE, CAI & CSD)**

L	T	P	C
2	1	0	3

**PRE-REQUISITES: Nil**

**Course Educational Objectives:**

On successful completion of the course, students will be able to

1. Impart knowledge on fundamentals of electrical circuits
2. Analyzing different factors of various periodic waveforms
3. Introduce phenomenon of DC Machines.
4. Understand construction and operation of A.C. machines
5. Impart knowledge on basic principles of electrical measuring instruments

**UNIT-1: INTRODUCTION TO ELECTRICAL ENGINEERING: (9)**

Ohm's Law, Basic Circuit Components, Kirchhoff's laws, Simple Problems. Types of Sources, Series, Parallel Circuits, Star-Delta Transformation, Network Theorems-Superposition and reciprocity, Thevenin's and Norton's Theorems and Maximum Power Transfer Theorem.

**UNIT-2: SINGLE PHASE AC CIRCUITS (9)**

R.M.S, Average values and form factor for different periodic waveforms - phase and phase difference of sinusoidal alternating quantities - steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation - concept of reactance, impedance, susceptance and admittance - Power triangle, power factor

**UNIT-3: DC MACHINES: (9)**

Principle of Operation of DC Generators, Types of DC Generators, EMF Equation in DC Generator, OCC of a DC Shunt Generator. Principle of Operation of DC Motors, Types of DC Motors, Torque Equation, Losses and Efficiency, Calculation in DC Motors, Swinburne's Test and Brake Test, Speed control of DC Shunt motor.

**UNIT-4: AC MACHINES: (9)**

Principles of Operation of Transformer, Constructional Details, Losses and Efficiency, Regulation of Transformer, O.C and S.C Tests - Principles of Operation of Three Phase Induction motor

**UNIT-5: MEASURING INSTRUMENTS: (9)**

Introduction, Classification of Instruments, Operating Principles, Essential Features of Measuring Instruments, Moving Coil and Moving Iron Instruments, Dynamometer Wattmeter and Energy meter

**TOTAL HOURS: 45**



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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**Course Outcomes:**

On successful completion of the course the student could be ,

Course Outcomes		POs related to COs
<b>CO1</b>	Understood the concept of electrical circuits	<b>PO1, PO2, PO3,PSO12</b>
<b>CO2</b>	Investigated the different AC circuits	<b>PO1, PO2, PO3,PSO12</b>
<b>CO3</b>	Analysed the operation of DC Machines.	<b>PO1, PO2, PO3,PSO12</b>
<b>CO4</b>	Analysed the operation of DC Machines.	<b>PO1, PO2, PO3,PO12</b>
<b>CO5</b>	Understand and evaluate the calibration of different electrical measuring instruments.	<b>PO1, PO2, PO3,PO12</b>

**TEXT BOOKS:**

1. M.S.Naidu and S Kamakshaiah, "Basic Electrical Engineering".
2. T.KNagasarkar and M.S Sukhija,"Basic Electrical Engineering"
3. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.

**REFERENCE BOOKS:**

1. DP Kothari and IJ Nagrath , "Theory and Problems of BEE".
2. V.K Mehtha, "Principle of Electrical Engineering",S Chand Publications.
3. Joseph A. Edminister, MahmoodNahri, "Electric circuits", Schaum's series, McGraw-Hill, New Delhi, 2010.
4. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015.

**REFERENCE WEBSITES:**

1. <https://nptel.ac.in/courses/108/105/108105053/>

**CO-PO Mapping:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	2	2	-	-	-	-	-	-	-	-	2
<b>CO2</b>	3	3	2	-	-	-	-	-	-	-	-	2
<b>CO3</b>	3	2	2	-	-	-	-	-	-	-	-	2
<b>CO4</b>	3	3	2	-	-	-	-	-	-	-	-	2
<b>CO5</b>	3	3	2	-	-	-	-	-	-	-	-	2
<b>CO*</b>	<b>3</b>	<b>2.6</b>	<b>2</b>									<b>2</b>



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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**I B.Tech - I Semester**

**20CSE111**

**C & DATA STRUCTURES** **L T P C**  
(Common to ECE, EEE, CSE, CSM, CAI & CSD) **2 1 0 3**

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide knowledge on algorithm, flowchart for a given problem and introducing the C programming basics.
2. To impart adequate knowledge on conditional and iterative statements for problem solving.
3. To familiarize with the pointers, structures and union.
4. To understand basic data structures.
5. To familiarize with several sub-quadratic sorting and searching algorithms.

**UNIT -1: INTRODUCTION TO C (9)**

**Overview of Computers:** Computer Software- Algorithm–Flowchart–Software Development Method.

**C Programming Basics:** Introduction to “C” Programming – Characteristics of C – Structure of a “C” program – Tokens –Constants- Variables – Data Types – Operators and their types-Expressions – Operator Precedence and Associativity.

**UNIT -2: CONTROL STATEMENTS AND FUNCTIONS (9)**

**Conditionals:** If-Else- Constructs – Loop Structures/Iterative Statements – While Loop – For Loop – Break Statement - Arrays: Initialization–Declaration - One-Dimensional Arrays-Two-Dimensional Arrays– Function Call and Returning Values – Parameter Passing – Local and Global- Scope – Recursive Functions.

**UNIT -3: POINTERS, STRUCTURES AND UNIONS (9)**

**Pointers:** Definition–Initialization–Pointers Arithmetic–Pointers and Arrays.

**Structures and Union:** Introduction – Need for Structure Data type – Structure Definition – Structure Declaration – Accessing Structure Members - Structure within a Structure – Copying and Comparing Structure Variables - Structures and Arrays – Union.

**UNIT-4: INTRODUCTION TO DATA STRUCTURES (9)**

Overview and importance of algorithms and data structures, Definition- Abstract Data Type, - Classification of Data Structures - Linear and Non Linear-List ADT –Single Linked List - Applications.Dynamic Memory Allocation and Deallocation.

**UNIT-5: SORTING AND SEARCHING TECHNIQUES (9)**

**Sorting Techniques:** Insertion sort - Selection sort - Bubble sort - Quick sort - Merge sort.

**Searching Techniques:** Linear search - Binary Search.

**TOTAL HOURS: 45**

**COURSE OUTCOMES:**

On successful completion of the course the student will be able to,		POs related to COs
<b>CO1</b>	Understand the problem solving basics.	<b>PO1, PO2</b>
<b>CO2</b>	Identify and develop programs using control structures like selection control and iterative control statements.	<b>PO1, PO2, PO3</b>
<b>CO3</b>	Apply and Demonstrate knowledge on pointers, structure and union.	<b>PO1,PO2, PO3, PO4</b>
<b>CO4</b>	Categorize the basic data Structures and its applications	<b>PO1, PO2,PO5</b>
<b>CO5</b>	Illustrate different sorting and searching techniques to solve real-world problems	<b>PO1, PO3, PO4</b>



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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**TEXT BOOKS:**

1. PradipDey, and Manas Ghosh, "Programming in C", Oxford University Pres, 2018.
2. D. Samanta, "Classic Data Structure", Eastern Economy Edition, 2014
3. YashavantKanetkar, "Let us C", 15th Edition, BPB Publications, 2016.

**REFERENCE BOOKS:**

1. J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, "Programming in C and Data Structures", Pearson Education, Chennai, 2010.
2. Reema Thareja, "Data Structures Using C", Oxford University Press, 2014.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2010 (Reprint).

**REFERENCE WEBSITES:**

1. [https://onlinecourses.swayam2.ac.in/cec22\\_cs11](https://onlinecourses.swayam2.ac.in/cec22_cs11)
2. [https://onlinecourses.nptel.ac.in/noc22\\_cs40](https://onlinecourses.nptel.ac.in/noc22_cs40)
3. <https://www.geeksforgeeks.org>.

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	-	-	2	-	-	-	-	-	-	-
CO5	3	-	2	2	-	-	-	-	-	-	-	-
CO*	3	3	2	2	2	-	-	-	-	-	-	-





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES**  
(Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

**I B.Tech. – I Semester**

**20HSM112**

**COMMUNICATIVE ENGLISH LANGUAGE LAB**  
(Common to All Branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide Knowledge on developing Soft Skills and its techniques.
2. To understand Knowledge on the use of technology for giving Presentations.
3. To apply gained information in Preparing Resume.
4. To analyze the use of body language while participating in Group Discussions.
5. To execute the complete knowledge on facing Job Interviews.

**LIST OF TOPICS:**

1. Introduction and importance of Soft Skills
2. Attributes of Soft Skills
3. Categories of Soft Skills- (Social, Thinking, Negotiating)
4. Exhibiting, Identifying, and Improving your Soft Skills
4. Acquiring Soft Skills (Train yourself)
5. Soft Skills practicing tips
6. Power Point presentation on Scientific/Technical Topics.
7. Designing a Resume
8. Resume Styles
9. Preparing Model Resumes
10. Group Discussion
11. Group Discussion strategies
12. Mock GDs.
13. Job Interviews
14. Interview Techniques
15. Model Interview questions – Mock Interview

**COURSE OUTCOMES:**

<b>At the end of the course, students will able to</b>		<b>POs related to COs</b>
<b>CO1</b>	Remembering the concepts on developing Soft Skills and its techniques. (Topics from 1 to 5)	<b>PO1</b>
<b>CO2</b>	Understand and Develop Knowledge on the use of technology in giving presentations. (Topic No:6)	<b>PO5</b>
<b>CO3</b>	Apply one's skills in Preparing a Resume before applying for a job.(Topic 7 to 9)	<b>PO6</b>
<b>CO4</b>	Analyze and execute body language while participating in Group Discussions. (Topics 10 to 12)	<b>PO2</b>
<b>CO5</b>	Evaluate by weighing one's communicative skills in facing Job Interviews through Mock Interviews. (Topics 13 to 15)	<b>PO10</b>



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**SOFT WARE SUGGESTED:** Walden –Hyderabad.

**REFERENCES:**

1. Dr.K.Alex, "Soft Skills- Know yourself and know the world", S. Chand Publications, New Delhi, 2010
2. T.Vijayakumar, K.Durga Bhavani, English in Action 1<sup>st</sup> Edition, 2019, Mac millan Publications, Guntur.
3. Rout ledge, "Bailey Stephen Academic Writing – A Hand book for international students", 2014.
4. Chase, Becky Tarver, " Pathways: Listening, Speaking and Critical Thinking. Heinley ELT", 2e/ 2018.
5. Hewings, Martin, "Cambridge Academic English (B2)". CUP, 2012

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-		-	-	-	-	-	-	-	-	-
CO2	-	-		-	3	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	-	-	-	-	-
CO4	-	3	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-
CO*	3	3	-	-	3	3	-	-	-	3	-	-



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<b>20ESC117</b>	<b>I B.Tech - I Semester FUNDAMENTALS OF ELECTRICAL &amp; ELECTRONICS ENGINEERING LAB (Common to CSM, CSE, CAI, CSD)</b>	<b>L T P C</b>
		<b>0 0 2 1</b>

**PRE-REQUISITES: Nil**

**Course Objectives:**

On successful completion of the course, students will be able

- 1: To gain practical experience on fundamental electric laws.
- 2: To gain practical experience on verification of theorems.
- 3: To evaluate the performance characteristics of DC shunt generator.
- 4: To evaluate the performance characteristics of DC shunt motor.
- 5: To evaluate the Characteristics of diode, rectifiers and filters.

**PART -A**

**Any SIX of the Following**

1. Verification of KCL and KVL
2. Verification of Superposition Theorem and Reciprocity Theorem.
3. Verification of Thevinin's and Norton's Theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Magnetization Characteristics of D.C Shunt Generator.
6. Swinburne's Test of DC Shunt Machine.
7. Brake Test on DC Shunt Motor & Determination of Performance Characteristics.
8. OC & SC Tests on Single-Phase Transformer to find the Efficiency.

**PART -B**

**Any SIX of the Following**

1. Volt-Ampere Characteristics of P-N Junction Diode and Zener Diode.
2. Rectifiers-Without Filter.
3. Rectifiers-With Filter.
4. BJT Characteristics (CE&CB Configuration).
5. Transistor as a Switch.
6. FET Characteristics.
7. UJT Characteristics.
8. SCR Characteristics.



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**Course outcomes:**

At the end of the course, students will able to

<b>Course Outcomes</b>		<b>POs related to COs</b>
<b>CO1</b>	Understand the fundamental electrical laws in engineering applications.	<b>PO1</b>
<b>CO2</b>	Verify different network theorems practically.	<b>PO2</b>
<b>CO3</b>	Design electrical circuits for measuring complicated electrical parameters.	<b>PO3</b>
<b>CO4</b>	Investigate AC Machines like Induction Motor and Transformer for solving complex problems.	<b>PO4</b>
<b>CO5</b>	Evaluate the Characteristics of D.C Shunt Generator and DC Motor through experimentation.	<b>PO4</b>
<b>CO6</b>	Follow the ethical principles in implementing the experiments.	<b>PO8</b>
<b>CO7</b>	Do experiments effectively as an individual and as a team member in a group.	<b>PO9</b>
<b>CO8</b>	Communicate verbally and in written form, the understanding about the experiments.	<b>PO10</b>
<b>CO9</b>	Continue updating their skill related to electrical circuits	<b>PO12</b>

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/117/106/117106108/>

**CO-PO Mapping:**

CO-PO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9												3
CO*	3	3	3	3	-	-	-	3	3	3		3



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**I B.Tech. – I Semester**

**20CSE112**

**C & DATA STRUCTURE LAB**  
(Common to CSE, ECE, EEE, CSM, CAI & CSD)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide knowledge on flowchart and algorithm to the given problem
2. To exercise conditional and iterative statements to Write C programs
3. To develop the skill of C programs using arrays, strings and functions.
4. To understand C programs using pointers and allocate memory using dynamic memory management functions.
5. To familiarize with sorting and searching techniques.

**EXERCISES:**

1. a. Write a C Program to Calculate the Simple Interest.  
b. Write a C Program to Convert the Temperature Unit from Fahrenheit to Celsius using the Formula  $C = (F-32)/1.8$ .  
c. Assume that any Month is of 30 Days. Now you are given Total Days. Write a C Program to find out the exact Number of Years - Months & Days.
2. a. Write a Program that Prints the Given 3 Integers in Ascending Order using if - else.  
b. Write a Program to Calculate Commission for the Input Value of Sales Amount. Commission is calculated as per the Following Rules:
  - i) Commission is NIL for Sales Amount Rs. 5000.
  - ii) Commission is 2% for Sales when Sales Amount is >Rs. 5000 and  $\leq$  Rs. 10000.
  - iii) Commission is 5% for Sales Amount >Rs. 10000.  
c. Write a C Program to find the Roots of Quadratic Equation.
3. a. Write a Program, which takes two integer Operands and one Operator from the User, Performs the Operation and then Prints the Result. (Consider the Operators +, -, \*, /, %, use switch Statement)  
b. A Character is entered through Keyboard. Write a Program to determine whether the Character Entered is a Capital Letter, a Small Case Letter, a Digit or a Special Symbol. The Following Table shows the Range of ASCII values for various Characters.

<b>Characters</b>	<b>ASCII values</b>
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 – 127.
4. a. Write a C Program to find the Sum of Individual Digits of a Positive Integer.  
b. A Fibonacci sequence is defined as follows: the First and Second terms in the Sequence are 0 and 1. Subsequent terms are found by adding the Preceding two terms in the Sequence. Write a C Program to Generate the first n terms of the Sequence.
5. a. i) A Perfect Number is a Number that is the Sum of all its Divisors Except Itself. Six is the Perfect Number. The only Numbers that Divide 6 evenly are 1, 2, 3 and 6 (i.e.,  $1+2+3=6$ ).  
ii) An Abundant Number is one that is Less than the Sum of its Divisors (Ex:  $12 < 1+2+3+4+6$ ).  
iii) A Deficient number is one that is Greater than the Sum of its Divisors (Ex:  $9 > 1+3$ ).  
Write a Program to Classify N Integers (Read N from keyboard) each as Perfect, Abundant or Deficient.  
  
b. An Armstrong Number is a Number that is the Sum of the Cubes of its Individual Digits. Write a C Program to Print Armstrong Numbers below 1000.



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6. a. Write a C Program to generate all the Prime Numbers between 1 And N, Where N is a Value Supplied by the User.  
b. Write a C Program to Calculate the Following Sum:  $Sum = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$
7. a. Write a C Program to find both the Largest and Smallest Number in a List of Integers using Arrays.  
b. Write a C Program to Perform the Following:  
i) Addition of Two Matrices. ii) Multiplication of Two Matrices.
8. a. Write C Programs that use both Recursive and Non-Recursive Functions to find the Factorial of a given Integer.  
b. Write C Programs that use both Recursive and Non-Recursive Functions to find the GCD (Greatest Common Divisor) of two given integers.  
c. Write C Program to solve Towers of Hanoi Problem using recursive function.
9. a. Write C Programs for Swap/Exchange values of two Integer variables using Call by Reference.  
b. Write a C Program using Pointers to Read in an Array of Integers and Print its Elements in Reverse Order.
10. Write a C Program using Dynamic Memory Allocation.
11. You are supposed to generate a Result Table which Consists of Student Id - Student Name - Marks of three Subject and Total Marks. Write a Program which takes Input for Five Students and Displays Result Table. Also Display Student Information Separately Who Got the Highest Total? Use Structures to do it.
12. Write C programs to perform the following searching operations for a Key value in a given list of integers: i) Linear search ii) Binary search
13. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort
14. Write a C Program that Implements the Following Sorting Methods to Sort a Given List of Integers in Ascending Order i) Quick sort ii) Merge sort

**COURSE OUTCOMES:**

<b>After the successful completion of this course, the students able to:</b>		<b>POs related to COs</b>
<b>CO1</b>	Design the algorithm and flowchart for the given problem.	<b>PO1, PO2, PO3</b>
<b>CO2</b>	Develop the programs on control statements and arrays.	<b>PO1, PO2, PO3</b>
<b>CO3</b>	Analyze the concepts on functions	<b>PO1, PO2</b>
<b>CO4</b>	Solve the memory access problems by using pointers and design the programs on structures and unions.	<b>PO1, PO2, PO4</b>
<b>CO5</b>	Analyze the dynamic memory allocation and deallocation.	<b>PO1, PO2</b>
<b>CO6</b>	Follow the ethical principles in implementing the programs	<b>PO8</b>
<b>CO7</b>	Do experiments effectively as an individual and as a team member in a group.	<b>PO9</b>
<b>CO8</b>	Communicate verbally and in written form, the understanding about the experiments.	<b>PO10</b>
<b>CO9</b>	Continue updating their skill related to loops, pointers and files implementing programs in future.	<b>PO12</b>



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**REFERENCE BOOKS:**

1. PradiptDey and Manas Ghosh, "Programming in C", Oxford University Press, 2018.
2. D. Samanta, "Classic Data Structure", Eastern Economy Edition, 2014.
3. Yashavant Kanetkar, "Let us C", 15th Edition, BPB Publications, 2016.
4. J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, "Programming in C and Data Structures", Pearson Education, Chennai, 2010.

**REFERENCE WEBSITES:**

1. [https://onlinecourses.swayam2.ac.in/cec22\\_cs11](https://onlinecourses.swayam2.ac.in/cec22_cs11)
2. [https://onlinecourses.nptel.ac.in/noc22\\_cs40](https://onlinecourses.nptel.ac.in/noc22_cs40)
3. <https://www.geeksforgeeks.org>.

**CO-PO MAPPING:**

CO-PO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	3	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9												3
CO*	3	3	3	3	-	-	-	3	3	3		3



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**I B.Tech. – II Semester**

<b>20BSC121</b>	<b>DIFFERENTIAL EQUATIONS AND TRANSFORMATION TECHNIQUES (COMMON TO ALL BRANCHES)</b>	<b>L T P C 2 1 0 3</b>
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**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

- 1 To learn the methods of solving the ordinary differential equations of first & higher order and applications of first order ordinary differential equations.
- 2 To learn partial differential equations and how they can serve as models for physical processes and also master the technique of separation of variables to solve partial differential equation.
- 3 To learn the concepts of Laplace Transforms and inverse Laplace Transforms and to explore the solving initial value problems by using Laplace transform method.
- 4 To develop skill to design Sine and Cosine waves with the help of Fourier series
- 5 To learn the concepts of Fourier transform and inverse Fourier Transform.

**UNIT -1: ORDINARY DIFFERENTIAL EQUATIONS (9)**

**Differential Equations of First Order and First Degree:** Formation – Linear and Bernoulli's equations – Applications to L-R and C-R circuit's problems.

**Linear Differential Equations of Higher Order:** Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax} v(x)$  &  $x^m v(x)$  - Method of variation of parameters.

**UNIT -2: PARTIAL DIFFERENTIAL EQUATIONS (9)**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of first order linear (Lagrange's) equation and Non-Linear (standard forms) equations - Solution of PDE by the Method of separation of variables.

**UNIT -3: LAPLACE TRANSFORMS (9)**

Definition of Laplace transform, Laplace transform of standard functions - Laplace Transform of Unit step function, Dirac's delta function and Periodic function – Properties of Laplace Transforms(without proof): Linear property, First shifting theorem, Change of Scale Property, Second shifting theorem, Multiplication & Division by  $t$ , Transform of Derivatives & Integrals - Inverse transform - Convolution theorem(without proof) – Application: Solution of ordinary differential equations of first and second order with constant coefficients.

**UNIT -4: FOURIER SERIES (9)**

Determination of Fourier coefficients, Euler's formulae, Dirichlet's conditions - Fourier series of periodic functions, even and odd functions - Fourier series in an arbitrary interval - Half-range Fourier sine and cosine expansions.

**UNIT -5: FOURIER TRANSFORM (9)**

Fourier integral theorem (without proof) - Fourier sine and cosine integrals - Fourier transform – Fourier sine and cosine transforms - Properties - Inverse transforms - Finite Fourier transforms.

**TOTAL HOURS: 45**





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**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		POs related to Cos
<b>CO1</b>	To identify whether the given differential equation of first order is linear or Bernoulli and to solve the higher order linear differential equations with constant coefficients.	<b>PO1,PO2,PO3</b>
<b>CO2</b>	Apply a range of techniques to find solutions of standard PDE's and outline the basic properties of standard PDE's	<b>PO1,PO2,PO3</b>
<b>CO3</b>	To understand the concepts of Laplace transform and elementary functions, general functions using its properties and special functions.	<b>PO1,PO2,PO3</b>
<b>CO4</b>	To understand finding Fourier series expression of the given function.	<b>PO1,PO2,PO3</b>
<b>CO5</b>	Understand Fourier transforms and properties of Fourier transforms	<b>PO1,PO2,PO3</b>

**TEXT BOOKS:**

1. K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, "Engineering Mathematics-I", T, S. Chand and Company Ltd, New Delhi.
2. T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, "Mathematical Methods", S. Chand and Company Ltd, New Delhi.
3. Dr. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 44/e, 2017.

**REFERENCE BOOKS:**

1. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishers, New Delhi.
2. Dr. M. K. Venkata Ramana, "Higher Engineering Mathematics", National Pub & Co, Madras.
3. N.P.Bali, "A Text Book of Engineering Mathematics", Laxmi publications (P)Ltd, New Delhi.
4. E.Rukmangadachari, E.Keshava Reddy, "Engineering Mathematics-II", Pearson Educations, Chennai.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/111/106/111106100/>
2. <https://www.youtube.com/watch?v=OBhZvyhc8JQ&t=982s>
3. <https://nptel.ac.in/courses/111/106/111106100/>
4. <https://www.youtube.com/watch?v=3zCdNO2xp3s>
5. <https://www.youtube.com/watch?v=XU5hUrh6-18&t=948s>
6. <https://nptel.ac.in/courses/111/106/111106139/>
7. [https://www.youtube.com/watch?v=LGxE\\_yZYigI](https://www.youtube.com/watch?v=LGxE_yZYigI)
8. <https://www.youtube.com/watch?v=6spPyJH6dkQ>
9. <https://www.youtube.com/watch?v=GFKggEkKtLM>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO2</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO3</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO4</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO5</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>2</b>	-	-	-	-	-	-	-	-	-



I B.Tech. – II Semester

20BSC112

APPLIED CHEMISTRY  
(Common to ECE, EEE, CSE, CSM, CAI & CSD)

L	T	P	C
3	0	0	3

PRE-REQUISITES: Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. To learn different purification methods and analyse the impurities present in water.
2. To develop skill to describe the mechanism and control of corrosion.
3. To train the students on the fundamentals and applications of polymers.
4. To understand and apply the concepts of electrochemistry effectively.
5. To introduce basic principles of spectroscopy and chromatography

**UNIT -1: WATER AND WATER FOR INDUSTRIAL PURPOSE (9)**

Water: Sources of water - Types of Impurities in Water - Hardness of water - Temporary and permanent hardness - Estimation of hardness by EDTA Method and numerical problems - Analysis of water - Dissolved oxygen - Disadvantages of hard water - Methods of treatment of water for domestic purpose - Sterilization - Chlorination, Ozonisation.

Water for industrial purpose: Water for steam making - Boiler troubles - Priming and foaming, Boiler corrosion, Scales and sludge, Caustic embrittlement - Water treatment - Internal treatment - Colloidal, Phosphate, Calgon, Carbonate and Sodium aluminate conditioning of water - External treatment - Ion-exchange process - Demineralization of brackish water – Reverse osmosis.

**UNIT - 2: SCIENCE OF CORROSION (9)**

Definition - Types of corrosion - Dry corrosion(Direct chemical attack) - Wet corrosion - Theories of corrosion and mechanism - Electro chemical theory of corrosion - Galvanic corrosion - Concentration cell corrosion - Oxygen absorption type - Factors influencing the corrosion - Control of corrosion - Cathodic protection - Sacrificial anode and impressed current cathodic protection method.

**UNIT -3: POLYMERS (9)**

Polymerization reactions - Basic concepts - Types of polymerization - Addition polymerization with mechanism - condensation polymerization - Plastics - Thermosetting and thermoplastics - Composition, Properties and Engineering applications of teflon, bakelite, nylon and rubber - Processing of natural rubber and compounding .Elastomers: Buna S - Buna N - Polyurethane Rubber and Silicone Rubber.

**UNIT - 4: ELECTRO CHEMISTRY AND APPLICATIONS (9)**

Electrodes-concepts-Reference electrodes- (Standard hydrogen electrode and calomel electrode)-Nernst equation. Electro Chemistry: Conductance - Equivalent conductance - Molar conductance –Effect of dilution- Conduct metric titrations (Acid –Base titrations) - Conductivity Measurements. Photo voltaic cells - working and applications- Fuel cells-Introduction - Hydrogen oxygen fuel cell and methanol fuel cell

**UNIT - 5: FUNDAMENTAL ASPECTS OF INSTRUMENTAL METHODS (9)**

Chromatography:- Principle and methods of thin layer chromatography-separation of liquid of Paper chromatography. Electromagnetic spectrum-Absorption of radiation-Beer-Lamberts law-UV-Visible and IR spectroscopy-principle and instrumentation

**TOTAL HOURS: 45**



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**COURSE OUTCOMES:**

On successful completion of the course the will be able to,		POs related to Cos
<b>CO1</b>	To understand the fundamentals of water technology and develop analytical skills in determining the hardness of water and to acquire awareness to societal issues on quality of water.	<b>PO1, PO2,PO6</b>
<b>CO2</b>	Acquire the knowledge in corrosion phenomenon and develop skills in the design of methods for control of corrosion	<b>PO1, PO2</b>
<b>CO3</b>	Acquire knowledge on polymeric materials and to prepare polymeric material for environmental safety and society need.	<b>PO1, PO2,PO6</b>
<b>CO4</b>	Understand and apply the concept of electrochemistry and analyse the standard Electrodes and different types of fuels cells	<b>PO1, PO2</b>
<b>CO5</b>	Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials	<b>PO1, PO2,PO3</b>

**TEXT BOOKS:**

1. Prof. K. N. Jayaveera, Dr. G. V. Subba Reddy and Dr. C. Ramachandraiah, "Chemistry for Engineers", Tata McGraw Hill Publishers, New Delhi, 4/e, 2009.
2. Jain and Jain, "Text book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi.15/e, 2008
3. Text book of Engineering Chemistry, 18/e, 2008, S. S. Dara, S. Chand & Co, New Delhi.

**REFERENCE BOOKS:**

1. Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications(India) Pvt. Ltd, Hyderabad,"Engineering Chemistry, 5/e, 2009.
2. B.Viswanath, M. Aulice Scibioh, "Fuel Cells Principles and Applications", Universities press, Hyderabad, 4/e, 2008.
3. Skoog and West, "Principles of Instrumental analysis",6/e Thomson,2007.
4. Glasston & Lewis, Dhanphtarai Publishers, Physical Chemistry, New Delhi ,12/e, 2009.
5. JC Kuriacose and J. Rajaram ,"Engineering Chemistry (Vol.1&2)", Tata McGraw Hill Publishers, New Delhi, 5/e, 2004, ,

**REFERENCE WEBSITE:**

1. <https://www.youtube.com/watch?v=zVZ9c6EXfTA>
2. <https://nptel.ac.in/courses/113/104/113104082/>
3. <https://nptel.ac.in/courses/104/105/104105039/>
4. <https://nptel.ac.in/courses/104/106/104106132/>
5. <https://www.digimat.in/nptel/courses/video/103108100/L01.html>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	2	2	-	-	-	2	-	-	-	-	-	-
<b>CO2</b>	2	2	-	-	-	-	-	-	-	-	-	-
<b>CO3</b>	2	2	-	-	-	2	-	-	-	-	-	-
<b>CO4</b>	2	2	-	-	-	-	-	-	-	-	-	-
<b>CO5</b>	2	2	2	-	-	-	-	-	-	-	-	-
<b>CO*</b>	<b>2</b>	<b>2</b>	<b>2</b>	-	-	<b>2</b>	-	-	-	-	-	-



I B.Tech. – II Semester

20BSC113

APPLIED PHYSICS

(Common to ECE, EEE, CSE, CSM, CAI & CSD)

L T P C

3 0 0 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To identify the importance and applications Wave Optics in various Streams of Engineering
2. To understand the working principle and applications of Lasers and Optical fibers.
3. To elucidate the importance, properties and applications of Magnetic materials and Dielectrics
4. To use ideas with mathematical solutions to Quantum mechanics and its applications in Various atomic phenomena
5. To provide knowledge about semiconductors and Nanomaterials.

UNIT-1: WAVE OPTICS

(7)

**Interference**- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index.

**Diffraction**- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit – Grating spectrum.

UNIT-2: LASERS & FIBER OPTICS

(9)

**Lasers**-Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

**Fiber optics**-Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Applications.

UNIT-3: DIELECTRIC MATERIALS & MAGNETIC MATERIALS

(9)

**Dielectric Materials**-Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation.

**Magnetic Materials**-Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro-Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

UNIT -4: QUANTUM MECHANICS, FREE ELECTRON AND BAND THEORY OF SOLIDES (10)

**Quantum Mechanics**- Dual nature of matter – Schrodinger's time independent and dependent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well

**Free Electron Theory**-Classical free electron theory (Merits and demerits only) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Fermi-Dirac distribution – Density of states – Fermi energy.

**Band theory of Solids**- Bloch's Theorem (Qualitative) – Kronig-Penney model (Qualitative)

– E vs K diagram – Classification of crystalline solids – Effective mass of electron –  $m^*$  vs K diagram – Concept of hole.

UNIT -5: SEMICONDUCTOR PHYSICS & NANOMATERIALS

(10)

Introduction- Intrinsic and extrinsic semiconductor (Qualitative Analysis) – Carrier transport in Semiconductors - Drift & Diffusion –Einstein Equation – Direct and indirect band Gap Semiconductors- Hall Effect and its applications

NANOMATERIALS –Types of Nanomaterials (One dimensional, Two dimensional and Three-dimensional Nanomaterials) - Significance of Nanoscale - surface to, volume ratio –Quantum Confinement effect- Synthesis of Nanomaterials - Ball milling Method - Chemical vapour deposition methods –Optical, thermal, mechanical and electrical properties of Nanomaterials - Applications of Nanomaterials.

TOTAL HOURS: 45



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES  
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**COURSE OUTCOME:**

On successful completion of the course the students will be able to		POs related to COs
CO1	Identify the importance and applications Wave Optics in various Streams of Engineering	PO1, PO2
CO2	Understand the working principle and applications of Lasers and Optical fibers	PO1,PO2
CO3	To elucidate the importance, properties and applications of Magnetic materials and dielectrics	PO1, PO2
CO4	Use ideas with mathematical solutions to Quantum mechanics and its applications in various atomic phenomena	PO1,PO2,
CO5	Provide knowledge about semiconductors and Nanomaterials	PO1,PO2,PO12

**TEXT BOOKS:**

1. Palanisamy , "Engineering Physics", Palanisamy, Scitech Publications.
2. K.Thyagarajan , "Engineering Physics", McGraw Hill Publications.
3. Maninaidu, "Engineering Physics", Pearson Publications.

**REFERENCE BOOKS:**

1. Kittel, "Solid State Physics", Wiley Publications.
2. Gaur and Gupta, "Engineering Physics", Dhanpatrai Publications.

**REFERENCE WEBSITE:**

1. <https://www.youtube.com/watch?v=PEXSH8dB-Uk>
2. <https://www.youtube.com/watch?v=YvrwVK9ZqQY>
3. <https://www.digimat.in/nptel/courses/video/115107095/L01.html>
4. <https://www.youtube.com/watch?v=6QUFuZpCgGw>
5. <https://www.youtube.com/watch?v=etjZmdmrjSU>
6. <https://nptel.ac.in/courses/115/105/115105122/>
7. <https://nptel.ac.in/courses/108/108/108108122/>
8. <https://nptel.ac.in/courses/118/104/118104008/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	2
CO*	3	2	-	-	-	-	-	-	-	-	-	2



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**I B.Tech. – II Semester**

<b>20ESC111</b>	<b>ENGINEERING GRAPHICS</b>	<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
	<b>(Common to all branches)</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To expose them to existing national standards related to technical drawings and develop knowledge of basic engineering curves.
2. To develop drawing skills for communication of concepts, ideas and design of projections of points, lines and planes.
3. To develop geometrical shapes and multiple views of projections of solids and sections of solids.
4. To develop drawing skills for communication of concepts, ideas and design the development of surfaces of objects and isometric views.
5. To develop geometrical shapes and multiple views of orthographic projections of solids and perspective views.

**CONCEPTS AND CONVENTIONS (Not for Examination) (3)**

Importance of drawings in engineering applications - Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets - Lettering, numbering and dimensioning – Basic geometrical constructions – Scales.

**UNIT – 1: ENGINEERING CURVES (9)**

**Engineering Curves:** Conics – Construction of ellipse, parabola and hyperbola by eccentricity method and rectangular hyperbola – Construction of cycloid, epi cycloid and hypo cycloid – Involute of square, circle, pentagon and hexagon – Drawing of tangents and normal to the above curves

**UNIT – 2: PROJECTION OF POINTS, LINES AND PLANE SURFACES (12)**

**Projection of Points:** Principles of orthographic projection – First angle and third angle projections – Projection of points. **Projection of Lines:** Projection of straight lines (only first angle projections) inclined to one and both the principal planes – Determination of true lengths, true inclinations by rotating line and trapezoidal method and traces. **Projection of Planes:** Planes (polygonal and circular surfaces) inclined to both the principal planes by change of position method.

**UNIT – 3: PROJECTION OF SOLIDS AND SECTION OF SOLIDS (12)**

**Projection of Solids:** Projection of simple solids like prisms, pyramids, cylinder and cone, when the axis is inclined to one principal plane. **Section of Solids:** Sectioning of right regular solids like prisms, pyramids, cylinder and cone, solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other plane – Obtaining true shape of section.

**UNIT – 4: DEVELOPMENT OF SURFACES AND ISOMETRIC PROJECTIONS (12)**

**Development of Surfaces:** Development of lateral surfaces of simple and sectioned solids like prisms, pyramids, cylinder and cone. **Isometric Projection:** Principles of isometric projection – Isometric scale – Isometric views of simple solids and truncated solids like prisms, pyramids, cylinder and cone – Combination of two solid objects in simple vertical positions.

**UNIT – 5: ORTHOGRAPHIC PROJECTIONS AND PERSPECTIVE PROJECTIONS (1)**

**Orthographic Projections:** Visualization principles – Plane of projections – Representation of three dimensional objects – Layout of views – Sketching of multiple views from pictorial views of objects. **Perspective Projection:** Perspective projection of simple solids like prisms and pyramids by visual ray method.

**Total Hours: 60**



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**COURSE OUTCOMES:**

<b>ON SUCCESSFUL COMPLETION OF THE COURSE, STUDENTS WILL BE ABLE TO</b>		<b>POS RELATED TO COS</b>
<b>CO1</b>	Construct the Engineering curves and generate tangent and normal for those curves.	<b>P01,P02,P03,P10</b>
<b>CO2</b>	Draw the projection of points, lines and plane surfaces.	<b>P01,P02,P03, P10</b>
<b>CO3</b>	Draw the projection of solids, sections of solids like prisms, pyramids, cylinder and cone.	<b>P01,P02,P03, P10</b>
<b>CO4</b>	Draw the isometric projections and views and also develop the development of surfaces.	<b>P01,P02,P03, P10</b>
<b>CO5</b>	Draw the orthographic and perspective projections of solids.	<b>P01,P02,P03, P10</b>

**TEXT BOOKS:**

1. N.D. Bhatt and V. M. Panchal , "Engineering Drawing" , Charotar Publishing House, 50<sup>th</sup> edition, 2010.
2. K.V.Natrajan, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai. 2009.

**REFERENCES BOOKS:**

1. K.V.Natrajan , "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
2. Luzzader, Warren.J and Duff,John M, "Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. K.Venugopal and V.Prabhu Raja , "Engineering Graphics", New Age International (P) Limited. 2008.
4. M.B.Shah and B.C.Rana , "Engineering Drawing", Pearson Education, 2/e, 2009.
5. Basant Agarwal and C.M.Agarwal , "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, , 2008,

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/112/102/112102304/>
2. <https://nptel.ac.in/courses/112/105/112105294/>
3. <https://nptel.ac.in/courses/112/103/112103019/>
4. <https://nptel.ac.in/courses/112/104/112104172/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	2	2	-	-	-	-	-	-	1	-	-
<b>CO2</b>	3	3	3	-	-	-	-	-	-	1	-	-
<b>CO3</b>	3	3	3	-	-	-	-	-	-	1	-	-
<b>CO4</b>	3	3	3	-	-	-	-	-	-	2	-	-
<b>CO5</b>	3	3	3	-	-	-	-	-	-	2	-	-
<b>CO*</b>	<b>3</b>	<b>2.8</b>	<b>2.8</b>	-	-	-	-	-	-	<b>1.4</b>	-	-



**I B.Tech. – II Semester**

**20ESC115**

**PROGRAMMING WITH PYTHON  
(Common to All Branches)**

**L T P C  
2 1 0 3**

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

- 1:** To impart the basics of python and its IDEs.
- 2:** To understand the basic data structure in python.
- 3:** To familiarize with python GUI and files.
- 4:** To develop broad understanding of various object-oriented concepts in python.
- 5:** To introduce the python libraries for solving real-time problems.

**UNIT -1: BASICS OF PYTHON**

**(9)**

**Python programming language:** About Python- Introduction to various IDEs- IDLE- PyCharm, Spyder- Sublime text- Jupyter Notebook.

**Literals:** Numeric literals - String literals- Variables and Identifiers: Variable assignment and keyboard input – Identifiers - keywords and other predefined identifiers.

**Control Structures:** Sequential control- Selection control- Iterative control statements.

**UNIT -2: LISTS, DICTIONARIES AND SETS**

**(9)**

**Lists:** List structures - Common list operations - List traversal - Lists in Python - Python list type –Tuples – sequences - Nested lists - Iterating over lists in python.

**Dictionaries and Sets:** Dictionary types in Python - Set data type- Strings and its operations.

**UNIT -3: FUNCTIONS AND TEXT FILES**

**(9)**

**Functions:** Function declaration- Category of Functions- Parameter Passing -Keyword Arguments in Python - Default Arguments in Python - Variable Scope, Lambda function.

**Files:** Fundamentals – opening, reading and writing text files, .csv and .xlsx files.

**UNIT -4: OBJECT-ORIENTED CONCEPTS USED IN PYTHON**

**(9)**

Features of object-oriented programming-Fundamental concepts- Class- Encapsulation- Inheritance- Polymorphism. Object references - Turtle graphics - creating a Turtle Graphics Window - the “Default” Turtle - Fundamental Turtle Attributes and Behavior - Additional Turtle Attributes - Creating Multiple Turtles.

**UNIT -5: INTRODUCTION TO PYTHON LIBRARIES**

**(9)**

Python Libraries- Introduction to Libraries- Creating and Exploring Packages-Numpy, SciPy, matplotlib, Pandas, Scikit-learn- seaborn.

**Total hours: 45**

**COURSE OUTCOMES:**

<b>On successful completion of the course the student will be able to,</b>		<b>POs related to COs</b>
<b>CO1</b>	Identify and apply the appropriate control statements for solving problems.	<b>PO1, PO2, PO5</b>
<b>CO2</b>	Demonstrate knowledge of basic data structures and functions.	<b>PO1, PO3, PO4</b>
<b>CO3</b>	Analyse and apply the appropriate file handling mechanism.	<b>PO1, PO2, PO5</b>
<b>CO4</b>	Identify and implement the suitable object-oriented concepts.	<b>PO1, PO2, PO5</b>
<b>CO5</b>	Evaluate the real-world problems using python packages.	<b>PO1, PO4, PO5</b>





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**TEXT BOOKS:**

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2016.
2. John V. Guttag., "Introduction to computation and programming using python: with applications to understanding data", PHI Publisher, 2016.
3. John Hunt, "A Beginners Guide to Python 3 Programming", Springer Publishers, 2020.

**REFERENCE BOOKS:**

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second Edition, Shroff/O'Reilly Publishers, (<http://greenteapress.com/wp/thinkpython/>), 2016.
2. Charles Severance, "Python for everybody: exploring data in Python 3", Creative Commons Attribution-Non Commercial Share Alike 3.0 Unported License, 2016.

**REFERENCE WEBSITES:**

1. [https://onlinecourses.swayam2.ac.in/aic20\\_sp33](https://onlinecourses.swayam2.ac.in/aic20_sp33)
2. [https://onlinecourses.nptel.ac.in/noc22\\_cs32](https://onlinecourses.nptel.ac.in/noc22_cs32)
3. <https://spoken-tutorial.org>
3. <https://www.w3schools.com/python>.
4. <https://www.geeksforgeeks.org>.

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	2	-	-	-	-	-	-	-
CO2	3	-	3	2	-	-	-	-	-	-	-	-
CO3	3	3	-	-	2	-	-	-	-	-	-	-
CO4	3	3	-	-	2	-	-	-	-	-	-	-
CO5	3	-	-	2	2	-	-	-	-	-	-	-
CO*	3	2	3	2	2							



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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
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**I B.Tech. – II Semester**

**20BSC114**

**ENGINEERING CHEMISTRY LABORATORY  
(Common to ECE, EEE, CSE, CSM, CAI & CSD)**

**L T P C  
0 0 2 1**

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide solid foundation in chemistry laboratory to solve engineering problems.
2. To apply the theoretical principles and perform experiments on hardness of water
3. To apply the theoretical principles and perform experiments dissolved oxygen, alkalinity, and acidity.
4. To Illustrates the properties of analytical equipments like red wood, Viscometer and conductometry

**LIST OF EXPERIMENTS:**

1. Preparation of Standard EDTA solution and Estimation of Hardness of Water
2. Preparation of Standard EDTA and Estimation of Copper
3. Estimation of dissolved oxygen in given water sample
4. Estimation of alkalinity of water
5. Estimation of Acidity of water sample.
6. Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron
7. Preparation of Standard Potassium Dichromate and Estimation of Copper by Iodometry
8. Determination of strength of the given Hydrochloric acid against standard sodium hydroxide Solution by Conductometric titration
9. Conduct metric titration of  $BaCl_2$  Vs  $Na_2SO_4$  (Precipitation Titration).
10. Determination of viscosity of the given oils through Redwood viscometer

**COURSE OUTCOMES:**

On successful completion of the course the students will be able to		POs related to COs
CO1	Prepare standard solutions	PO1,PO3
CO2	Acquire knowledge about volumetric analysis of estimation copper by EDTA and by Iodometry	PO1,PO2,PO3
CO3	Acquire analytical skills in estimation of hardness of water, Alkanility and Acidity of water, dissolved oxygen in water and estimation of iron through laboratory methods	PO1,PO2,PO3,PO6,PO12
CO4	Acquire skills to use instrumental techniques for the determination of electrical conductance of electrolytes and viscosity of lubricants	PO1,PO2,PO3
CO5	Provide solutions for environmental issues through determination of quality of water	PO1,PO2,PO3,PO6,PO7
CO6	Communicate verbally and in written form pertaining to results of the Experiments	PO1,PO2,PO8,PO9,
CO7	Learns to perform experiments involving chemistry in future years.	PO1,PO2,PO8,PO9, PO10
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO1,PO2,PO8,PO9,PO10
CO9	Continue updating their skill related to chemistry laboratory.	PO1,PO2,PO8, PO9,PO10



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**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	-	-	-	-	-	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-
CO3	2	2	2	-	-	2	-	-	-	-	-	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	-	2	2	-	-	-	-	-
CO6	2	2	-	-	-	-	-	2	2	-	-	-
CO7	2	2	-	-	-	-	-	2	2	2	-	-
CO8	2	2	-	-	-	-	-	2	2	2	-	-
CO9	2	2	-	-	-	-	-	2	2	2	-	-
CO*	3	2	2	-	-	2	2	-	-	-	-	2



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**I B.Tech. – II Semester**

**20BSC115**

**ENGINEERING PHYSICS LABORATORY  
(Common to ECE, EEE, CSE, CSM)**

**L T P C  
0 0 2 1**

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To understand the concepts of interference, diffraction and their applications.
2. To understand the role of optical fiber parameters in communication.
3. Recognize the importance of energy gap in the study of conductivity
4. To illustrate the properties of Magnetic and their applications
5. To understand and evaluate the properties of materials and sounds

S. NO.	NAME OF THE EXPERIMENT
1	Diffraction grating - Measurement of wavelength of given Laser.
2	To determine the frequency of AC using Sonometer
3	Determination of magnetic field along the axis of a current carrying circular coil - Stewart Gees method
4	Determination of numerical aperture and acceptance angle of an optical fiber
5	Determination of particle size using a laser source
6	Parallel fringes – Determination of thickness of thin object using wedge method
7	Newton's rings – Determination of radius of curvature of given plano convex lens
8	B-H curve – Determination of hysteresis loss for a given magnetic material
9	Determination of Energy band gap of semiconductor
10	To find the rigidity modulus of the material using torsional pendulum

**TEXT BOOKS:**

1. Palanisamy , "Engineering Physics", Scitech Publications.
2. K.Thyagarajan , "Engineering Physics", McGraw Hill Publications.
3. Maninaidu, "Engineering Physics", Pearson Publications.

**Course Outcomes:**

On completion of the laboratory course the student will be able to		POs related to COs
<b>CO1</b>	Demonstrate Knowledge on measurement of various physical quantities using optical methods and fundamentals of magnetic fields	<b>PO1</b>
<b>CO2</b>	Identify different physical properties of materials like band gap, magnetic field intensity etc, for engineering and technological applications	<b>PO2</b>
<b>CO3</b>	Provide valid conclusions on phenomena Interference and Diffraction	<b>PO4</b>
<b>CO4</b>	Follow the ethical principles in implementing the programs	<b>PO8</b>
<b>CO5</b>	Do experiments effectively as an individual and as a team member in a group.	<b>PO9</b>
<b>CO6</b>	Communicate verbally and in written form, the understanding about the experiments.	<b>PO10</b>
<b>CO7</b>	Continue updating their skill related to loops, pointers and files implementing programs in future.	<b>PO12</b>



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CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	-	-	-	3	-	-
CO7	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	-	3	-	-	-	3	3	3	-	3



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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

**I B.Tech. – II Semester**

<b>20ESC112</b>	<b>ENGINEERING WORKSHOP AND IT WORKSHOP</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to all branches)</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide exposure to the students with hands on experience on various basic engineering practices in civil, mechanical and electrical engineering.
2. To include training on PC Hardware, Internet & World Wide Web and Productivity Tools including Word, Excel and Power Point.

**A. ENGINEERING WORKSHOP**

**TRADES FOR EXERCISES:**

1. **Carpentry:** Two exercises from: Middle T lap joint – Dove tail lap joint – Mortise and tenon joint from out of 300 x 50 x 35 mm soft wood stock.
2. **Sheet Metal:** Two exercise from: Square tray – Open scoop – Frustum of pyramid from out of 22 or 20 gauge G.I. sheet.
3. **Fitting:** Two exercises from: Square joint – V joint – Dove tail joint from out of 50 x 50 x 5 mm M.S. flat piece.
4. **House Wiring:** Two exercise from: Two lamps controlled by one switch in series and parallel – One lamp controlled by 2 two way switches (stair case) – Wiring for fluorescent lamp.
5. **Plumbing:** Two exercise from: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
6. **Machining:** Exercise on drilling and tapping.

**TRADES FOR DEMONSTRATION:**

- a. Lathe machine.
- b. Grinding machine.
- c. Arc and gas welding.

**COURSE OUTCOMES (ENGINEERING WORKSHOP):**

<b>On successful completion of the course, students will be able to</b>		<b>POs related to COs</b>
<b>CO1</b>	Demonstrate the knowledge on different tools used in carpentry, fitting, sheet metal, house wiring and plumbing sections and also basic machining process	<b>PO1</b>
<b>CO2</b>	Analyze the basic pipeline connection using different joints	<b>PO2</b>
<b>CO3</b>	Design and develop simple components by using different materials includes wood, GI sheet and MS plates	<b>PO3</b>
<b>CO4</b>	Apply basic electrical engineering tools on the house wiring practice	<b>PO5</b>
<b>CO5</b>	Follow the ethical principles in while doing the exercises.	<b>PO8</b>
<b>CO6</b>	Do the exercises effectively as an individual and as a team member in a Group	<b>PO9</b>
<b>CO7</b>	Communicate verbally among team members and in written form, the understanding about the trade exercises.	<b>PO10</b>
<b>CO8</b>	Continue updating their skill related to trades.	<b>PO12</b>



**TEXT BOOKS:**

1. Lab manual provided by the department.

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	2	2	-	2	-	-	3	3	3	-	3

**B. IT WORKSHOP**

**PC HARDWARE**

1. Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
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. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.
3. Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
4. 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
5. **Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva
6. **Software Troubleshooting:** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

**LATEX AND WORD**

7. Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
8. Using LaTeX and Word to create project certificate. Features to be covered: -Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.



**EXCEL**

9. Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.
10. Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

**LATEX AND MS/EQUIVALENT (FOSS) TOOL POWER POINT**

11. Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and PowerPoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).
12. Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

**INTERNET & WORLD WIDE WEB**

13. **Internet & World Wide Web -Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

14. **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of the instructors. Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computers to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer.

**COURSE OUTCOMES (IT WORKSHOP):**

On the successful completion of this course, the student should be able to,		POs related to COs
CO1	Acquire knowledge on computer system such as system unit, input devices, and output devices connected to the computer.	PO1
CO2	Demonstrate the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.	PO2
CO3	Demonstrate the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc.	PO3
CO4	Familiarize with parts of MS Office, To create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.	PO5
CO5	Follow the ethical principles in implementing the programs	PO8
CO6	Do experiments effectively as an individual and as a team member in a group.	PO9





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<b>CO7</b>	Communicate verbally and in written form, the understanding about the experiments and	<b>PO10</b>
<b>CO8</b>	Continue updating their skill related to MS Office, Internet and Computer in future.	<b>PO12</b>

**REFERENCE BOOKS:**

1. Vikas Gupta, "Comdex Information Technology course tool kit" , WILEY Dream tech, New Delhi, 2003.
2. Cheryl A Schmidt, "The Complete Computer upgrade and repair book", WILEY Dream Tech, New Delhi, 3/e, 2008.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, New Delhi, ,2008
4. Kate J. Chase , "PC Hardware and A+ Handbook", Microsoft press, 2004.
5. Leslie Lamport, Addison Wesley, "LaTeX Companion, New Delhi, 2/e, 2002
6. David Anfinson and Ken Quamme , "IT Essentials PC Hardware and Software Companion Guide", CISCO Press, Pearson Education, New Delhi, 3/e, 2008.
7. Patrick Regan , "IT Essentials PC Hardware and Software Labs and Study Guide", CISCO Press, Pearson Education, New Delhi, 3/e, 2008, ,
8. S.J. Bigelow , "Troubleshooting, Maintaining and Repairing PCs", TMH, New Delhi, 5/e, 2008.

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-
<b>CO3</b>	-	-	3	-	-	-	-	-	-	-	-	-
<b>CO4</b>	-	-	-	3	-	-	-	-	-	-	-	-
<b>CO5</b>	-	-	-	-	3	-	-	-	-	-	-	-
<b>CO6</b>	-	-	-	-	-	-	-	3	-	-	-	-
<b>CO7</b>	-	-	-	-	-	-	-	-	3	-	-	-
<b>CO8</b>	-	-	-	-	-	-	-	-	-	3	-	-
<b>CO9</b>	-	-	-	-	-	-	-	-	-	-	-	3
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	-	-	<b>3</b>	<b>3</b>	<b>3</b>	-	<b>3</b>



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(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**20ESC118**

**I B.Tech. – II Semester  
PROGRAMMING WITH PYTHON LAB  
(Common to all branches)**

**L T P C  
0 0 3 1.5**

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

- 1: To understand the basic IDEs in python.
- 2: To gain expertise for problem solving using control structures in python
- 3: To develop the python programs using functions.
- 4: To solve various engineering problems using different data structures.
- 5: To gain knowledge on python libraries.

**RECOMMENDED SYSTEMS/SOFTWARE REQUIREMENTS:**

- For Windows: IDLE/ Spyder python development environment.
- For Linux: Default python version installed/ higher version.

**LIST OF TASKS:**

**TASK-1: BASICS**

- a) Develop a simple python scripts to illustrate numeric literals and string literals.
- b) Write a Python Program to Convert Kilometres to Miles

**TASK-2: LOOPS**

- a) Write a python Program to Make a Simple Calculator
- b) Write a python program that reads a rating from the user and indicates whether the performance was unacceptable, acceptable or meritorious. The amount of the employee’s raise should also be reported. Your program should display an appropriate error message if an invalid rating is entered. (The amount of an employee’s raise is \$2400.00 multiplied by their rating).

Rating	Meaning
0.0	Unacceptable performance
0.4	Acceptable performance
0.6 or more	Meritorious performance

**TASK-3: LOOPS**

- a) Write a program containing a pair of nested while loop that displays the integer values 1–100. Ten numbers per row - with the columns aligned as shown below

```

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30

```

91 92 93 94 95 96 97 98 99 100

- b) Display the integer values 1–100 as given in question 3a) using only *one* while loop.

**TASK-4: DICTIONARIES**

- a) Write a Python script to generate all the possible spellings of the last four digits of any given phone number – use Dictionaries.

**TASK-5: STRINGS**

- a) Write a program to figure out if the register number format is correct or not using a Python code. (Hint: sample register number format- 20751A0500). Use string methods to solve the above problem.



### TASK-6: FUNCTIONS

- a) Write a function that generates a random password. The password should have a random length of between 7 and 10 characters. Each character should be randomly selected from positions 33 to 126 in the ASCII table. Your function will not take any parameters. It will return the randomly generated password as its only result. Display the randomly generated password in your file's main program. Your main program should only run when your solution has not been imported into another file.

### TASK-7: PATTERN PRINTING

- a) Write a python program to print half pyramid pattern with star (asterisk)

```
*
* *
* * *
* * * *
* * * * *
```

- b) Write a python program to print the characters/alphabets in right-angled triangle pattern.

```
A
B C
D E F
G H I J
K L M N O
P Q R S T U
V W X Y Z [ \
```

### TASK-8: TURTLE

- a) Write a python program to draw the basic shapes using turtle (Hint: Square, circle, triangle).

### TASK-9: FILES

- a) Write a python script to create a simple text file. Write the contents into the created file and read the contents from the file and display the same on to the console screen.  
b) Write a python script to Create and write on excel file using xlsxwriter module.  
c) Write a python script to write the contents into a csv file.

### TASK 10: FILE HANDLING

Write a python program to perform the following tasks:

- a) Copy the contents of one file into another file.  
b) Count number of lines in a file.  
c) Count number of characters in a file.  
d) Count number of words in a file.

### TASK 11: INHERITANCE

- a) Write a python program to illustrate the inheritance concept.

### TASK-12: MATH LIBRARIES

- a) Write a python program to calculate area of a circle. Use the pi constant in the math module in your calculations. (Area of the circle =  $\pi r^2$ )  
b) Write a python program to calculate Volume of a sphere. Use the pi constant in the math module in your calculations. (Volume of a sphere =  $\frac{4}{3}\pi r^3$ ).

### TASK-13: PANDAS

- a) Write a Pandas program to create a line plot of the historical stock prices of a company between two specific dates.



**TASK-14: PANDAS**

- a) Write a Pandas program to create a bar plot of the trading volume of a company stock between two specific dates.

**COURSE OUTCOMES:**

<b>On successful completion of this course the students should be able to:</b>		<b>POs related to COs</b>
<b>CO1</b>	Learn various problem solving approaches and ability to identify an appropriate approach to solve the problem	<b>PO1, PO2, PO3, PO5</b>
<b>CO2</b>	Implement conditionals and loops to design the python programming	<b>PO1, PO2, PO3, PO5</b>
<b>CO3</b>	Implement lists, set, tuples and dictionaries to develop python program.	<b>PO1, PO2, PO3, PO5</b>
<b>CO4</b>	Able to modulate the given problem using structural approach of programming	<b>PO1, PO2, PO3, PO5</b>
<b>CO5</b>	Build Python Programs using packages to solve real-time problems.	<b>PO1, PO2, PO3, PO4, PO5</b>
<b>CO6</b>	Follow the ethical principles in implementing the programs	<b>PO8</b>
<b>CO7</b>	Do experiments effectively as an individual and as a team member in a group.	<b>PO9</b>
<b>CO8</b>	Communicate verbally and in written form, the understanding about the experiments.	<b>PO10</b>
<b>CO9</b>	Continue updating their skill related to lists, tuples and dictionaries implementing programs in future.	<b>PO12</b>

**REFERENCE BOOKS:**

1. John V. Guttag., "Introduction to computation and programming using python: with applications to understanding data", PHI Publisher, 2016.
2. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2016.
3. John Hunt, "A Beginners Guide to Python 3 Programming", Springer Publishers, 2020.

**REFERENCE WEBSITES:**

1. [https://onlinecourses.swayam2.ac.in/aic20\\_sp33](https://onlinecourses.swayam2.ac.in/aic20_sp33)
2. [https://onlinecourses.nptel.ac.in/noc22\\_cs32](https://onlinecourses.nptel.ac.in/noc22_cs32)
3. <https://spoken-tutorial.org>
4. <https://www.w3schools.com/python>.
5. <https://www.geeksforgeeks.org>.

**CO-PO Mapping:**

<b>CO-PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	3	3	3	-	2	-	-	-	-	-	-	-
<b>CO2</b>	3	3	3	-	2	-	-	-	-	-	-	-
<b>CO3</b>	3	3	3	-	2	-	-	-	-	-	-	-
<b>CO4</b>	3	3	3	-	2	-	-	-	-	-	-	-
<b>CO5</b>	3	3	3	3	2	-	-	-	-	-	-	-
<b>CO6</b>	-	-	-	-	-	-	-	3	-	-	-	-
<b>CO7</b>	-	-	-	-	-	-	-	-	3	-	-	-
<b>CO8</b>	-	-	-	-	-	-	-	-	-	3	-	-
<b>CO9</b>	-	-	-	-	-	-	-	-	-	-	-	3
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>-</b>	<b>3</b>



I B.Tech. – II Semester

20MAC121

HUMAN VALUES AND ETHICS  
(Mandatory Audit Course)

L T P C  
2 0 0 0

PRE-REQUISITES: Nil

**COURSE EDUCATIONAL OBJECTIVES:**

- 1: To provide Knowledge in remembering Human Values.
- 2: To understand about Human Esteem.
- 3: To apply basic guidelines on Value Education.
- 4: To analyze the concepts of Happiness and Prosperity.
- 5: To evaluate the value of one's body as an instrument.

**UNIT -1: HUMAN VALUES**

(9)

Morals – Values – Ethics – Human Values – Integrity - Work Ethic – Service – Learning – Civic Virtue

**UNIT -2: HUMAN ESTEEM**

(9)

Respect for others – living peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Cooperation – Commitment – Empathy – Self Confidence – Character – Spirituality

**UNIT -3: VALUE EDUCATION.**

(9)

Understanding the need – Basic guidelines – content and process for value education – self exploration – its content and process – Natural acceptance and experiential validation as the mechanism for self exploration.

**UNIT -4: HAPPINESS AND PROSPERITY**

(9)

Continuous Happiness and Prosperity – Basic Human aspirations – right understanding – relationship and physical facilities – the basic requirements for fulfillment of aspirations.

**UNIT -5: UNDERSTANDING THE BODY**

(9)

Understanding the body as an instrument of 'I' ('I' being the doer, seer, and enjoyer) – understanding Harmony in the family – the basic unit of human interaction..

**TOTAL HOURS: 45**

**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Remember the concepts on developing Human Values and Ethics.	PO1
CO2	Understand and Develop Knowledge on Human Esteem.	PO8
CO3	Apply basic guidelines on Value Education	PO3,PO6
CO4	Analyze and follow How to maintain happiness and Prosperity.	PO4
CO5	Evaluate the Value of Oneself as an Instrument.	PO4

**REFERENCE BOOKS:**

1. R.S. Naagarazan, "A Text Book on Professional Ethics and Human Values", New age International Publishers, New Delhi, 2014.
2. Jayshree Suresh & B.S.Raghavan, "Human Values and Professional Ethics", S. Chand & Company, New Delhi, 2010.
3. R.R Gaur, R Sangal, G P Bagaria, "The text book, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010.
4. R.R Gaur, R Sangal, G P Bagaria, "The teacher's manual, A foundation course in Human Values and professional Ethics – Teachers Manual", Excel books, New Delhi, 2010.



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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**REFERENCE WEBSITE:**

1. <https://www.vlab.co.in/broad-area-electronics-and-communications>
2. <https://nptel.ac.in/courses/122/106/122106025>
3. <https://nptel.ac.in/courses/117/103/117103063>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	3	-	-	3	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-
CO*	3		3	3		3		3				



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**AUTONOMOUS**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**II B.Tech - III Semester**

<b>20BSC233</b>	<b>MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE</b>	<b>L T P C</b>
	(Common to CSE, CSM, CAI, CSD)	<b>2 1 0 3</b>

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. To gain the knowledge on connectives and relate the laws of logic to find the disjunctive normal form and conjunctive normal form of compound proposition.
2. To learn the various concepts related to predicate logic.
3. To perform the operations associated with sets, functions, and relations and study the basic Properties of lattices.
4. To understand the concept of groups, Abelian groups and group homomorphism and isomorphism.
5. To study the fundamentals of graphs, sub graphs, planar graphs, Hamiltonian graphs, Euler graphs, Spanning trees and graph traversals.

**UNIT –1: MATHEMATICAL LOGIC (9)**

Mathematical logic: Statements and Notations - Connectives(Negation, Conjunction , Disjunction, Conditional and Biconditional) - Statements Formulas and Truth Tables - Well-Formed Formulas, Tautologies - Equivalence of Formulas - Duality Law - Tautological Implications - Normal Forms(DNF, CNF, PDNF, PCNF) - Theory of Inference for Statement Calculus: Validity using Truth tables - Rules of Inference - Consistency of Premises and Indirect Method of Proof.

**UNIT –2: PREDICATE CALCULUS (9)**

Predicates – open statements-Quantifiers- Variables- Free and Bound Variables -Truth value of a quantified statements- Two rules of Inference-Logical equivalence- Rules for negation of a quantified statements- Theory of Inference for Predicate Calculus - statements with more than one variable.

**UNIT –3: RELATIONS & FUNCTIONS (9)**

Relations: Properties of Binary Relations, Equivalence Relations - Compatibility and Partial Ordering Relations - Hasse Diagram - Lattices (Basic Concepts) - Functions: Inverse function - Composition of Functions - Recursive Functions - Pigeon Hole Principles and its Applications.

**UNIT –4: ALGEBRAIC STRUCTURES (9)**

Algebraic Systems - Examples and General Properties - Semi Groups - Monoids - Groups and Subgroups - Homomorphism and Isomorphism.

**UNIT –5: GRAPH THEORY (9)**

Basic Terminology - Multi Graphs - Weighted Graphs - Digraphs and Relations - Representations of Graphs (Incidence Matrix, Adjacency Matrix) - Operations on Graphs - Isomorphism and Sub Graphs. Paths and Circuits - Graph Traversals(DFS, BFS) - Eulerian Paths and Circuits - Hamiltonian Paths and Circuits - Planar Graph - Graph Coloring - Spanning Trees - Minimum Spanning Trees - Kruskal's Algorithm - Prim's Algorithm.

**Total Hours: 45**



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**AUTONOMOUS**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
<b>CO1</b>	Understand the validity of statements using connectives, tautologies, equivalence, implications and solve the problems using normal forms.	<b>PO1, PO2, PO3</b>
<b>CO2</b>	Solve the problems using statement calculus, predicate calculus and analyze the equivalence of quantified statements.	<b>PO1, PO2, PO3</b>
<b>CO3</b>	Identify and describe various types of relations (Compatibility, Partial ordering and Equivalence relations) and analyze the functions concepts and distinguish different types of functions.	<b>PO1, PO2, PO3, PO4</b>
<b>CO4</b>	Understand the concept of groups, Abelian groups and analyze whether the given set satisfies the properties of group or not.	<b>PO1, PO2</b>
<b>CO5</b>	Design network applications using Prim's and Kruskal's Algorithms and Demonstrate different traversal methods for graphs.	<b>PO1, PO2, PO3, PO4</b>

**TEXT BOOKS:**

1. J.P. Tremblay and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 27/e, Tata McGraw Hill Publishers, 2006, New Delhi.
2. C.L. Liu, D.P. Mohapatra, "Elements of Discrete Mathematics – A Computer Oriented Approach", 3/e, Tata McGraw Hill Publishers, 2008, New Delhi.
3. D.S. Chandrasekharaiah, "Mathematical Foundations of Computer Science", 3/e, Prism Books Pvt. Ltd., 2001. Bangalore

**REFERENCE BOOKS:**

1. Ralph. P. Grimaldi, "Discrete and Combinational Mathematics – An Applied introduction", 5/e, Pearson Education, 2008, New Delhi.
2. Kenneth H. Rosen, "Discrete Mathematics and its applications", 6/e, Tata McGraw Hill Publishers, New Delhi.
3. Mott, Kandel, Banker, "Discrete Mathematics for Computer Scientists & Mathematicians", 2/e, Prentice Hall India, 2007, New Delhi.
4. Lipschutz, Lipson, Schaum's outlines, "Discrete Mathematics", 2/e, Tata McGraw Hill Publishers, 2006, New Delhi.
5. Gary Haggard, John Schlipf, Sue Whitesides, "Discrete Mathematics for Computer Science", 4/e, Thomson Publications, 2008, New Delhi.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/106/108/106108227/>
2. <https://nptel.ac.in/courses/106/103/106103205/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	3	3	--	-	-	-	-	-	-	-	-
<b>CO2</b>	3	3	3	--	-	-	-	-	-	-	-	-
<b>CO3</b>	3	3	2	3	-	-	-	-	-	-	-	-
<b>CO4</b>	2	3	--	--	-	-	-	-	-	-	-	-
<b>CO5</b>	3	3	3	3	-	-	-	-	-	-	-	-
<b>CO*</b>	2.8	3	2.75	3	-	-	-	-	-	-	-	-





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**AUTONOMOUS**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**II B.Tech. – III Semester**

<b>20ESC237</b>	<b>DIGITAL LOGIC DESIGN AND MICROPROCESSOR</b> (Common to CSE, CSM, CAI, CSD)	<b>L T P C</b>
		<b>2 1 0 3</b>

**PRE-REQUISITES:** Nil

**Course Educational Objectives:**

1. To Provide Knowledge On number systems, coding and basic logic functions.
2. To develop skill to minimize switching functions in effective way using K-MAP
3. To develop skill to design combinational logic circuits.
4. To provide knowledge on architecture of 8086 microprocessor.
5. To develop the skill on programming of 8086 and 8051 microcontroller

**UNIT -1: NUMBER SYSTEMS & CODES (9)**

Review of Number Systems- Binary Arithmetic-Subtraction with  $r$  and  $(r-1)$ 's Complements- Weighted & Non Weighted Codes- Error Detection and Error Correction Codes- Hamming Code, Introduction to ASCII code - Basic Logic Operations of (NOT, OR, AND), Universal Gates - EX-OR & EX-NOR Gates.

**UNIT- 2: MINIMIZATION OF LOGIC FUNCTIONS (9)**

Boolean Algebra : Boolean Theorems- Complement and Dual of Logical Expressions- Minimization of Logic Functions using Demorgan's Theorems. Standard SOP and POS, Minimal SOP and POS Realization, Minimization of Switching Functions using K-Map upto 5 variables.

**UNIT -3: COMBINATIONAL & SEQUENTIAL LOGIC CIRCUITS (9)**

Design of Half Adder - Full Adder - Half Subtractor- Full Subtractor- 4-Bit Binary Adder-4-Bit Adder Subtractor- BCD Adder- Magnitude Comparator – Decoder- Encoder- Multiplexer – De Multiplexer. Basic Latches & Flip Flops-SR, D, JK, T – Design of Shift Registers-Universal Shift Register, Design of Synchronous and Asynchronous Counters.

**UNIT-4: INTRODUCTION TO 8086 MICROPROCESSOR (9)**

8085 Overview, 8086 Internal Architecture- Register Organization, Memory Segmentation, Flag Register, Pin Configuration, Minimum and Maximum Mode Signals, Interrupts in 8086.

**UNIT -5: 8086 INSTRUCTION SET & 8051 MICROCONTROLLER (9)**

Instruction set of 8086, Assembler directives, Simple programs involving arithmetic, logical, branch instructions, Overview of 8051 microcontroller, Architecture, I/O ports and Memory organization, addressing modes and instruction set of 8051 (Brief details only), Simple Programs

**Total Hours: 45**



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**Course Outcomes:**

On successful completion of the course the student will be able to		POs related to COs
CO1	Demonstrate knowledge on types and conversion of number systems, Error Detection and Error Correction arithmetic and logical operations of different radix and applying boolean algebra for switching functions reduction.	PO1, PO2
CO2	Identify the most efficient grouping to minimize the switching functions using k-map.	PO1,PO2
CO3	Design the combinational logic circuits and realize for given specifications.	PO1,PO2,PO3
CO4	Understand the knowledge 8086 microprocessor and its architecture	PO1,PO2,PO3
CO5	Analyze the instruction set of 8086 and 8051 microcontroller architecture and instruction set.	PO1,PO2,PO3,PO4

**TEXT BOOKS:**

1. Morris Mano, "Digital Design", Prentice Hall of India, 3/e, 2006.
2. Thomas L.Floyd, "Digital Fundamentals", Pearson/Prentice Hall, 10/e, 2008.
3. A.K.Ray and K.M.Bhurchandi, "Advanced microprocessor and Peripherals", Tata Mc-Graw Hill, 2/e, 2000.
4. Kenneth.J.Ayala, The 8051 microcontroller, 3rd edition, Cengage Learning, 2010

**REFERENCE BOOKS:**

1. Charles H.Roth, "Fundamentals of Logic Design", Thomas Publications, 5/e, 2004.
2. Zvi Kohavi, "Switching and Finite Automata Theory", Tata McGraw Hill, 2/e, 1978.
3. Ronald J. Tocci, Neal S. Widmer, "Digital Systems Principles and Applications", 8/e, Pearson Education, 2002.
4. Douglas V. Hall, "Micro Processors & Interfacing", Tata McGraw Hill, 2/e, 2007.
5. Walter A.Triebel, Avtar Singh, "The 8088 and 8086 microprocessors", Prentice Hall of India, 1/e, 2003.

**REFERENCE WEBSITES:**

1. [https://www.csie.ntu.edu.tw/~pjcheng/course/asm2008/asm\\_ch2\\_dl.pdf](https://www.csie.ntu.edu.tw/~pjcheng/course/asm2008/asm_ch2_dl.pdf)
2. <https://nptel.ac.in/courses/117/105/117105080/>
3. <https://nptel.ac.in/courses/108/103/108103157/>

**CO-PO Mapping**

CO\PO	CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO.1</b>	CO1	3	3	-	-	-	-	-	-	-	-	-	-
<b>CO.2</b>	CO2	3	3	-	-	-	-	-	-	-	-	-	-
<b>CO.3</b>	CO3	3	2	2	-	-	-	-	-	-	-	-	-
<b>CO.4</b>	CO4	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO.5</b>	CO5	3	2	3	2	-	-	-	-	-	-	-	-
<b>CO*</b>	CO*	<b>3</b>	<b>2.6</b>	<b>2.3</b>	<b>2</b>	-	-	-	-	-	-	-	-



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**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**II B.Tech - III Semester**

**20CSM231**

**ADVANCED DATA STRUCTURES AND ALGORITHMS**

**L T P C**  
**3 0 0 3**

**PRE-REQUISITES:** A course on C and Data Structures

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide knowledge on different object-oriented programming concepts.
2. To develop skills to analyze the complexity of algorithms and to review Stack and Queue ADTs.
3. To enhance skill to work on non-linear data structures concepts and Hashing.
4. To learn about greedy, divide and conquer algorithms using relevant data structures.
5. To develop skill to apply different pattern matching algorithms and tries concepts.

**UNIT –1: INTRODUCTION TO C++**

**(9)**

Class & Objects- Class Members- Access Control- Constructors and Destructors- Inheritance Basics- Base and Derived Classes- Inheritance Types- Base Class Access Control- Polymorphism-Operator Overloading- Function Overloading- Runtime Polymorphism using Virtual Functions- Generic Programming- Function and Class Templates.

**UNIT –2: INTRODUCTION TO ALGORITHMS & LINEAR DATA STRUCTURES**

**(9)**

Algorithm - Pseudo Code for Expressing Algorithms - Performance Analysis- Space Complexity - Time Complexity- Asymptotic Notation - Big Oh Notation - Omega Notation - Theta Notation and Little Oh Notation.

Stack ADT – Stack Operations - Implementation using Template Classes in C++ - Queue ADT – Queue Operations - Implementation using Template Classes in C++.

**UNIT –3: NON LINEAR DATA STRUCTURES AND HASHING**

**(9)**

Trees: Binary Search Tree – Definitions & Operations-Implementation using C++ - AVL Trees – Definitions & Operations - B-Trees – Definitions & Operations.

Hash Functions: Collision Resolution - Separate Chaining- Open Addressing-Linear Probing - Quadratic Probing.

**UNIT –4: DIVIDE AND CONQUER, GREEDY METHOD**

**(9)**

Divide and Conquer: General Method - Applications-Binary Search – Quick Sort - Merge Sort- Strassen's Matrix Multiplication.

Greedy Method: General Method –Applications- Job Sequencing with Deadlines - Knapsack Problem - Minimum Cost Spanning Trees - Single Source Shortest Path Problem.

**UNIT –5: PATTERN MATCHING ALGORITHMS AND TRIES**

**(9)**

Pattern Matching Algorithms: Brute Force Algorithm - Boyer Moore Algorithm –Knuth Morris Pratt Algorithm –Applications - Tries: Standard Tries - Compressed Tries - Suffix Tries – Applications.

**Total Hours: 45**



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**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
<b>CO1</b>	Identify and apply the concepts of Object Oriented programming for real-world problems.	<b>PO1, PO2</b>
<b>CO2</b>	Analyze step by step and develop algorithms to solve real world problems, implement the data structures like Stack and Queue ADTs	<b>PO1, PO2, PO3</b>
<b>CO3</b>	Understand and apply the advanced trees concepts and appropriate hashing technique for solving real world problems.	<b>PO1, PO4, PO5</b>
<b>CO4</b>	Understand about greedy, divide and conquer algorithms using relevant data structures.	<b>PO1, PO2</b>
<b>CO5</b>	Recognize suitable pattern matching algorithms and Trie techniques for various applications.	<b>PO1, PO2, PO4</b>

**TEXT BOOKS:**

1. Wisnu Anggoro, "C++ Data Structures and Algorithms", Packt Publishing, 2018.
2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++", Pearson Education Ltd., 4/e, New Delhi, 2014.

**REFERENCE BOOKS:**

1. Rajesh K. Shukla, "Data Structures Using C & C++", Wiley Publishing, 2019.
2. Ananda Rao Akepogu and Radhika Raju Palagiri, "Data structures and Algorithms using C++", 2/e, Pearson Education, 2012, New Delhi.
3. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/106/102/106102064/>
2. <https://nptel.ac.in/courses/106/106/106106127/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	3	-	-	-	-	-	-	-	-	-	-
<b>CO2</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO3</b>	3	-	-	3	2	-	-	-	-	-	-	-
<b>CO4</b>	3	2	-	-	-	-	-	-	-	-	-	-
<b>CO5</b>	3	3	-	3	-	-	-	-	-	-	-	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	-	-	-	-	-	-	-



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**II B.Tech - III Semester**

**20CSE231**

**COMPUTER ORGANIZATION AND ARCHITECTURE**

**L T P C**

(Common to CSE, CSM, CAI, CSD)

**3 0 0 3**

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. To conceptualize the basics of organizational and architectural issues of a digital computer.
2. To articulate design issues in the development of processor or other components that satisfy design requirements and objectives.
3. To study various data transfer techniques in digital computer and the design of control unit.
4. To learn the function of each element of a memory hierarchy and I/O devices.
5. To develop skill to apply the concept of Pipelining in designing multiprocessor system.

**UNIT –1: BASIC STRUCTURE OF COMPUTERS (9)**

Computer Types - Functional Units - Basic Operational Concepts - Bus Structures – Software – Performance - Multiprocessors and Multi Computers - Data Representation- Fixed Point Representation - Floating Point Representation - Error Detection Codes.

**UNIT –2: CPU DESIGN AND COMPUTER ARITHMETIC (9)**

CPU Design: Instruction Cycle - Memory Reference Instructions–Input/output and Interrupt -Addressing Modes - DATA Transfer and Manipulation - Program Control  
 Computer Arithmetic: Addition and Subtraction - Multiplication Algorithms - Division Algorithms -Floating Point Arithmetic Operations - Decimal Arithmetic Unit.

**UNIT –3: REGISTER TRANSFER AND DESIGN OF CONTROLUNIT (9)**

Register Transfer: Register Transfer Language - Register Transfer - Bus and Memory Transfers - Arithmetic Micro operations - Logic Micro Operations - Shift Micro Operations - Control Unit: Control Memory - Address Sequencing–Micro program Example - Design of Control Unit.

**UNIT –4: MEMORY AND INPUT/OUTPUT ORGANIZATION (9)**

Memory Organization: Memory Hierarchy–Main Memory–Auxiliary Memory–Associative Memory – Cache Memory – Virtual Memory - Input/output Organization: Input-Output Interface - Asynchronous data transfer - Modes of Transfer - Priority Interrupt - Direct memory Access.

**UNIT –5: PIPELINE AND MULTIPROCESSOR (9)**

Pipeline: Parallel Processing–Pipelining - Arithmetic Pipeline - Instruction Pipeline - Multiprocessor: Characteristics of Multiprocessors - Interconnection Structures–Inter processor Arbitration - Inter Processor Communication and Synchronization.

**Total Hours: 45**

**COURSE OUTCOMES:**

<b>On successful completion of the course the student will be</b>		<b>POs related to COs</b>
<b>CO1</b>	Demonstrate the knowledge on fundamentals of organizational and architectural issues of a digital computer	<b>PO1, PO2</b>
<b>CO2</b>	Identify design issues in the development of processor or other components	<b>PO1, PO2, PO3, PO4</b>
<b>CO3</b>	Demonstrate control unit operations and conceptualize various data transfer operation among registers.	<b>PO1, PO3</b>
<b>CO4</b>	Categorize memory organization and explain the function of each element of a memory hierarchy and compare different methods for computer I/O mechanisms.	<b>PO1, PO3, PO5</b>
<b>CO5</b>	Understand and use the concept of Pipelining in various multiprocessor applications.	<b>PO1, PO4, PO5</b>



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**TEXT BOOKS:**

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, "Computer Organization", 5/e, MCG, 2002
2. M. Moris Mano, "Computer Systems Architecture" 3/e, PEA, 2007.

**REFERENCE BOOKS:**

1. John D. Carpinelli, "Computer Systems Organization and Architecture", PEA, 2009
2. William Stallings, "Computer Organization and Architecture", 6/e, Pearson/PHI.
3. Andrew S. Tanenbaum, "Structured Computer Organization", 4/e, PHI/Pearson.
4. Sivaraama Dandamudi, "Fundamentals of Computer Organization and Design", Springer Int. Edition.
5. John L. Hennessy and David A. Patterson, "Computer Architecture a quantitative approach", 4th Edition, Elsevier.
6. Joseph D. Dumas II, "Computer Architecture: Fundamentals and principles of Computer Design", BS Publication.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/106/103/106103180/>
2. <https://nptel.ac.in/courses/106/105/106105163/>
3. <https://nptel.ac.in/courses/106/106/106106166/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	3	3	-	-	-	-	-	-	-	-
CO3	3	-	2	-	-	-	-	-	-	-	-	-
CO4	3	-	3	-	3	-	-	-	-	-	-	-
CO5	2	-	-	2	2	-	-	-	-	-	-	-
CO*	2.6	2.5	2.6	2.5	2.5	-	-	-	-	-	-	-



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**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**II B.Tech - III Semester**

**20CSE233**

**PROGRAMMING WITH JAVA**

**L T P C**

(Common to CSE, CSM, CAI, CSD)

**2 1 0 3**

**PRE-REQUISITES:** A course on Advanced Data Structures

**COURSE EDUCATIONAL OBJECTIVES:**

1. To study the syntax, semantics and features of Java Programming Language.
2. To understand the principles of inheritance and interfaces.
3. To develop Java application programs using exceptions and exploring packages.
4. To apply multithreading on problem solving and understand File handling.
5. To create GUI applications & perform event handling.

**UNIT –1: BASICS OF JAVA**

**(9)**

History of Java - Java Buzzwords - Overview of Java - Data Types - Variables - Arrays - Operators - Control Statements – Introducing Classes & Objects - Constructors - Methods – Access Control -this Keyword - Garbage Collection -Overloading Methods and Constructors - Parameter Passing - Recursion – Reading input-Command Line Arguments – Buffer Reader – Scanner.

**UNIT –2: STRING HANDLING, INHERITANCE AND INTERFACES**

**(9)**

String Handling: Constructors, length(), Special String Operations, Character Extraction, String Comparison – equals(), equalsIgnoreCase(), startsWith(), endsWith(), Deep Vs Shallow comparisons, String Buffer – constructors, length(), capacity(), reverse() and replace() - Inheritance-Basics of Inheritance-Using super-Creating a multilevel hierarchy-Method overriding- Dynamic method dispatch - Using abstract classes -Using final - Interfaces- Differences between Classes and Interfaces - Defining an Interface – Implementing Interface - Applying Interfaces - Variables in Interfaces and Extending Interfaces.

**UNIT –3: PACKAGES AND EXCEPTION HANDLING**

**(9)**

Packages-Defining - Creating and Accessing a Package - Understanding CLASSPATH – Importing Packages - Exploring Packages - Exception Handling- Introduction – Exception Types – Uncaught Exception – Using Try and Catch – Multiple Catch clauses – Nested Try Statements – Throw – Throws – Finally – Built-in Exceptions – Creating Own Exception Subclass – Checked and Unchecked Exceptions.

**UNIT –4: MULTITHREADING AND FILE HANDLING**

**(9)**

Multithreading -Differences between Multithreading and Multiprocessing - Thread Life Cycle - Creating Threads - Synchronizing Threads-Inter Thread Communication – wait(), notify(), notifyall() - File Handling: Reading and writing files.

**UNIT –5: EVENT HANDLING AND SWINGS**

**(9)**

Event Handling and AWT - Delegation Event Model - Event Classes - Sources of Events - Event Listeners - Handling Mouse and Keyboard Events - Adapter Classes - Inner Classes - The AWT Class Hierarchy - Layout Managers - Swings - Limitations of AWT – Components - Containers - Exploring Swing - JApplet - JFrame and JComponent - JLabel and ImageIcon –JTextField - JButton - JCheck Box - JRadioButton - JComboBox - JTabbedPane - JScrollPane - JTable.

**Total Hours: 45**



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**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Understand the basics of java programming	PO1, PO2, PO3, PO4, PO5
CO2	Develop Java programs with the concepts of inheritance and interfaces	PO1, PO2, PO3, PO4, PO5
CO3	Build Java applications using exceptions and packages	PO1, PO2, PO3, PO4, PO5
CO4	Applying multithreading concepts in problem solving and understand reading and writing of files	PO1, PO2, PO3, PO5
CO5	Develop the interactive Java programs using event handling and swings	PO1, PO2, PO3, PO5

**TEXT BOOKS:**

1. Herbert schildt, "Java; The complete reference", 7<sup>th</sup>edition, TMH.
2. Ivor Horton's, "Beginning Java2 JDK", 5<sup>th</sup> edition, WILEY Dream Tech.

**REFERENC BOOKS:**

1. J.Nino and F.A. Hosch, "An Introduction to programming and OO design using Java",Johnwiley& sons.
2. T. Budd, "An Introduction to OOP", 2<sup>nd</sup>edition, Pearson education.
3. Y. Daniel Liang, "Introduction to Java programming", 6<sup>th</sup> edition, Pearson education.
4. R.A. Johnson,"An introduction to Java programming and object oriented application development,Thomson.
5. Cay.S.Horstmann and Gary Cornell, "Core Java 2, Fundamentals", Vol 1, 7<sup>th</sup> Edition, Pearson Education.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/106/105/106105191/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-
CO3	3	3	2	3	3	-	-	-	-	-	-	-
CO4	3	3	2	-	3	-	-	-	-	-	-	-
CO5	3	3	2	-	3	-	-	-	-	-	-	-
CO*	3	3	2.4	2.6	2.8	-	-	-	-	-	-	-





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**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**II B.Tech - IV Semester**

**20CSM232**

**WEB PROGRAMMING**

**L T P C**  
**0 1 2 2**

**PRE-REQUISITES:** NIL

**COURSE EDUCATIONAL OBJECTIVES:**

1. To Provide Knowledge on Fundamentals of HTML, CSS, XML and PHP.
2. To learn website development using Advanced HTML and XML concepts.
3. To identify suitable web scripting languages for efficient web page design.
4. To understand the complex web design techniques.
5. To identify the basic concepts of PHP.

**UNIT –1: INTRODUCTION**

**(6)**

History of HTML, Fundamentals of HTML - Working with text, Organizing text in HTML - Working with links and URLs - Creating tables - Working with images – colors - Canvas and Forms - Interactive elements and Working with Multimedia.

**Tasks:**

1. a. Create a webpage with HTML describing your department. Use paragraph and list tags.  
b. Apply various colors to suitably distinguish key words. Also apply font styling like italics, underline and two other fonts to words you find appropriate. Also use header tags.
2. Design a home page which will display your information, i.e. Bio data, using table.
3. Create a table to show your class time-table.
4. Create a HTML web page with the following:
  - i) To embed an image map in a web page.
  - ii) To fix the hot spots.
  - iii) Show all the related information when the hot spots are clicked.
5. Create a LOGIN PAGE: Login page must contain Login field, Password field, Submit and reset buttons.
6. Create a “registration form “with the following fields 1) Name (Text field) 2) Password (password field) 3) E-mail id (text field) 4) Phone number (text field) 5) Gender (radio button) 6) Date of birth (3 select boxes) 7) Languages known (check boxes – English, Telugu, Hindi, Tamil) 8) Address (text area).

**UNIT –2: ADVANCED FEATURES OF HTML5**

**(6)**

HTML Iframe - Creating editable content - Checking spelling mistakes - Exploring custom data attributes - Exploring Client-Side storage - Exploring Drag and drop feature.

**Tasks:**

1. Design the following static web pages required for an online book store web site. 1) HOME PAGE: The static home page must contain three frames. Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below). Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link “MCA” the catalogue for MCA Books should be displayed in the Right frame. Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.
2. To write a HTML Program to design the pages using canvas.
3. Create an interactive web page with Drag and Drop features of HTML.

**UNIT –3: CSS**

**(6)**

Overview of CSS - Features of CSS3-Backgrounds and Color Gradients in CSS - Fonts and Text Styles - Displaying - Positioning and floating elements - Creating Boxes and Columns Using CSS: Exploring the Box Model - Exploring the Line Box Model.



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**Tasks:**

1. a. To write a html program to create college website with various css styles like inline, embedded and external styles.  
 b. Write a program to Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.
2. To write a CSS Program for displaying, positioning and floating an element.

**UNIT 4: XML**

**(6)**

Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

**Tasks:**

1. Write an XML file which will display the Book information which includes the following: 1) Title of the book 2) Author Name 3) ISBN number 4) Publisher name 5) Edition 6) Price. Write a Document Type Definition (DTD) to validate the above XML file.
2. Design an XML document to store information about a student in a college affiliated to JUNTU. The information must include User id, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 10 students.

**UNIT 5: PHP**

**(6)**

Introduction- Data types- Variables- Constants- Expressions- String interpolation- Control structures- Functions- Arrays- Embedding PHP code in web pages.

**Tasks:**

1. Write a program to validate the form using PHP regular expression.
2. Write a PHP Program to implement functions
  - a. Create the functions f1(),f2(),f3() and f4() for addition, subtraction, Multiplication and Division of two numbers.
  - b. Call the functions f1(),f2(),f3() and f4().
3. Write a PHP Program to implement the following concepts in Arrays.
  - a. array\_merge( ) used to merge two arrays.
  - b. sort( ) used to sort the arrays in ascending order
  - c. rsort( ) used to sort the arrays in descending order.

**Total Hours: 30**

**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Understand the simple website design using HTML, CSS, XML and PHP.	PO1
CO2	Analyze and identify the appropriate webpage design techniques.	PO2
CO3	Design and develop efficient web page with HTML, CSS, XML and PHP.	PO3
CO4	Demonstrate simple web pages with various scripting languages.	PO4
CO5	Illustrate the complex programming concepts using different techniques.	PO5
CO6	Follow ethical principles in designing and implementation of various data structure algorithms	PO8
CO7	Do experiments effectively as an individual and as a member in a group	PO9
CO8	Communicate verbally and in written form, the understanding about the experiment	PO10
CO9	Continue updating their skill related to OOPs, trees and pattern matching algorithm	PO12



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**TEXT BOOKS:**

1. Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How to Program", 5<sup>th</sup> Edition, Pearson Education, 2018.
2. Uttam K. Roy, "Web Technologies", Oxford Higher Education., 1<sup>st</sup> edition, 10th impression, 2015.

**REFERENCE BOOKS:**

1. Achyut Godbole, Atul Kahate, "Web Technologies", Third Edition, McGraw Hill Education (India) Private Limited, 2017.
2. Willard. Wendy, "Web design: A beginner's guide", second Edition, Mcgraw-hill, 2014.
3. Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 2011.

**REFERENCE WEBSITE:**

1. <https://www.geeksforgeeks.org/web-technology/>
2. <https://www.w3schools.com/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	-	-	3	3	3	-	3



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**II B.Tech. –III Semester**

**20ESC238**

**DIGITAL LOGIC DESIGN & MICROPROCESSORS LAB**

(Common to CSE, CSM, CAI, CSD)

**L T P C**  
**0 0 3 1.5**

**PRE-REQUISITES:** NIL

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide practical knowledge on functions of digital ICs.
2. To analyze Boolean functions and verify logic gates.
3. To develop skill to understand arithmetic operations, concepts of Multiplexers.
4. To understand the basics of 8086 and 8051 microcontroller
5. To understand the Assembly language programming of 8086 and 8051.

**LIST OF EXPERIMENTS:**

Note: Minimum of 12 (8+4) experiments shall be conducted from both the sections given below:

**DIGITAL ICS (MINIMUM '8' EXPERIMENTS):**

1. Verify truth table of all the basic gates using IC-74XX.
2. Construct and verify the Universal gates.
3. Implement a given Boolean function of POS form and verify its function using logic gates.
4. Implement a given Boolean function of SOP form and verify its function using logic gates.
5. Verify the Demorgan's theorem using logic gates.
6. Construct and prove the complement and dual of logic functions using basic gates.
7. Verify the functions of Half adder and Full adder using CMOS logic gates.
8. Verify the functions of Half Subtractor and Full Subtractor using CMOS logic gates.
9. Construct and check the outputs using multiplexer IC-74XX151 and Demultiplexer IC-74XX155.
10. Construct and verify the functions of a D FLIP-FLOP using IC-74XX74, shift register.

**MICROPROCESSORS (MINIMUM '4' EXPERIMENTS):**

1. Addition of two 16 bit numbers using 8086 Processor
2. Rotate operations using 8086 processor
3. Shift operations using 8086 processor
4. Conversion of Packed BCD to Unpacked BCD using 8086 processor
5. BCD to ASCII conversion using 8086 processor
6. ASCII operations using 8086 processor.

**EQUIPMENTS AND COMPONENTS REQUIRED:**

- 74xx series of logic gate ICs
- Digital ICs: 74XX74, 74XX95, 74XX138, 74XX148, 74XX151, 74XX155, 74XX138, 74XX138
- 5 Volt DC Power supply
- Digital multimeter/LEDs
- 8086 Microprocessor kits.



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**COURSE OUTCOMES:**

On successful completion of the course the student will be able to		POs related to COs
<b>CO1</b>	Comprehend the operations of digital logic gates	<b>PO1</b>
<b>CO2</b>	Analyze the functioning performance of digital ICs	<b>PO2</b>
<b>CO3</b>	Gain the practical knowledge to design the circuits using digital integrated chips and Microprocessor.	<b>PO3</b>
<b>CO4</b>	Conduct investigation for analyzing the digital integrated circuits and microprocessor performance in various applications	<b>PO4</b>
<b>CO5</b>	Follow ethical principles in analyzing and design the circuits	<b>PO8</b>
<b>CO6</b>	Do experiments effectively as an individual and as a member in a group.	<b>PO9</b>
<b>CO7</b>	Communicate verbally and in written form, the understandings about the circuits.	<b>PO10</b>
<b>CO8</b>	Continue updating their skill and apply during their life time.	<b>PO12</b>

**REFERENCE BOOKS:**

1. Morris Mano, "Digital Design", Prentice Hall of India, 3/e, 2006.
2. Thomas L.Floyd, "Digital Fundamentals", Pearson/Prentice Hall, 10/e, 2008.
3. A.K.Ray and K.M.Bhurchandi, "Advanced microprocessor and Peripherals", Tata Mc-Graw Hill, 2/e, 2000.
4. Kenneth.J.Ayala, The 8051 microcontroller, 3rd edition, Cengage Learning, 2010

**REFERENCE WEBSITES:**

1. [https://www.csie.ntu.edu.tw/~pjcheng/course/asm2008/asm\\_ch2\\_dl.pdf](https://www.csie.ntu.edu.tw/~pjcheng/course/asm2008/asm_ch2_dl.pdf)
2. <https://nptel.ac.in/courses/117/105/117105080/>
3. <https://nptel.ac.in/courses/108/103/108103157/>

**CO-PO Mapping**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-
<b>CO3</b>	-	-	3	-	-	-	-	-	-	-	-	-
<b>CO4</b>	-	-	-	3	-	-	-	-	-	-	-	-
<b>CO5</b>	-	-	-	-	-	-	-	3	-	-	-	-
<b>CO6</b>	-	-	-	-	-	-	-	-	3	-	-	-
<b>CO7</b>	-	-	-	-	-	-	-	-	-	3	-	-
<b>CO8</b>	-	-	-	-	-	-	-	-	-	-	-	3
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	-	-	<b>3</b>	<b>3</b>	<b>3</b>	-	<b>3</b>



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**II B.Tech - III Semester**

**20CSM233**

**ADVANCED DATA STRUCTURES AND ALGORITHMS LAB**

**L T P C**  
**0 0 3 1.5**

**PRE-REQUISITES:** A course on C & Data Structures

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide knowledge about the object oriented programming concepts
2. To inculcate skill to investigate the template concepts
3. To develop skill to implement the data structure concepts of stack and queue using array and linked list.
4. To provide knowledge to implement various trees and sorting methods using class template.
5. To develop and implement pattern matching algorithms and its applications.

**List of Experiments:**

1. Write a C++ Program to Illustrate the Following Concepts:  
a) Class.      b) Constructors.
2. Develop a C++ Program to elaborate the Concept of Inheritance.
3. Develop a C++ Program to elaborate the Concept of Operator Overloading.
4. Develop a C++ Program to elaborate the Concept of Function Overloading.
5. Develop a C++ Program to explain the concept of Virtual Functions.
6. Write a C++ Program to Illustrate the Following Concepts:  
a) Function Templates b) Class Templates
7. Write a C++ Programs to Implement Stack ADT using An Array.
8. Write a C++ Programs to Implement the Queue ADT using An Array.
9. Write a C++ Programs that use Non-Recursive Functions to Traverse the given Binary Tree in a) Preorder b) Inorder c) Postorder
10. Develop a C++ Program to explain the concept Of Hashing.
11. Write a C++ Programs for Implementing the Following Sorting Methods:  
a) Merge Sort      b) Heap Sort
12. Write a C++ program to find the solution for the knapsack problem using the greedy method.
13. Write a C++ Program for Implementing Knuth-Morris- Pratt Pattern Matching Algorithm.
14. Write a C++ Program for Implementing Boyer – Moore Patten Matching Algorithm.

**Total Hours: 45**

**COURSE OUTCOMES:**

<b>On successful completion of the course the student will be</b>		<b>POs related to COs</b>
<b>CO1</b>	Understand the object oriented programming concepts	<b>PO1</b>
<b>CO2</b>	Identify and design the software using templates	<b>PO2</b>
<b>CO3</b>	Develop solutions for the complex engineering problems using data structure concepts like stack and queue	<b>PO3</b>
<b>CO4</b>	Implement the trees and sorting methods for different applications	<b>PO4</b>
<b>CO5</b>	Understand and identify the suitable pattern matching algorithm for solving complex problems	<b>PO5</b>
<b>CO6</b>	Follow ethical principles in designing and implementation of various data structure algorithms	<b>PO8</b>
<b>CO7</b>	Do experiments effectively as an individual and as a member in a group	<b>PO9</b>
<b>CO8</b>	Communicate verbally and in written form, the understanding about the experiment	<b>PO10</b>
<b>CO9</b>	Continue updating their skill related to OOPs, trees and pattern matching algorithm	<b>PO12</b>



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**REFERENCE BOOKS:**

1. Wisnu Anggoro, "C++ Data Structures and Algorithms", Packt Publishing, 2018.
2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++", Pearson Education Ltd., 4/e, New Delhi, 2014.
3. Rajesh K. Shukla, "Data Structures Using C & C++", Wiley Publishing, 2019.
4. Ananda Rao Akepogu and Radhika Raju Palagiri, "Data structures and Algorithms using C++", 2/e, Pearson Education, 2012, New Delhi.
5. C Programming Language (2nd Edition): Brian W. Kernighan, Dennis M. Ritchie: 0076092003106, 2015.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/106/102/106102064/>
2. <https://nptel.ac.in/courses/106/106/106106127/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	2
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	-	-	3	-	-	-	-	-	-	-	-	-	3	2
CO4	-	-	-	3	-	-	-	-	-	-	-	-	3	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	3	2
CO6	-	-	-	-	-	-	-	3	-	-	-	-	3	2
CO7	-	-	-	-	-	-	-	-	3	-	-	-	3	2
CO8	-	-	-	-	-	-	-	-	-	3	-	-	3	2
CO9	-	-	-	-	-	-	-	-	-	-	-	3	3	2
CO*	3	3	3	-	3	-	-	3	3	3	-	3	3	2



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**II B.Tech - III Semester**

**20CSE236**

**PROGRAMMING WITH JAVA LAB**  
(Common to CSE, CSM, CAI, CSD)

**L T P C**  
**0 0 3 1.5**

**PRE-REQUISITES:** A course on Advanced Data Structures using C++

**COURSE EDUCATIONAL OBJECTIVES:**

1. To gain knowledge on object oriented programming concepts.
2. To develop the Java programs by using the concepts of inheritance and packages.
3. To design the variety of technologies and on different platforms.
4. To understand the concepts of event handling in Java platform.
5. To design the application using object oriented programming concepts.

**List of Experiments:**

1. Write a Java program
  - a. To demonstrate the use of different data types in java
  - b. To demonstrate the use of different types operators in java
  - c. To demonstrate the scope and life time of variables.
2. Write a Java program
  - a. To demonstrate the use of classes, objects and methods
  - b. To demonstrate the use of constructors
3. Write a Java program
  - a. To demonstrate the concept of method overloading
  - b. To demonstrate the concept of constructor overloading (use this keyword)
4. Write a Java programs to read and write different types of data using
  - a. Command line arguments
  - b. Scanner class
5.
  - a. Write a Java Program that Uses both Recursive and Non Recursive Functions to Print the N<sup>th</sup> Fibonacci number.
  - b. Write a Java Program that Prompts the User for an Integer and then Prints out all Prime Numbers up to that Integer.
6.
  - a. Write a Java Program that Checks whether a Given String is a Palindrome or Not. Ex: MADAM is a Palindrome
  - b. Write a Java Program for Sorting a Given List of Names in Ascending Order.
7.
  - a. Write a Java Program for Multilevel Inheritance.
  - b. Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.
8.
  - a. Write a Java Program to create an abstract class Named Shape that contains an Empty Method named numberOfSides(). Provide three classes Named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes Contains only the Method numberOfSides ( ) that Shows the Number of Sides in the Given Geometrical Figures.
  - b. Write a Java Program Which includes class, abstract class and interface.
  - c. Write a Java Program for Creation of User Defined Package and Accessing the Members Present in Package.
9.
  - a. Write a Java Program for Checked and Unchecked Exceptions.
  - b. Write a program that reads two numbers from the user to perform integer division into Num1 and Num2 variables. The division of Num1 and Num2 is displayed if they are integers. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an ArithmeticException.
  - c. Use inheritance to create an exception super class called ExceptionA and exception sub class ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionC inherits from ExceptionB. Write a java program to demonstrate that the catch block for type ExceptionA catches exception of type ExceptionB and ExceptionC.





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10. a. Write a Java Program that creates three threads. First Thread displays "Good Morning" every one second, the Second Thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.  
 b. Write a Java Program that Correctly Implements Producer Consumer Problem using the Concept of Inter Thread Communication.
11. a. Write a java program that prints the contents of a given file. (use command line)  
 b. Write a java program that copy one file in to another file. (use command line)
12. Develop an Applet that Receives an Integer in one Text Field, and Computes its Factorial Value and Returns it in Another Text Field, When The Button Named "Compute" is Clicked.
13. Write a java program that handles all mouse and key events and shows the event name at the center of the window when mouse event is fired (Use Adapter classes).
14. 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.(Use SWINGS)

**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Acquire the Knowledge on structure and model of the Java programming language.	PO1
CO2	Analyze the complex examples using java programming language.	PO2
CO3	Design solutions for user requirements using software functionality.	PO3
CO4	Investigate on event handling concepts in developing the object oriented programming	PO4
CO5	Develop the data base connectivity to the Java application	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10
CO9	Continue updating their skill related to object oriented concepts and implementing programs in future.	PO12

**REFERENCE BOOKS:**

1. H.M.Dietel and P.J.Dietel, "Java How to Program", 6<sup>th</sup> edition, Pearson Education/PHI
2. Y.Daniel Liang, "Introduction to Java programming" 6<sup>th</sup> edition, Pearson Education
3. Cay Horstmann, "Big Java", 2<sup>nd</sup> edition, Wiley Student Edition, Wiley India Private Limited.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/106/105/106105191/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	-	-	3	3	3	-	3



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<b>20BSC231</b>	<b>II B.Tech - IV Semester</b> <b>NUMERICAL METHODS AND PROBABILITY THEORY</b> <b>(Common to All Branches)</b>	<b>L T P C</b>  <b>3 1 0 4</b>
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**PRE-REQUISITES:** A Course on Algebra & Calculus, Differential equations & Transform Techniques

**COURSE EDUCATIONAL OBJECTIVES:**

1. To develop skill to analyze appropriate method to find the root of the Algebraic and Transcendental Equations and to develop skill to apply the concept of interpolation for the Prediction of required values.
2. To learn the method of evaluation of numerical integration and to solve ordinary differential equations numerically using numerical methods.
3. To develop skill to analyze the discrete and continuous data.
4. To develop skill to analyze the discrete and continuous data using appropriate Statistical Distributions like Binomial, Poisson, Normal, etc and to inculcate skill to investigate different applications of statistical distributions and the corresponding conclusions required for the analysis of sample data.
5. To develop skill in testing of hypotheses and Tests of significance for small and large samples

**UNIT –1: SOLUTION OF ALGEBRAIC, TRANSCENDENTAL EQUATIONS & INTERPOLATION** **(9)**

**Solution of Algebraic and Transcendental Equations:** Introduction - The Bisection method - The method of False position - The Iteration method - Newton-Raphson method (Single Variable).

**Interpolation:** Introduction - Finite differences - Forward differences, Backward differences - Newton's forward, Newton's backward - Lagrange's method of interpolation.

**UNIT–2: NUMERICAL INTEGRATION AND NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS** **(9)**

**Numerical integration:** Trapezoidal rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule.

**Numerical solution of Ordinary Differential equations:** Solution by Taylor's series - Picard's method of successive approximations - Euler's method - Runge-Kutta methods.

**UNIT –3: PROBABILITY, RANDOM VARIABLES** **(9)**

**Probability:** Sample space and events - Probability - The axioms of probability - Some elementary theorems - Conditional probability - Baye's theorem.

**Random variables:** Discrete and continuous distributions – Statistical Parameters (Mean, Variance and Standard Deviation) of distribution functions.

**UNIT -4: PROBABILITY DISTRIBUTIONS & SAMPLING THEORY** **(9)**

Binomial - Poisson and Normal distributions - Related properties.

**Sampling distribution:** Populations and samples - Sampling distributions of mean ( $\sigma$ : known and unknown) - Proportions - Sums and differences.

**UNIT -5: TEST OF HYPOTHESIS AND TEST OF SIGNIFICANCE** **(9)**

**Test of Hypothesis:** Means - Hypothesis concerning one and two means - Type I and Type II errors - One tail, two-tail tests.

**Test of Significance:** Student's t-test - F-test - Chi-square test of goodness of fit.

**Total Hours: 45**



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**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		POs related to
<b>CO1</b>	Demonstrate knowledge in solving algebraic and transcendental equations by various mathematical methods and Design novel mathematical methods for constructing the interpolating polynomials to the given data	<b>PO1,PO2</b>
<b>CO2</b>	Demonstrate knowledge in finding the numerical values to integrals through different mathematical methods and solving ordinary differential equations numerically through various methods and Design novel mathematical methods for solving the ordinary differential	<b>PO1,PO2</b>
<b>CO3</b>	Demonstrate knowledge on use the probability and Random Variables in the field of engineering	<b>PO1,PO2,PO3</b>
<b>CO4</b>	Demonstrate knowledge in probability distributions and develop analytical skills for the problems involving means, probability distributions and standard deviations sampling techniques for decision making in uncertain environments	<b>PO1,PO2,PO3</b>
<b>CO5</b>	Demonstrate knowledge in testing of hypotheses and Tests of significance for small and large samples and Develop skills for analyzing the data with suitable tests of significance for practical situations through probability distributions	<b>PO1,PO2,PO3,PO4</b>

**TEXT BOOKS:**

1. S.C. Gupta, V.K. Kapoor, "Fundamentals of Mathematical Statistics", 10/e, S. Chand and Company Publishers, New Delhi, 2001.
2. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad , "Probability and Statistics", S. Chand and Company Publishers, New Delhi, 2012.

**REFERENCE BOOKS:**

1. V. Ravindranath, T.S.R. Murthy,"Probability and Statistics, I.K. International Pvt. Ltd, New Delhi, 2011.
2. Johnson A. Richard, Miler & Friends,"Probability and Statistics for Engineers", 6/e, Pearson Education, New Delhi, 2006.
3. Dr. B. S. Grewal, "Higher Engineering Mathematics", 34/e, Khanna Publishers, Delhi, 1999.
4. Dr. J. Ravichandran, "Probability and Statistics for Engineers", Wiley-India Publishers, New Delhi, 2011.
5. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, "Probability and Statistics for Engineers and Scientists", 7/e, Pearson Education Asia, New Delhi, 2002.

**REFERENCE WEBSITE:**

1. <https://www.youtube.com/watch?v=hizXlwJO1Ck>
2. <https://www.youtube.com/watch?v=5817fLmsTGE>
3. <https://www.youtube.com/watch?v=yv6i9plC9nk>
4. <https://www.youtube.com/watch?v=r1sLCDA-kNY&list=PL46B9EA2CFEB51241>
5. <https://www.youtube.com/watch?v=r1sLCDAkNY&list=PL46B9EA2CFEB51241&index=1>
6. <https://www.youtube.com/watch?v=HnvB8BCDQm0&list=PL46B9EA2CFEB51241&index=2>

**CO-PO MAPPING:**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO.1</b>	3	3	-	-	-	-	-	-	-	-	-	-
<b>CO.2</b>	3	3	-	-	-	-	-	-	-	-	-	-
<b>CO.3</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO.4</b>	3	3	2	-	-	-	-	-	-	-	-	-
<b>CO.5</b>	3	3	2	2	-	-	-	-	-	-	-	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	-	-	-	-	-	-	-	-



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**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**II B.Tech - IV Semester**

**20HSM241**

**PRINCIPLES OF MANAGEMENT**

**L T P C**  
**3 0 0 3**

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. To understand the concepts of total quality management, and Contributions of TQM
2. To learn TQM principles and impact of 5s, Kaizen, PDSA cycles in continuous process improvement.
3. To study the basic need of quality control and process control in an organization
4. To learn the traditional and modern TQM tools and techniques
5. To study the quality standard, requirements and elements in Quality management system

**UNIT –1: INTRODUCTION TO MANAGEMENT**

**(9)**

Definition of management – Science or Art – Manager Vs Entrepreneur – Types of managers – Managerial roles and skills – Levels of management – Functions of management – Principles of management and Scientific Management and its approaches – Corporate Social Responsibilities – Organization culture and Environment.

**UNIT –2: PLANNING AND DECISION MAKING**

**(9)**

**Planning:** Nature and purpose of planning – Planning process – Types of planning –Objectives – Setting objectives – Policies – Planning premises – Strategic Management – Planning Tools and Techniques  
**Decision Making:** Importance of decision making – Decision making steps and process.

**UNIT –3: ORGANIZING AND DIRECTING**

**(9)**

**Organizing:** Nature and purpose – Formal and informal organization – Organization chart and structure – Line and staff authority – Departmentalization – Delegation of authority – Centralization and decentralization – Job Design – HR planning, recruitment, selection, training and development, performance management, career planning and management. **Directing:** Principles of directing – Process of communication – Barrier in communication – Effective communication.

**UNIT –4: CONTROLLING AND CO-ORDINATING**

**(9)**

System and process of controlling – Budgetary and non-budgetary control techniques – Use of computers and IT in Management control – Productivity problems and management – Control and performance – Direct and preventive control – Reporting.

**UNIT –5: MODERN CONCEPTS OF MANAGEMENT**

**(9)**

Concept, features, merits and demerits of SWOT Analysis, Business Process Re-engineering, Supply Chain Management – Concepts, functions importance of marketing – Competitive analysis and advantages of E-marketing.

**Total Hours: 45**



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**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Understand the concepts of management, roles to be adopted by manager, functions of manager and inculcating the social responsibility towards different stake holders.	PO1, PO11
CO2	Demonstrate knowledge with regard to planning, planning process and the process of making effective decisions.	PO1, PO11
CO3	Demonstrate knowledge about organizational environment, the process of staffing and the application of directive principles.	PO1, PO11
CO4	Demonstrate knowledge about controlling and Co-ordinating	PO1, PO11
CO5	Demonstrate knowledge about modern concepts in management.	PO1, PO11

**TEXT BOOKS:**

1. Besterfield Dale H, Besterfield Carol, Besterfield Glen H, Besterfield Mary, Urdhwareshe Hemant and Urdhwareshe Rashmi, "Total Quality Management", 5/e, Pearson Education, New Delhi, 2018.
2. M. Govindarajan and S. Natarajan, "Principles of Management", Prentice Hall of India Pvt. Ltd.

**REFERENCE BOOKS:**

1. Stephen P. Robbins and Mary Coulter, "Management", 8/e, Prentice Hall of India.
2. Charles W.L Hill, Steven L McShane, "Principles of Management", McGraw Hill Education, Special Indian Edition, 2007.
3. Hellriegel, Slocum and Jackson, "Management-A Competency Based Approach", 10/e, Thomson South Western, 2007.
4. Harold Koontz, Heinz Weihrich and mark V Cannice, "Management - A global and Entrepreneurial Perspective", 12/e, Tata McGraw Hill, 2007.
5. Andrew J. Dubrin, "Essentials of Management", Thomson South western. 7/e, 2007.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/110/105/110105146/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	-	-	-	-	-	-	-	-	-	2	-
CO4	3	-	-	-	-	-	-	-	-	-	2	-
CO5	3	-	-	-	-	-	-	-	-	-	2	-
CO*	3	-	-	-	-	-	-	-	-	-	2	-



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**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**II B.Tech - IV Semester**

**20CSM241      ARTIFICIAL INTELLIGENCE: PRINCIPLES AND TECHNIQUES      L T P C**  
**3 0 0 3**

**PRE-REQUISITES:** A course on Algebra and Calculus

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide basic knowledge about artificial intelligence.
2. To understand various searching techniques for problem solving.
3. To understand the knowledge, reasoning and planning involved in artificial intelligence.
4. To explore about reinforcement learning and natural language processing.
5. To understand natural language for communication and robotics.

**UNIT –1: INTRODUCTION (9)**

**Introduction:** Definition of AI, Foundations of AI, History of AI, The State of Art.

**Intelligent Agents:** Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, Structure of Agents.

**UNIT –2: PROBLEM SOLVING (9)**

**Solving problems by searching:** Problem solving agents, Searching for solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions.

**Beyond Classical Search:** Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

**Game playing:** mini-max algorithm, Alpha-Beta Pruning.

**UNIT –3: KNOWLEDGE, REASONING, AND PLANNING (9)**

Knowledge-Based Agents, Wumpus World, Logic, Syntax and Semantics of First-Order Logic, Forward chaining and backward chaining.

**Classical Planning:** Definition, Algorithms for Planning as State-Space Search, Planning Graphs.

**UNIT –4: REINFORCEMENT LEARNING & NATURAL LANGUAGE PROCESSING (9)**

**Reinforcement Learning:** Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL.

**Natural Language Processing:** Language Models, Text Classification, Information Retrieval, Information Extraction.

**UNIT –5: NATURAL LANGUAGE FOR COMMUNICATION & ROBOTICS (9)**

**Natural Language for Communication:** Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition.

**Robotics:** Introduction, Robot Hardware, Robotic Perception, Planning to move, Planning uncertain movements, Moving, Robotic software architectures, application domains.

**Total Hours: 45**



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**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Understand the basics about artificial intelligence.	PO1, PO2
CO2	Identify the searching technique for problem solving.	PO1, PO2
CO3	Apply knowledge, reasoning and planning for solving real-world problems.	PO1,PO2, PO3,PO4,PO5
CO4	Understand reinforcement learning and natural language processing.	PO1, PO2
CO5	Understand the robotics concept.	PO1, PO2, PO4

**TEXT BOOKS:**

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 4<sup>th</sup> Edition, Pearson Education, 2020.
2. Wolfgang Ertel, "Introduction to Artificial Intelligence", 2<sup>nd</sup> Edition, Springer International Publishing, 2017.

**REFERENCES:**

1. Stephen Lucci, Danny Kopec, "Artificial Intelligence in the 21st Century", Mercury Learning and Information, 3rd Edition, 2018.
2. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill, 2017.

**REFERENCE WEBSITE:**

1. <http://peterindia.net/AILinks.html>
2. <https://nptel.ac.in/courses/106/102/106102220/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	2	-	-	-	-	-	-	-	-
CO*	2.6	2.4	2	2	2	-	-	-	-	-	-	-



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**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**II B.Tech - IV Semester**

**20CSE241**

**DATABASE MANAGEMENT SYSTEMS**

**L T P C**

(Common to CSE, CSM, CAI, CSD)

**3 0 0 3**

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. Discuss the basic database concepts, applications, data models, schemas and instances and design Entity Relationship (E-R) model for a database.
2. Demonstrate the use of integrity constraints, relational algebra operations and relational calculus.
3. Describe the basics of SQL, construct queries using SQL, SQL functions, trigger and cursor concepts in PL/SQL.
4. Understand reasoning about functional dependency and to make the students to identify the role of normalization in database management systems.
5. To present the students with the knowledge of Transaction, concurrency and recovery strategies of DBMS

**UNIT –1: DATABASE SYSTEMS AND ENTITY RELATIONSHIP MODELING (9)**

Database System Applications - Purpose of Database Systems - View of Data - Database Languages - Database Users and Administrators - Various Components of overall Database System Structure- Data Models-The Entity-Relationship Model - Attributes and Entity Sets - Relationship Sets - Entity-Relationship Diagrams.

**UNIT –2: RELATIONAL DATA MODEL (9)**

Introduction to the Relational Model - Integrity Constraints -Relational algebra, selection and projection, set operations, renaming, joins, division, examples of algebra queries- Tuple Relational Calculus - Domain Relational Calculus-Expressive power of algebra and calculus.

**UNIT –3: INTRODUCTIONS TO SQL (9)**

Structured Query Language (SQL): Introduction to SQL, Data types, Data Definition language commands, Data Manipulation language Commands and Data control Language Commands, Candidate Key, Primary key, Foreign key, Select Clause, Where Clause, Logical Connectivity's – AND, OR, Range Search, Pattern Matching, Order By, Group By, Set Operations – Union, Intersect and Minus, Aggregate Functions, Join Operations. **PL/SQL:** Control Structures, functions, Triggers and Cursors.

**UNIT –4: NORMALIZATION (9)**

Introduction to Schema Refinement - Properties of Decompositions – Functional Dependencies – Attribute closure - Normal Forms - First - Second - Third – BCNF - Basic definitions of MVDs and JDs, Fourth and Fifth normal forms.

**UNIT –5: TRANSACTION PROCESSING CONCEPTS AND CONCURRENCY CONTROL TECHNIQUES (9)**

Transaction Concept - Transaction States - Implementation of Atomicity and Durability - Serializability - Recoverability - Concurrent Executions - Lock-Based Protocols for Concurrency Control - Time Stamp-Based Protocol for Concurrency Control - Multiple Granularity Recovery System: Recovery and Atomicity – Log based Recovery – Recovery with Concurrent Transactions.

**Total Hours: 45**





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**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate knowledge on Data models and Database Languages and Design Entity Relationship model for a database	PO1, PO3
CO2	Analyze the relational database theory, and be able to write relational algebra and relational calculus expressions for queries.	PO1, PO2
CO3	Analyze and evaluate the databases using SQL DML/DDL Commands	PO1, PO2, PO3, PO5
CO4	Analyze databases using normal forms to provide solutions for real time applications.	PO1, PO2
CO5	Understand the properties of transactions in a database system, Analyze concurrency control techniques for handling concurrent transactions and understand recovery of data from failures	PO1, PO3, PO4

**TEXT BOOKS:**

1. Henry F. Korth, Silberchatz, Sudarshan, "Database System Concepts", 7/e, Tata McGraw-Hill, New York, 2019.
2. Raghu Rama Krishnan, "Database Management System", 2/e, Tata McGraw Hill, New York, 2000.

**REFERENCE BOOKS:**

1. Elmasri and Navathe, "Fundamentals of Database Systems", 5/e, Pearson Education, USA, 2008.
2. Peter Rob, A. Ananda Rao and Carlos Coronel, "Database Management Systems", 5/e, Cengage Learning, USA, 2003.
3. Ivan Bayross, "SQL, PL/SQL Programming", 2/e, BPB Publications, New Delhi, India, 2011.
4. C.J. Date, "Introduction to Database Systems", 8/e, Pearson Education, USA, 2004.
5. M.L. Gillenson, "Fundamentals of Database Management Systems", 1/e, Wiley, New Delhi, India, 2006.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/106/106/106106220/>
2. <https://nptel.ac.in/courses/106/105/106105175/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	3	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-
CO5	3	-	2	3	-	-	-	-	-	-	-	-
CO*	3	3	2.6	3	3	-	-	-	-	-	-	-



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**II B.Tech - IV Semester**

**20CSE242**

**OPERATING SYSTEMS**

**L T P C**

(Common to CSE, CSM, CAI, CSD)

**3 0 0 3**

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. To understand main components of OS, System structures and the operations performed by OS as a resource manager.
2. To Study process concurrency and synchronization.
3. To analyze the different memory management techniques.
4. To gain knowledge about concepts of input/ output systems and storage management.
5. To manage different file systems, protection and security to the systems

**UNIT –1: OPERATING SYSTEMS OVERVIEW**

**(9)**

Introduction - What Operating system do - Operating system operations - Process management - Memory management - Storage management - Protection and Security - Distributed Systems - Special purpose systems - System structures: Operating system services - user operating system interface - System calls - Types of system calls - Operating system design and implementation - Operating system structure - Operating system generation - System boot.

**UNIT –2: PROCESS MANAGEMENT AND CONCURRENCY**

**(9)**

Process Management: Process concepts – threads - scheduling-criteria – algorithms and their evaluation - Thread scheduling - Concurrency: Process synchronization - the critical- section problem - Peterson's Solution - synchronization Hardware – semaphores - classic problems of synchronization - monitors.

**UNIT –3: PRINCIPLES OF DEADLOCK AND MASS-STORAGE STRUCTURE & I/O SYSTEMS**

**(9)**

Principles of deadlock - system model - deadlock characterization - deadlock prevention - detection and avoidance - recovery form deadlock. Mass-storage structure - overview of Mass – storage structure - Disk structure - disk attachment - disk scheduling - swap-space management - RAID structure - stable-storage implementation - Tertiary storage structure.

**UNIT –4: MEMORY MANAGEMENT**

**(8)**

Memory Management and Virtual Memory :Logical & physical Address Space – Swapping - Contiguous Allocation – Paging - Structure of Page Table – Segmentation - Virtual Memory - Demand Paging - Performance of Demanding Paging - Page Replacement - Page Replacement Algorithms - Allocation of Frames - Thrashing.

**UNIT –5: FILE SYSTEM INTERFACE**

**(10)**

File system Interface- the concept of a file - Access Methods - Directory structure - File system mounting - file sharing – protection - File System implementation - File system structure - file system implementation - directory implementation - allocation methods - free-space management - efficiency and performance - Protection and Security - Goals of protection - Principles of protection - Access matrix - The security problem - program threats - System and network threats, Language-Based Protection, Capability-Based Systems, The Security Problem, User Authentication, Program Threats, System Threats, Securing Systems and Facilities, Intrusion Detection, Cryptography, Computer-Security Classifications.

**Total Hours: 45**



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**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to Cos
CO1	Analyze operating system operations, system design and implementation.	PO1, PO2, PO5
CO2	Implement Thread scheduling, solutions to synchronize problems.	PO1, PO4, PO5
CO3	Apply memory management techniques, virtual memory concepts.	PO1,PO3,PO4, PO5
CO4	Manage process execution without deadlock, mass storage structure.	PO1,PO4, PO5
CO5	Understand file system interface, protection and security in System and Network.	PO1, PO2, PO4, PO5

**TEXT BOOKS:**

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Principles", 9<sup>th</sup>Edition, Wiley Student Edition, April 2013.
2. W. Stallings, "Operating systems - Internals and Design Principles", 6<sup>th</sup> edition, Pearson, 2009.

**REFERENCE BOOKS:**

1. Andrew S Tanenbaum, "Modern Operating Systems", 3<sup>rd</sup>edition, PHI,2015.
2. D. M. Dhamdhare, "Operating Systems A concept - based Approach", 2<sup>nd</sup> edition, TMH, 2017.
3. B. L. Stuart, "Principles of Operating Systems", Cengage learning, India Edition, 2008.
4. A. S. Godbole, "Operating Systems", 2<sup>nd</sup> edition, TMH, 2020.
5. S, Haldar and A. A. Arvind, "Operating Systems", Pearson Education, 2014.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/106/102/106102132/>
2. <https://nptel.ac.in/courses/106/108/106108101/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	2	-	-	-	-	-	-	-
CO2	2	-	-	3	3	-	-	-	-	-	-	-
CO3	3	-	3	3	3	-	-	-	-	-	-	-
CO4	3	-	-	3	3	-	-	-	-	-	-	-
CO5	2	3	-	3	3	-	-	-	-	-	-	-
CO*	2.6	3	3	3	2.8	-	-	-	-	-	-	-



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**II B.Tech - IV Semester**

**20CSE244**

**DATA ANALYTICS USING R**  
(Common to CSE, CSM, CAI, CSD)

**L T P C**  
**0 1 2 2**

**PRE-REQUISITES:** A course on Programming with Python

**COURSE EDUCATIONAL OBJECTIVES:**

1. How to manipulate data within R
2. To create simple graphs and charts used in introductory statistics
3. The given data using different distribution functions in R.
4. The hypothesis testing and calculate confidence intervals; perform linear regression models for data analysis.
5. The relevance and importance of the theory in solving practical problems in the real world.

**UNIT 1: INTRODUCTION**

**(6)**

Introducing to R-Environment Setup-Data Types-Variables-Operators-Decision Making-Loops-Functions-Strings-Vectors-Lists.

**Tasks:**

1. Study of basic Syntaxes in R.
2. Implementation of vector data objects operations.
3. Study and implementation of Helse control structures in R.
4. Study and implementation of loop control structures.

**UNIT 2: DATA INTERFACES**

**(6)**

Matrices-Arrays-Factors-Data Frames-Packages - Import and Export data with : CSV Files-Excel Files-XML Files-JSON Files-Web Data-Database

**Tasks:**

1. Implementation of matrix, array and factors and perform via in R.
2. Implementation and use of data frames in R.
3. Data Manipulation with data table package.
4. Import and export data from csv files.
5. Import and export data from excel files.

**UNIT 3: STATISTICS**

**(6)**

Mean, Median & Mode-Linear Regression-Multiple Regression-Logistic Regression-Normal Distribution-Binomial Distribution-Poisson Regression-Analysis of Covariance-Time Series Analysis-Nonlinear Least Square

**Tasks:**

1. Demonstrate the different types of regressions.

**UNIT 4: DATA VISUALIZATION**

**(6)**

R Charts & Graphs-Pie Charts-Bar Charts-Boxplots-Histograms-Line Graphs- Scatterplots

**Tasks:**

1. Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.
2. Study and implementation of Data Visualization with ggplot2.

**UNIT 5: CLASSIFICATION**

**(6)**

Decision Tree-Random Forest-Survival Analysis-Chi Square Tests

**Tasks:**

1. Implementation of classification with decision tree in R.
2. Demonstration on a Statistical Model for Linear Relationship
  - a. Least Squares Estimates
  - b. The R Function lm
  - c. Scrutinizing the Residuals

**Total Hours: 30**



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**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Install and use R for simple programming tasks.	PO1, PO2
CO2	Extend the functionality of R by using add-on packages	PO1, PO3
CO3	Extract data from files and other sources and perform various data manipulation tasks on them	PO1, PO4
CO4	Explore statistical functions and Tables to visualize results of various statistical operations on data in R	PO1, PO4
CO5	Apply the knowledge of R gained to data Analytics for real-life applications	PO1, PO2, PO4
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10
CO9	Continue updating their skill related to data analysis concepts and implementing programs in future.	PO12

**TEXT BOOKS:**

1. The Art of R Programming: A Tour of Statistical Software Design, Norman Matloff, No Starch Press, 2011
2. R for Everyone: Advanced Analytics and Graphics, Jared P. Lander, Addison-Wesley Data & Analytics Series, 2013.

**REFERENCE BOOKS:**

1. SandipRakshit, "Statistics with R Programming", McGraw Hill Education, 2018.
2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "An Introduction to Statistical Learning: with Applications in R", Springer Texts in Statistics, 2017.
3. Joseph Schmuller, "Statistical Analysis with R for Dummies", Wiley, 2017.
4. K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, "Statistical Programming in R", Oxford Higher Education, 2017.

**REFERENCE WEBSITE:**

1. [www.oikostat.ch](http://www.oikostat.ch)
2. <https://learningstatisticswithr.com/>
3. <https://www.coursera.org/learn/probability-intro#syllabus>
4. <https://www.isibang.ac.in/~athreya/psweur/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	1	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	1	-	3	3	3	-	3



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**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**II B.Tech - IV Semester**

**20CSM242 ARTIFICIAL INTELLIGENCE: PRINCIPLES AND TECHNIQUES LAB L T P C**

**0 0 3 1.5**

**PRE-REQUISITES:** A course on Programming with Python

**COURSE EDUCATIONAL OBJECTIVES:**

1. To understand the methods for implementing algorithms using artificial intelligence techniques.
2. To explore different algorithms for solving real-world problems.
3. To practice and implement various local search algorithms.
4. To understand different informed search strategies.
5. To learn the robotics concepts.

**List of Experiments:**

1. Write a Program to Implement Breadth First Search.
2. Write a Program to Implement Depth First Search.
3. Write a Program to Implement 8-Puzzle problem.
4. Write a Program to Implement Water-Jug problem.
5. Write a Program to find the solution for Wumpus world problem.
6. Write a Program to Implement Simulated Annealing algorithm.
7. Write a Program to Implement Travelling Salesman Problem using Python.
8. Write a Program to Implement A\* Algorithm.
9. Write a Program to Implement Hill Climbing Algorithm.
10. Write a Program to Implement text analysis using NLTK.
11. Develop a robotic simulation using VEX.

**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Understand the different searching algorithms for solving problems.	PO1
CO2	Analyze and identify the problem solving techniques.	PO2
CO3	Design and develop various algorithms for solving real world problems	PO3
CO4	Understand and demonstrate various local search algorithms.	PO4
CO5	Understand the robot functions through simulation.	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10
CO9	Continue updating their skill related to object oriented concepts and implementing programs in future.	PO12

**REFERENCE BOOKS:**

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 4<sup>th</sup> Edition, Pearson Education, 2020.
2. Wolfgang Ertel, "Introduction to Artificial Intelligence", 2<sup>nd</sup> Edition, Springer International Publishing, 2017.
3. Stephen Lucci, Danny Kopec, "Artificial Intelligence in the 21st Century", Mercury Learning and Information, 3rd Edition, 2018.
4. John Hunt, "A Beginners Guide to Python 3 Programming", Springer, 2020.



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**REFERENCE WEBSITE:**

1. <https://www.tensorflow.org/>
2. <https://github.com/pytorch>
3. <https://keras.io/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	2
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	-	-	2	-	-	-	-	-	-	-	-	-	3	2
CO4	-	-	-	3	-	-	-	-	-	-	-	-	3	2
CO5	-	-	-	-	2	-	-	-	-	-	-	-	3	2
CO6	-	-	-	-	-	-	-	3	-	-	-	-	3	2
CO7	-	-	-	-	-	-	-	-	3	-	-	-	3	2
CO8	-	-	-	-	-	-	-	-	-	3	-	-	3	2
CO9	-	-	-	-	-	-	-	-	-	-	-	3	3	2
CO*	3	3	2	3	2	-	-	3	3	3	-	3	3	2



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**II B.Tech - IV Semester**

**20CSE245**

**DATABASE MANAGEMENT SYSTEMS LAB**

(Common to CSE, CSM, CAI, CSD)

**L T P C**  
**0 0 3 1.5**

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data and Analyze and evaluate the databases using SQL DML/DDL commands.
2. Write SQL Queries to implement a Database Schema for the given Database.
3. Design Simple Database using a Tool and Implement it using SQL.
4. Implement DDL and DML commands in SQL and PL/SQL, ORACLE to manage data in databases.
5. Programming PL/SQL including procedures, functions, cursors and triggers.

**The Following Topics need to be covered in the Laboratory Sessions:**

**SQL**

**Introduction to SQL:**

DDL - DML Commands- Basic Data Types- Commands to Create Table- Constraint Definition Commands for Table Handling- Alter Table – Drop Table- Insert - Update – Delete Commands for Record Handling- Select with Operators like Arithmetic - Comparison - Logical Query Expression Operators - Ordering the Records with Order by- Grouping the Records.

**SQL Functions:**

Date - Numeric - Character – Conversion Functions - Group Functions: avg - max - min - sum -count

**Set Operations:** Union – Union all - Intersect - Minus

**Join concept:** Simple - Equi – Nonequi Join - Self –Outer join

Query&Sub queries- View Introduction - Create - Update - and Drop Commands

**PL/SQL**

Advantages of PL/SQL- Support of SQL - Executing PL/SQL- PL/SQL Character Set & Data Types- Character - Row - rowid - Boolean - Binary integer - Number Variable - Constant

**Control structures:** Condition–if- Interactive-loop - for – while- Sequential–go to.

**Database Triggers**

Definition - Syntax - Parts of Triggers- Types of Triggers - Enabling and Disabling Triggers-Cursors - Procedures and Functions- Definition and Implementation.

**Note:** The Faculty Members are instructed to provide the Necessary Exercises which covers the above Topics.





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**COURSE OUTCOMES:**

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.	PO1
CO2	Analyze the database schemas for the different types of database	PO2
CO3	Design the databases using SQL DML/DDDL Commands	PO3
CO4	Design the complex PL/SQL programs for different problems	PO4
CO5	Use the procedure, function, trigger and cursor concepts in PL/SQL	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10
CO9	Continue updating their skill related to SQL Commands and Queries and implementing programs in future.	PO12

**REFERENCE BOOKS:**

1. Ivan Bayross, "SQL, PL/SQL Programming", 2/e, BPB Publications, New Delhi, India, 2011.
2. Satish Ansari, "Oracle Database 11g: Hands-on SQL and PL/SQL", PHI Publishers, 2010.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/106/106/106106220/>
2. <https://nptel.ac.in/courses/106/105/106105175/>
3. <https://www.tutorialspoint.com/plsql/index.htm>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	-	-	3	3	3	-	3



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**II B.Tech - IV Semester**

**20CSE246**

**OPERATING SYSTEMS LAB**  
(Common to CSE, CSM, CAI, CSD)

**L T P C**  
**0 0 3 1.5**

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide knowledge about practical experience with designing and implementing concepts of operating systems.
2. To analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
3. To develop skill to implement the file allocation and organization techniques.
4. To Understand and Implement Deadlock management techniques.
5. To provide knowledge to implement memory management schemes and page replacement schemes.

**List of Experiments:**

1. Simulate the following CPU scheduling algorithms  
a) Round Robin b) SJF
2. Simulate the following CPU scheduling algorithms  
a) FCFS b) Priority
3. Simulate all file allocation strategies  
a) Sequential b) Indexed c) Linked
4. Simulate MVT and MFT.
5. Simulate the following File Organization Techniques  
a) Single level directory b) Two level
6. Simulate the following File Organization Techniques  
a) Hierarchical b) DAG
7. Simulate Bankers Algorithm for Dead Lock Avoidance.
8. Simulate Bankers Algorithm for Dead Lock Prevention.
9. Simulate all page replacement algorithms  
a) FIFO b) LRU c) LFU Etc. ...
10. Simulate Paging Technique of memory management
11. Write a C program to simulate the following contiguous memory allocation techniques  
a) Worst-fit b) Best fit c) First fit
12. Write a C program to simulate the disk scheduling algorithms.  
a)FCFS b) SCAN c) C-SCAN
13. Write a C program to simulate optimal page replacement algorithms
14. Write a C program to simulate the concept of Dining-Philosophers problem

**COURSE OUTCOMES:**

<b>On successful completion of the course the student will be</b>		<b>POs related to COs</b>
<b>CO1</b>	Simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority	<b>PO1, PO2, PO3, PO5</b>
<b>CO2</b>	Simulate file allocation techniques	<b>PO1, PO2, PO3, PO5, PO11</b>
<b>CO3</b>	Simulate file organization techniques	<b>PO2, PO3, PO5</b>
<b>CO4</b>	Implement Deadlock management techniques.	<b>PO2, PO4, PO5</b>
<b>CO5</b>	Implement memory management schemes	<b>PO1, PO2, PO5</b>
<b>CO6</b>	Implement disk scheduling algorithms	<b>PO1, PO2, PO5, PO8</b>
<b>CO7</b>	Simulate optimal page replacement algorithms	<b>PO1, PO2, PO5, PO9</b>
<b>CO8</b>	Simulate optimal page replacement algorithms	<b>PO1, PO2, PO5, PO10</b>
<b>CO9</b>	Simulate the concept of Dining-Philosophers problem	<b>PO1, PO2, PO5, PO12</b>



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**REFERENCE BOOKS:**

1. Operating System Principles, 9th Edition, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley Student Edition, 2009.
2. Modern Operating Systems (3rd Edition): Andrew S. Tanenbaum: 9780136006633, Pearson, 2008.
3. C Programming Language (2nd Edition): Brian W. Kernighan, Dennis M. Ritchie: 0076092003106, 2015.
4. Operating Systems In Depth: Design and Programming by Thomas W. Doepfner, 2010.

**REFERENCE WEBSITE:**

1. [https://onlinecourses.nptel.ac.in/noc21\\_cs44/preview](https://onlinecourses.nptel.ac.in/noc21_cs44/preview)
2. [https://profile.iiita.ac.in/bibhas.ghoshal/teaching\\_os\\_lab.html](https://profile.iiita.ac.in/bibhas.ghoshal/teaching_os_lab.html)

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	-	-	3	3	3	-	3



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**II B.Tech - IV Semester**

**20MAC231**

**ENVIRONMENTAL SCIENCE**  
(COMMON TO ALL BRANCHES)

**L T P C**

**2 - - -**

**PRE-REQUISITES:** NIL

**COURSE EDUCATIONAL OBJECTIVES:**

1. To recognize nature of environmental studies and various renewable and nonrenewable resources.
2. To understand flow and bio-geo- chemical cycles and ecological pyramids.
3. To identify various causes of pollution and solid waste management and related preventive measures.
4. To evaluate and interpret the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
5. To understand the causes of population explosion, value education and welfare programmes.

**UNIT – 1: INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES (6)**

**Multidisciplinary nature of environmental studies:** Definition, scope and importance. Need for public awareness.

**Natural Resources:** Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and nonrenewable energy resources.

**UNIT – 2: CONCEPT OF ECOSYSTEM AND BIODIVERSITY (6)**

**Structure and function of an ecosystem:** Producers, consumers and decomposers- Energy flow in the ecosystem- Ecological succession- Food chains, food webs and ecological pyramids- Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Biodiversity and its conservation:** Introduction – Definition: genetic, species and ecosystem diversity-Biogeographical classification of India-Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels- India as a mega-diversity nation-Hot-spots of biodiversity-Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. -Endangered and endemic species of India -Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

**UNIT –3: ENVIRONMENTAL POLLUTION AND WASTE MANAGEMENT (6)**

**Environmental Pollution:** Definition - Cause, effects and control measures of: - a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. nuclear hazards

**Solid waste Management:** Causes, effects and control measures of urban and industrial wastes-Role of an individual in prevention of pollution. Pollution case studies-Disaster management: floods, earthquake, cyclone and landslides.

**UNIT – 4: SOCIAL ISSUES AND THE ENVIRONMENT (6)**

**From Unsustainable to Sustainable development:** Urban problems related to energy Water conservation, rain water harvesting, watershed management-Resettlement and rehabilitation of people; its problems and concerns. -Environment Protection Act-Air (Prevention and Control of Pollution) Act-Water (Prevention and control of Pollution) Act-Wildlife Protection Act- Forest Conservation Act -Issues involved in enforcement of environmental legislation- Public awareness.



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**UNIT – 5: HUMAN POPULATION AND THE ENVIRONMENT**

**(6)**

**Population growth:** variation among nations-Population explosion – Family Welfare Programme- Environment and human health-Human Rights-Value Education-HIV/AIDS. Women and Child Welfare-Role of Information Technology in Environment and human Case Studies.

**Total hours: 30**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		POs mapped with COs
<b>CO1</b>	Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.	<b>PO1, PO2, PO3 PO4, PO5, PO6,PO7</b>
<b>CO2</b>	Understand flow and bio-geo- chemical cycles and ecological pyramids.	<b>PO1, PO2, PO3 PO4, PO5, PO6,PO7</b>
<b>CO3</b>	Understand various causes of pollution and solid waste management and related preventive measures.	<b>PO1, PO2, PO3 PO4, PO5, PO6,PO7</b>
<b>CO4</b>	Understand concept of rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.	<b>PO1, PO2, PO3 PO4, PO5, PO6,PO7</b>
<b>CO5</b>	Causes of population explosion, value education and welfare programmes.	<b>PO1, PO2, PO3 PO4, PO5, PO6,PO7</b>

**TEXT BOOKS:**

1. R. Rajagopalan, " Environmental Studies", Oxford University Press.
2. Gilbert M. Masters and Wendell P. Ela., "Environmental Engineering and science" PHI Learning Pvt. Ltd, 2008

**REFERENCE BOOKS:**

1. ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses", University grants commission, 2/e,2013.
2. C.P.Kaushik and Anubhakaushik "Text book of environmental studies", New age International publishers, 4/e,2006.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/127/105/127105018/>
2. <https://nptel.ac.in/courses/113/104/113104061/>
3. <https://nptel.ac.in/courses/120/108/120108005/>
4. <https://nptel.ac.in/courses/120/108/120108002/>

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO.1</b>	3	2	1	2	2	2	3	-	-	-	-	-
<b>CO.2</b>	3	2	1	2	2	2	3	-	-	-	-	-
<b>CO.3</b>	3	2	1	2	2	2	3	-	-	-	-	-
<b>CO.4</b>	3	2	1	2	2	2	3	-	-	-	-	-
<b>CO.5</b>	3	2	1	2	2	2	3	-	-	-	-	-
<b>CO*</b>	<b>3</b>	2	1	2	2	2	<b>3</b>	-	-	-	-	-



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**II B.Tech - IV Semester**

- **INTERNSHIP DURING SUMMER VACATION** **L T P C**  
**0 0 0 0**

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. Objective is to give an opportunity to the student to get hands on training industry.
2. The course is designed so as to expose the students to industry environment and to take up on-site assignment as trainees or interns.

**SCHEME OF INDUSTRY INTERNSHIP:**

1. Students are encouraged to go to Industrial Internship for at least 2-3 weeks during summer vacation and should be organized by the Head of the Department for every student.