



# Course Structure and Syllabus

(R20 Regulations)

**B.Tech.**  
**Computer Science & Engineering (AI&ML)**  
**(2 Year Syllabus)**  
**(Applicable for the Batches admitted from 2022-23)**



# NARASARAOPETA ENGINEERING COLLEGE

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(AUTONOMOUS)

Kotappakonda Road, Yellamanda (Post), Narasaraopet – 522601, Guntur District, AP  
Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada, Code: 47,  
Accredited by NBA & NAAC A+, RTA Approved Pollution test Centre, ISO 9001: 2015 Certified Institution  
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## **CURRICULAR FRAMEWORK FOR REGULAR, MINORS AND HONORS B.TECH PROGRAMMES OF ALL BRANCHES**

### **1. PREAMBLE**

The rapid transformation in every sphere of life is augmenting the need to prepare the present fast-paced generation to adapt to the changing knowledge & skill requirement on a life-long basis, in the fields of science, engineering, technology and humanities to influence society positively. The future looks up to multi-disciplinary, competent leaders who are Information and Communication Technology ready and driven by strong ethical values.

NEC envisions to nurture knowledge, skills, and attitude and values of the aspiring youth to enable them to become global citizens and towards that process, the institution has evolved a flexible integrated academic curriculum.

NEC introduced Outcome Based Education (OBE) and Choice Based Credit System (CBCS), which emphasized on honing the skills and knowledge of the graduates.

The Engineering curriculum is revised with an objective to fill the gaps in the existing curriculum with reference to skill development. The revised curriculum underwent a reorganization making the engineering education enshrined with skill development ecosystem to suit the industry's needs and to ensure the graduates employability.

The curriculum mandates students to take up five skill courses, Out of the five skill courses two shall be skill-oriented courses from the same domain and shall be completed in second year. Of the remaining 3 skill courses, one shall be necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature. The students are also given the option of choosing between skill courses offered by the college and a certificate course offered by industry, a professional body, APSSDC or any other accredited body.

Another major change brought in the curriculum is the introduction of B.Tech with Honors or a B.Tech. with a Minor. This is to give an opportunity for the fast learners to earn additional credits either in the same domain or in a related domain, making them more proficient in their chosen field of discipline or be a graduate with multidisciplinary knowledge and job ready skills.

## 2. PROGRAMS OFFERED BY THE COLLEGE

Narasaraopeta Engineering College (NEC) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) for the following branches of Engineering.

S. No.	Name of the Program	Program Code
1.	Civil Engineering	01
2.	Electrical and Electronics Engineering	02
3.	Mechanical Engineering	03
4.	Electronics and Communication Engineering	04
5.	Computer Science and Engineering	05
6.	Information Technology	12
7.	CSE (Artificial Intelligence)	43

## 3. ELIGIBILITY FOR ADMISSION

The total seats available as per the approved intake are grouped into two categories viz. category A and Category B with a ratio of 70:30 as per the state government guidelines vide G.O No.52.

The admissions for category A and B seats shall be as per the guidelines of Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.

- Under Category A: 70% of the seats are filled through EAMCET counselling.
- Under Category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE

### **Eligibility for Admission - Under Lateral Entry Scheme (LES)**

Students with diploma qualification have an option of direct admission into 2nd year B. Tech. (Lateral Entry Scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats. Admissions to this three-year B.Tech. Lateral entry Programme will be through ECET.

#### 4. AWARD OF THE DEGREE:

##### **For Regular and LES(Lateral Entry Scheme) students**

A student will be declared eligible for the award of B. Tech. degree if he/she fulfils the following:

- (a) Pursues a course of study in not less than four and not more than eight academic years for regular students. For LES students, pursue a course of study for not less than three academic years and not more than six academic years counted from the academic year of admission.
- (b) He/she shall forfeit their seat in B. Tech course and their admission stands cancelled after eight academic years for regular students and six academic years for LES students starting from the academic year of admission.
- (c) Registers for 160 credits and must secure all the 160 credits for Regular students. Registers for 121 credits and must secure all the 121 credits for LES students
- (d) 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 160/121 credits and meet other specified requirements in the appropriate section of this document.
- (e) A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

##### **Academic Calendar**

For all the eight/six semesters a common academic calendar shall be followed in each semester by having sixteen weeks of instruction, one week for the conduct of practical exams and with two weeks for theory examinations. Dates for registration, sessional and end semester examinations shall be notified in the academic calendar of every semester. The schedule for the conduct of all the curricular and co-curricular activities shall be notified in the planner.

#### **4. Assigning of Credits:**

- 1 Hr. Lecture (L) per week - 1 credit
- 1 Hr. Tutorial (T) per week - 1 credit
- 1 Hr. Practical (P) per week - 0.5 credits
- 2 Hours Practical (Lab)/week - 1 credit

## 5. Induction Program

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

A three-week induction program for first year B.Tech students is to be held in zero semester. Regular classes will start after the induction program.

The objectives of the program are as follows:

1. Assimilation in the ethos and culture of the institution
2. Exposure to a larger vision of life
3. Bonding among students and teachers
4. Learning a creative skill in arts
5. Regular lifestyle and professional discipline
6. Special assistance for needy students for improving proficiency in English and Mathematics

The above objectives will be achieved through the following activities:

1. Physical activity: Yoga, Mild Exercise, Games and sports etc.
2. Creative arts: Painting, Photography, music, dance etc.
3. Literary activity: General reading, writing summaries, debating, enacting a play etc.
4. Human Values: Discussion/Lectures in small groups of students with a faculty member
5. Lectures by eminent people: From industry, entrepreneurs, public life, social activists, alumni .
6. Exposure to department/branch, Innovation, Exploring Engineering.

## 6. DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for Theory and 50 marks for Mini Project/Practical Training/Internship/ Research Project/ Community Service Project. The Project Work shall be evaluated for 200 marks.

## **THEORY**

For all theory subjects consisting of 5 units in each subject, the assessment shall be for 30 marks through internal evaluation and 70 marks through external end semester examination of 3 hours duration.

## **INTERNAL EVALUATION**

Internal evaluation is based on two **Cycle** examinations. Each **Cycle** consists of three components.

1) **Assignment Test – 1 (A1):**

A1 will be conducted after the completion of 1<sup>st</sup> unit of syllabus. 5 or 6 questions will be given to students before 1 week of the commencement of the test. On the day of test each student will be given two questions at random. A1 will be evaluated for 05 marks.

2) **Quiz - 1(Q1):**

After the first two and half Units of syllabus is over along with the descriptive test, online quiz test will be conducted for 20 marks and scaled down to 10 marks.

3) **Descriptive Test – 1(D1):**

Along with the Q1, a descriptive test will be conducted for 25 marks and scaled down to 15 marks. One 10 marks question from unit 1, one 10 marks question from unit 2, and one 5 marks question from first half of 3<sup>rd</sup> unit will be given.

**Cycle–I** final marks = A1 (05 marks) + Q1 (10 marks) + D1 (15 marks) = 30 marks

**In the similar manner, Cycle–II Examination will be conducted as follows:**

A2 test will be conducted after 3.5 units of syllabus (covering syllabus from 2.5 to 3.5 units)

Q2 and D2 will be conducted after 5<sup>th</sup> unit is over. For D2, one 5 marks question will be given from second half of third unit, two 10 marks questions will be given each from units 4 and 5.

**Cycle–II** final marks = A2 + Q2 + D2 = 30 Marks.

**Final internal marks** will be computed as **80 % of best cycle marks + 20% of least cycle marks.**

## **EXTERNAL EVALUATION**

The semester end examinations will be conducted for 70 marks consist of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

## **PRACTICALS**

### **INTERNAL EVALUATION**

For practical subjects there shall be continuous evaluation during the semester for 15 internal marks and 35 end examination marks. The internal 15 marks shall be awarded as follows:

Day to day work - 5 marks,

Record-5 marks and

Internal laboratory test -5 marks.

### **EXTERNAL EVALUATION**

For practical subjects there shall be an external examination at the end of the semester for 35 marks in the presence of external examiner. The examination duration is 3 hours.

### **DRAWING SUBJECTS**

For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing etc..) and estimation, the distribution shall be 30 marks for Internal Evaluation and 70 marks for End Examination. There shall be two internal tests in a semester.

The 30 internal marks will be evaluated as follows:

#### **Cycle–I:**

Internal Test : 15 marks. (1½ hour duration)

Day – to – day work: 15 marks (evaluation of charts)

In the Similar manner, **Cycle–II examination will be conducted for 30 marks**

The sum of 80% of the best and 20% of the least of two internal tests shall be considered.

The syllabus for the subject “**Machine drawing using Auto CAD**” consists of two major portions:

1. Unit I to III –Conventional drawing pattern.
2. Unit IV to VI-Computer lab pattern using any drafting packages

The distribution of internal and external marks is 30 and 70 marks respectively.

**Internal Evaluation:** Max Marks: 30

The total internal evaluation marks are distributed in the following two components:

1. Day-to-day work : 15 Marks (Evaluation of Charts)

2. Descriptive Test : 15 Marks

**Cycle-I Examination – Conventional drawing pattern**

In Cycle-I examination the 30 marks will be awarded as follows:

Day-to-day evaluation	- 15 Marks
Descriptive Test	- 15 Marks

In the Descriptive Test of duration 2 hours, 3 questions will be given to the student and he has to answer all the three questions (3x05M = 15M).

**Cycle-II Examination – Computer lab pattern using any drafting packages**

for duration of 2 hours.

In Cycle-II examination the 30 marks will be awarded as follows:

Record	- 10 Marks
Execution	- 10 Marks
Paper Work	- 10 Marks

Of two cycle examinations conducted during the semester, sum of 80% of the best and 20% of the least of two cycle examinations shall be considered for the award of internal marks.

**End semester Examination** (Total Duration: 4 hours, Max, marks: 70)

Conventional drawing pattern (Duration: 2 Hours, Marks: 35)

Computer lab pattern using any drafting packages (Duration: 2 Hours, Max:35)

(Note: Both Conventional drawing pattern and Computer lab pattern using any drafting packages are compulsory and are to be conducted in separate sessions)

**Mandatory Course (M.C):** Environmental Sciences/NSS/NCC, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc non-credit (zero credits) mandatory courses. Environmental Sciences shall be offered compulsorily as mandatory course for all branches. A minimum of 75% attendance is mandatory in these subjects. There shall be an external examination for 70 marks and it shall be conducted by the college internally. Two internal examinations shall be conducted for 30 marks and a student has to secure at least 40% of the marks for passing the course. There is no online internal exam for mandatory courses. No marks or letter grade shall be printed in the transcripts for all mandatory non-credit courses, but only SATISFACTORY(S)/NOT-SATISFACTORY (F) will be specified.



- There shall be 05 Professional Elective courses and 04 Open Elective courses. All the Professional & Open Elective courses shall be offered for 03 credits, wherever lab component is involved it shall be (2-0-2) and without lab component it shall be (3-0-0) or (2-1-0) and for all minors /honors, it shall be (4-0-0). If a course comes with a lab component, that component has to be cleared separately. The concerned BOS shall explore the possibility of introducing virtual labs for such courses with lab component.
- All Open Electives are offered to students of all branches in general. 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 the Programme.
- The college shall invite registration forms from the students at the beginning of the semester for offering professional and open elective courses. There shall be a limit on the minimum and maximum number of registrations based on class/section strength.
- Students shall undergo mandatory summer internships for a minimum of six weeks duration at the end of second and third year of the Programme.
- There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain courses and the remaining one shall be a soft skills course.
- Undergraduate Degree with Honors/Minor shall be issued by the Institute to the students who fulfil all the academic eligibility requirements for the B.Tech program and Honors/Minor program. The objective is to provide additional learning opportunities to academically motivated students.
- **Assessment:** The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory, 50 marks for practical subject. The distribution shall be 30% marks for Internal Evaluation and 70% marks for the End Semester Examinations. 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 and end semester examination marks to earn the credits allotted to each course.

**Mini Project/Practical Training/ Internship/ Research Project/ Community Service Project (1.5 Credits):**

It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Industries, Hydal and thermal power projects and also in software MNCs in the area of concerned specialization of the UG programme.

Students shall pursue this course during summer vacation just before its offering as per course structure. The minimum duration of this course is at least 6 weeks. The student shall register for the course as per course structure after commencement of academic year. A supervisor/mentor/advisor has to be allotted from the institute to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students while taking up the internship. After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the departmental committee consists of an external examiner; Head of the Department; supervisor of the internship and a senior faculty member of the department.

A certificate from industry/skill development center shall be included in the report. The report and the oral presentation shall carry 40% and 60% weightages respectively. It shall be evaluated for 50 external marks at the end of the semester. A student shall secure a minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted.

Mini Project/Practical Training/ Internship/ Research Project/ Community Service Project will be evaluated at the end of the semester for 50 marks (Record/Report: 15 marks and viva-voce: 35 marks) along with laboratory end examinations in the presence of external and internal examiner. There are no internal marks for the Mini Project/Practical Training/ Internship/ Research Project/ Community Service Project.

**Major Project (12 credits):**

**Evaluation:** The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner and is evaluated for 140 marks.

**MOOCS (1.5 Credits):**

Meeting with the global requirements, to inculcate the habit of self-learning and in compliance with AICTE/ UGC guidelines, MOOC (Massive Open Online Course) have been introduced, Student has to complete an on-line course to fulfil the academic requirement of B.Tech course. He/she can start doing the course from II Year I semester and submit the MOOCs certificate before the commencement of the end examinations of IV year I sem. The student shall register for the course (Minimum of 8 weeks) offered by SWAYAM/NPTEL/ Any other reputed organization, through online with the approval of Head of the Department. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only after submission of the certificate.

**Skill Oriented Courses ( 2 Credits)**

1. For skill oriented/skill advanced course, one theory and 2 practical hours or two theory hours may be allotted as per the decision of concerned BOS.
2. Out of the five skill courses two shall be skill-oriented courses from the same domain and shall be completed in second year. Of the remaining 3 skill courses, one shall be necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.
3. A pool of interdisciplinary job-oriented skill courses shall be designed by a common Board of studies by the participating departments/disciplines and the syllabus along with the pre requisites shall be prepared for each of the laboratory infrastructure requirements.
4. The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies as approved by the departmental committee.
5. The Board of Studies of the concerned discipline of Engineering shall review the skill advanced courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest courses based on industrial demand.
6. If a student chooses to take a Certificate Course offered by industries/Professional bodies/APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the Department, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency/professional bodies as approved by the departmental committee.

**Evaluation:** The job oriented skill courses may be registered at the college or at any accredited external agency as approved by departmental committee. A student shall submit a record/report on the on the skills learned. If the student completes job oriented skill course at external agency, a certificate from the agency shall be included in the report. The course will be evaluated at the end of the semester for 50 marks (record: 15 marks and viva-voce: 35 marks) along with laboratory end examinations in the presence of external and internal examiner. There are no internal marks for the job oriented skill courses.

### **Curricular Framework for Honors Programme**

1. Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.
2. A student shall be permitted to register for Honors program at the beginning of 4<sup>th</sup> semester provided that the student must have acquired a minimum of 8.0 SGPA upto the end of 2<sup>nd</sup> semester without any backlogs. In case of the declaration of the 3<sup>rd</sup> semester results after the commencement of the 4<sup>th</sup> semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Honors Programme registration active.
3. 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. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech. (Honors) in Mechanical Engineering.
4. In addition to fulfilling all the requisites of a Regular B.Tech Programme, 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 credits).
5. Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, 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 Departmental committee.
6. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.

7. The concerned departmental committee 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 departmental committee. 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 departmental committee. 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 per the guidelines approved by the departmental committee. .

8. The concerned BoS shall also consider courses listed under professional electives 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 Programme.

9. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will be mentioned 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.

10. In case a student fails to meet the SGPA 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.

11. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor’s degree.

### **Curricular Framework for Minor Programme:**

1. a) 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 Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering

b) 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.

2. The BOS concerned 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, Robotics, VLSI etc.

3. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.

4. There shall be no limit on the number of programs offered under Minor. The Institution can offer minor programs in emerging technologies based on expertise in the respective departments or can explore the possibility of collaborating with the relevant industries/agencies in offering the program.

5. 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.

6. A student shall be permitted to register for Minors program at the beginning of 4<sup>th</sup> semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 SGPA (Semester Grade point average) upto the end of 2<sup>nd</sup> semester without any history of backlogs. It is expected that the 3<sup>rd</sup> semester results may be announced after the commencement of the 4<sup>th</sup> semester. If a student fails to acquire 8 SGPA upto 3<sup>rd</sup> semester or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

7. 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 credits).

8. Out of the 20 Credits, 16 credits shall be earned by undergoing specified courses listed by the concerned BoS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab

component, that component has to be cleared separately. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

9. In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. 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.

10. Student can opt for the Industry relevant minor specialization as approved by the concerned Departmental committee. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Departmental committee of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

11. A committee should be formed at the level of College/Universities/department to evaluate the grades/marks given by external agencies to a student which are approved by concerned Departmental committee. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.

12. If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free 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.

13. In case a student fails to meet the SGPA 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.

14. 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.

### PASS MARK CRITERIA

A student shall be deemed to have satisfied the pass mark, if he secures not less than 35% of marks in the end examinations and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together as detailed below.

On passing a course of a program, the student shall earn the credits as assigned to that course.

S.No	Category of Subject	Max. Marks	Internal Marks	External Marks	External pass %	External pass mark	Over all pass %	Over all pass mark
1	Theory/ Drawing	100	30	70	35	25	40	40
2	Practical	50	15	35	35	12	40	20
3	Miniproject/Internship/Industrial Training /Skill development courses/ Research project/ Community service project	50	-	50	40%	20	40	20
4	Project Work	200	60	140	35	50	40	80
5	MOOCs(Credit Course)	Certificate must be submitted before the end semester examinations of that semester in which MOOCs course is offered.						

#### 11. Attendance Requirements:

- a) A student is eligible to write the end semester examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all the subjects.
- b) Condonation of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) may be granted by the College Academic Committee. However, this condonation concession is applicable only to any two semesters during the entire programme.
- c) Shortage of Attendance below 65% in aggregate shall not be condoned.
- d) A student who is short of attendance in a semester may seek re-admission into that semester when offered within 4 weeks from the date of commencement of class work.
- e) Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.
- f) A stipulated fee shall be payable towards condonation of shortage of attendance to the college. Students availing condonation on medical ground shall produce a medical certificate issued by the competitive authority.
- g) A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) minimum required credits.
- h) If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.



- i) For induction programme attendance shall be maintained as per AICTE norms.
- j) For non-credit mandatory courses the students shall maintain the attendance similar to credit courses

18. Promotion Rules:

- a) A student shall be promoted from first year to second year if he fulfils the minimum attendance requirements.
- b) A student will be promoted from II year to III year if he fulfils the academic requirement of 40% of credits up to II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.
- c) A student shall be promoted from III year to IV year if he fulfils the academic requirements of 40% of the credits up to III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.
- d) For LES, point C is only applicable

19. Grading:

After each subject is evaluated for 100 marks, the marks obtained in each subject 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	A+	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	-
-	Malpractice	MP	-

**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.

- 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.

$$CGPA = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

Where 'Si' is the SGPA of the  $i^{\text{th}}$  semester and  $C_i$  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. SGPA & CGPA will be calculated for those candidates who have passed all the subjects in that or up to that semester respectively.
- 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 A+, A, B, C, D, E and F.
- vii. As per AICTE regulations, conversion of CGPA into equivalent percentage as follows:

$$\text{Equivalent Percentage} = (CGPA - 0.75) \times 10$$

**Award of Class:**

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

<b>Class Awarded</b>	<b>CGPA Secured</b>
First Class with Distinction	$\geq 7.75$ (With No subject failures)
First Class	$\geq 6.75$ (With subject failures)
Second Class	$\geq 5.75$ & $< 6.75$
Pass Class	$\geq 4.75$ & $< 5.75$

20. Gap - Year:

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. An evaluation committee at institute 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.

### REVALUATION

1. Student can submit the application for revaluation, along with the prescribed fee for revaluation evaluation of his answer script(s) of theory subject(s) as per the notification issued by the Controller of Examinations.
2. The Controller of Examinations shall arrange for revaluation of such answer script(s).
3. An evaluator, other than the first evaluator shall reevaluate the answer script(s).

### MINIMUM INSTRUCTION DAYS

The minimum instruction days for each semester shall be 90 working days.

There shall be no branch transfer after the completion of admission process.

### WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the college or if any case of indiscipline is pending against him, the result of such student will be kept withheld. His degree will be withheld in such cases.

### TRANSITORY REGULATIONS

Discontinued or detained candidates are eligible for readmission as and when next offered. A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the subjects in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already

passed such subjects in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of first year shall join the autonomous batch of first year first semester. Such students shall study all the subjects prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of first year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

**Transfer candidates (from non-autonomous college affiliated to JNTUK)**

A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester under JNTUK

regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

**Transfer candidates (from an autonomous college affiliated to JNTUK)**

A student who has secured the required credits up to previous semester as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college.

A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree.

However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of studies.

The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester as per the regulations of the college from which he has transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

**Scope**

1. The academic regulations should be read as a whole, for the purpose of any interpretation.
2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
3. The college may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the date notified by the College Authorities.

**MALPRACTICES RULES****DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS**

- The Principal shall refer the cases of Malpractices in Internal Assessment Test and Semester end examinations to a malpractice prevention committee constituted by him for the purpose. Such committee shall follow the approved levels of punishment. The Principal shall take necessary action against the students based on the recommendations of the committee.
- Any action by the candidate trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder:

	<b>Nature of Malpractices/ Improper conduct</b>	<b>Punishment</b>
	<i>If the candidate:</i>	
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he 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.
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 in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or	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 to appear for the remaining examinations of the

	practical) in which the candidate is appearing.	subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the college.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred 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 practicals and to 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 college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the 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 college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/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	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 also are debarred and forfeit their seats. In case

	<p>person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</p>	<p>of outsiders, they will be handed over to the police and a police case is registered against them.</p>
7.	<p>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</p>	<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 college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>
8.	<p>Possess 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>
9.	<p>If student of the college, who is not a candidate for the particular examination or any person not</p>	<p>Student of the college expulsion from the examination hall and cancellation of the performance in that subject and all other</p>



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

**OTHER MATTERS:**

1. Physically challenged candidates who have availed additional examination time and a scribe during their intermediate / EAMCET examinations will be given similar concessions on production of relevant proof / documents.
2. The Principal shall deal in an appropriate manner with any academic problem which is not covered under these rules and regulations, in consultation with the Heads of the departments and subsequently such actions shall be placed before the Academic Council for ratification. Any emergency modification of regulation, approved in the meetings of the Heads of the departments shall be reported to the Academic Council for ratification.

**GENERAL:**

1. The academic council may, from time to time, revise, amend or change the regulations, schemes of examinations and / or syllabi.
2. Where ever the words ‘he’ ‘him’ ‘his’, occur in the regulations, they include ‘she’, ‘her’, ‘hers’.
3. The academic regulation should be read as a whole for the purpose of any interpretation.
4. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

## ANNEXURE-I

### COMMUNITY SERVICE PROJECT

.....Experiential learning through community engagement

As per the decision of the decision of the concerned department BoS

#### Introduction

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

#### Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of the society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

#### Implementation of Community Service Project

- Every student should put in a minimum of **180 hours** for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.

- 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
- 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 incharge.
- 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 programmes 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/apprentice/ on the job training

### Procedure

- 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.
- 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.
  - 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

### **EXPECTED OUTCOMES**

#### **BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS**

##### **Learning Outcomes**

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
- Improved ability to understand complexity and ambiguity

##### **Personal Outcomes**

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills

##### **Social Outcomes**

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

##### **Career Development**

- Connections with professionals and community members for learning and career opportunities

- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity

#### **Relationship with the Institution**

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

#### **BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS**

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research

#### **BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES**

- Improved institutional commitment
- Improved student retention
- Enhanced community relations

#### **BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY**

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals
- New energy, enthusiasm and perspectives applied to community work
- Enhanced community-university relation.

## **SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY**

### **SERVICE PROJECT**

The following is the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

#### **For Engineering Students**

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**

**KAKINADA-533003, Andhra Pradesh (India)**






**For Constituent Colleges and Affiliated Colleges of JNTUK**

# Ragging

## Prohibition of ragging in educational institutions Act 26 of 1997

### Salient Features

- ⇒ Ragging within or outside any educational institution is prohibited.
- ⇒ Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Fine Upto
Teasing, Embarrassing & Humiliation	 <b>6 Months</b>	+	<b>Rs. 1,000/-</b>
Assaulting or Using Criminal force or Criminal intimidation	 <b>1 Year</b>	+	<b>Rs. 2,000/-</b>
Wrongfully restraining or confining or causing hurt	 <b>2 Years</b>	+	<b>Rs. 5,000/-</b>
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 <b>5 Years</b>	+	<b>Rs. 10,000/-</b>
Causing death or abetting suicide	 <b>10 Months</b>	+	<b>Rs. 50,000/-</b>

**In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288**

**LET US MAKE JNTUK A RAGGING FREE UNIVERSITY**



**R20 COURSE STRUCTURE****I B.TECH - I SEMESTER**

S.No	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC1101	Technical & Communicative English-I	HS	30	70	100	3	0	0	3
2	R20CC1102	Linear Algebra & Calculus	BS	30	70	100	2	1	0	3
3	R20CC1103	Engineering Chemistry	BS	30	70	100	3	0	0	3
4	R20CC1105	Problem Solving Using C	ES	30	70	100	3	0	0	3
5	R20CC1111	Electronic Devices and Logic Design	ES	30	70	100	3	0	0	3
6	R20CC11L1	Soft Skills and Communication Skills Lab	HS	15	35	50	0	0	3	1.5
6	R20CC11L2	Problem Solving Using C Lab	ES	15	35	50	0	0	3	1.5
7	R20CC11L5	Engineering Chemistry Lab	BS	15	35	50	0	0	3	1.5
9	R20CC11MC1	Environmental Studies	MC	-	-	-	2	0	0	0
<b>TOTAL</b>										<b>19.5</b>

**R20 COURSE STRUCTURE****I B.TECH – II SEMESTER**

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC1201	Differential Equations & Vector Calculus	BS	30	70	100	2	1	0	3
2	R20CC1205	Applied Physics	BS	30	70	100	3	0	0	3
3	R20CC1206	Problem Solving Using PYTHON	ES	30	70	100	3	0	0	3
4	R20CC1218	Technical and Communicative English-II	ES	30	70	100	3	0	0	3
5	R20CC12L10	Applied Physics Lab	BS	15	35	50	0	0	3	1.5
6	R20CC12L12	Problem Solving using PYTHON Lab	ES	15	35	50	0	0	3	1.5
7	R20CC12L15	IT Workshop	ES	15	35	50	0	0	3	1.5
8	R20CC12L16	UNIX Programming Lab	ES	15	35	50	0	0	3	1.5
9	R20CC12L14	Engineering Graphics	ES	15	35	50	0	0	3	1.5
<b>TOTAL</b>										<b>19.5</b>

**R20 COURSE STRUCTURE****II B.TECH - I SEMESTER**

S.No	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC2106	Probability & Statistics	BS	30	70	100	2	1	0	3
2	R20CC2103	OOPs through Java	PC	30	70	100	3	0	0	3
3	R20CC2104	Data Structures	PC	30	70	100	3	0	0	3
4	R20CI2101	Computer Organization	PC	30	70	100	3	0	0	3
5	R20AC2105	Software Engineering	PC	30	70	100	3	0	0	3
6	R20CC21L1	Data Structures Lab	PC	15	35	50	0	0	3	1.5
7	R20CC21L2	OOPs through Java Lab	PC	15	35	50	0	0	3	1.5
8	R20AC21L3	Software Engineering and UML Lab	PC	15	35	50	0	0	3	1.5
9	R20CC21SC1	Data Science Lab	SOC	-	50	50	0	0	4	2
10	R20CC21MC2	Constitution of India	MC	-	-	-	2	0	0	0
<b>Total</b>										<b>21.5</b>

**R20 COURSE STRUCTURE****II B.TECH – II SEMESTER**

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC2211	Mathematical Foundations of Computer Science	BS	30	70	100	2	1	0	3
2	R20CC2203	Database Management Systems	PC	30	70	100	3	0	0	3
3	R20CC2210	Numerical Methods & Transformations	BS	30	70	100	3	0	0	3
4	R20AM2205	Artificial Intelligence	PC	30	70	100	3	0	0	3
5	R20AC2204	Operating Systems	PC	30	70	100	3	0	0	3
6	R20CC22L1	Database Management Systems Lab	PC	15	35	50	0	0	3	1.5
7	R20AM22L3	Operating Systems Lab	PC	15	35	50	0	0	3	1.5
8	R20AC22L4	Front End Web Technologies Lab	PC	15	35	50	0	0	3	1.5
9	R20CC22SC3	Mobile Application Development Lab	SOC	-	50	50	0	0	4	2
<b>TOTAL</b>										<b>21.5</b>
10	Honors/Minors Course			30	70	100	4	0	0	4
Summer Internship / Community Service Project					To be evaluated in III/I					

**I B.TECH - I SEMESTER**

S.No	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC1101	Technical & Communicative English-I	HS	30	70	100	3	0	0	3
2	R20CC1102	Linear Algebra & Calculus	BS	30	70	100	2	1	0	3
3	R20CC1103	Engineering Chemistry	BS	30	70	100	3	0	0	3
4	R20CC1105	Problem Solving Using C	ES	30	70	100	3	0	0	3
5	R20CC1111	Electronic Devices and Logic Design	ES	30	70	100	3	0	0	3
6	R20CC11L1	Soft Skills and Communication Skills Lab	HS	15	35	50	0	0	3	1.5
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7	R20CC11L5	Engineering Chemistry Lab	BS	15	35	50	0	0	3	1.5
9	R20CC11MC1	Environmental Studies	MC	-	-	-	2	0	0	0
<b>TOTAL</b>										<b>19.5</b>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1101	<b>TECHNICAL AND COMMUNICATIVE ENGLISH - I (Common to All Branches)</b>						

### COURSE OBJECTIVES:

- To enable the engineering students develop their basic communication skills in English for academic and social purposes.
- To equip the students with appropriate oral and written communication skills.
- To inculcate the skills of listening, reading and critical thinking.
- To integrate English Language learning with employability skills and training.
- To enhance the students' proficiency in reading skills enabling them meet the academic demands of their course.

### COURSE OUTCOMES:

Learners are able to

**CO1:** Interpret explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it. [K3].

**CO2:** Compose paragraphs, essays, emails, letters, reports, resume and transfer information into tables, Pie and bar diagrams. [K6].

**CO3:** Build grammatically correct sentences using a variety of sentence structures. [K3]

**CO4:** Enhance word power and usage of lexicons [K3].

### Teaching Methodology:

The methodology of teaching will be chalk and talk, PPT, audio-visual, flipped class and activity based teaching.

### UNIT-I

**Hours of Instruction per unit: 8**

#### 1. A Drawer full of Happiness

- Listening** : Dialogues, Task based listening activities.
- Speaking** : Asking and answering general questions.
- Reading** : Skimming, Scanning.
- Writing** : Punctuations, Paragraphs.
- Grammar & Vocabulary** : Nouns, Adjuncts, GRE Vocabulary, Technical Vocabulary.

### UNIT-II

**Hours of Instruction per unit: 8**

#### 2. Nehru's Letter to daughter Indira on her Birthday

- Listening** : Individual and pair based listening to the audio track.
- Speaking** : Discussion in pairs / small groups on specific topics.

- c. **Reading** : Identifying sequence of ideas; recognising verbal techniques.
- d. **Writing** : Summarising, Paraphrasing.
- e. **Grammar & Vocabulary** : Articles, Adjectives, Prepositions  
Verbal Competence,  
Synonyms & Antonyms,  
Analogy,  
GRE Vocabulary,  
Technical Vocabulary.

### UNIT-III

**Hours of Instruction per unit: 8**

#### **3. Stephen Hawking- Positivity ‘Benchmark’**

- a. **Listening** : Listening for global comprehension and summarising.
- b. **Speaking** : Discussing specific topics in pairs (or) small groups and reporting the discussion, Complaining, Apologising.
- c. **Reading** : Reading between the lines, Critical reading for evaluation.
- d. **Writing** : Official Letter writing, E-Mail etiquette, General Netiquette, Covering Letter & Resume writing.
- e. **Grammar & Vocabulary** : Phrasal verbs, Verbs, Tenses (Present, Past & Future), Concord: Subject-Verb Agreement, Verbal reason, Using equivalents, Word associations, GRE Vocabulary, Technical Vocabulary.

### UNIT-IV

**Hours of Instruction per unit: 8**

#### **4. Like a Tree, Unbowed: Wangari Maathai- Biography**

- a. **Listening** : Making predictions while listening to conversations (or) transactional dialogues.
- b. **Speaking** : Role plays for practice of conversational English in academic contexts (formal and informal) .
- c. **Reading** : Information transfer (Tables, Bar Diagrams, Line Graphs, Pie Diagrams)
- d. **Writing** : Interpreting visual information, Statement of Purpose (SOP)
- e. **Grammar & Vocabulary** : Gender inclusive language (Gendered Noun, Gender-neutral Noun), Quantifying expressions, Adjectives, Adverbs, Degrees of comparison, GRE Vocabulary, Technical Vocabulary.

## UNIT-V

Hours of Instruction per unit: 8

### 5. “Stay Hungry, Stay Foolish”- Rushmi Bansal

- a. **Listening** : Identifying key terms, understanding concepts, interpreting the concepts.
- b. **Speaking** : Formal oral presentations on topics from academic contexts.
- c. **Reading** : Reading comprehension, The RAP strategy for in-depth reading, Intensive reading and extensive reading.
- d. **Writing** : Academic proposals, Poster presentation.
- e. **Grammar & Vocabulary** : Reported Speech, Reporting verbs for academic purposes, Corrections of sentences, GRE Vocabulary, Technical Vocabulary.

### TEXTBOOKS:

1. INFOTECH ENGLISH , Maruthi Publications, Guntur- 522001.

### REFERENCES:

1. Raymond Murphy, *Murphy’s English Grammar*, Cambridge University Press 2004
2. Meenakshi Raman, Sangeeta Sharma, *Technical Communication: English Skills for Engineers*, Oxford University Press, 2009
3. Michael Swan, *Practical English Usage*, Oxford University Press, 1996

### ONLINE SOURCES:

1. [www.enchantedlearning.com](http://www.enchantedlearning.com)
2. <https://www.englisch-hilfen.de/en/>
3. <https://www.bbc.co.uk/learningenglish/>
4. <https://in.usembassy.gov/education-culture/american-spaces/american-space-new-delhi/collection/>
5. [https://www.talkenglish.com/speaking/basics/speaking\\_basics\\_ii.aspx](https://www.talkenglish.com/speaking/basics/speaking_basics_ii.aspx)
6. <https://www.englishclub.com/speaking/>
7. <https://agendaweb.org/listening-exercises.html>
8. <https://www.esolcourses.com/content/topicsmenu/listening.html>
9. <https://www.esl-lab.com/>
10. [https://www.eagetutor.com/eage-fluent-english-speaking-search-p.htm?gclid=EAIaIQobChMIpr-F5OzH7QIVChsrCh1kBAkzEAMYASAAEgINpFD\\_BwE](https://www.eagetutor.com/eage-fluent-english-speaking-search-p.htm?gclid=EAIaIQobChMIpr-F5OzH7QIVChsrCh1kBAkzEAMYASAAEgINpFD_BwE)
11. [https://www.myenglishpages.com/site\\_php\\_files/reading.php](https://www.myenglishpages.com/site_php_files/reading.php)
12. <https://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/>



I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	30	70	100	3
SUBCODE: R20CC1102	<b>LINEAR ALGEBRA AND CALCULUS</b> (Common to All Branches)						

**COURSE OBJECTIVES:**

- Understanding basic concepts of linear algebra (systems of linear equations, matrix calculus).
- To become proficiency in solving computational problems of linear algebra.
- To acquire knowledge on mean value theorems in calculus.
- Familiarization about the techniques in calculus and multivariate analysis.

**COURSE OUTCOMES:**

Upon successful completion of the course, the students should be able to

**CO 1:** Solve the system of linear equations.[K3]

**CO 2:** Analyze the applications of matrices in various fields and obtain Eigen values and Eigenvectors.[K4]

**CO 3:** Apply the mean value theorems in calculus to Engineering problems.[K3]

**CO 4:** Apply the functions of several variables to evaluate the rates of change with respect to Time and space variables in engineering. [K3]

**CO 5:** Determine the area and volume by interlinking them to appropriate double and triple integrals. [K5]

**SYLLABUS**

**UNIT-I:**

**LINEAR SYSTEMS OF EQUATIONS: (10 hours)**

Rank of a matrix - Echelon form, Normal form, Solution of linear systems, Direct Methods, Gauss elimination, Gauss Jordan and Gauss Seidal Methods. Solutions of linear simultaneous equations: LU decomposition.

**Application:** Finding the current in a electrical circuit, Traffic flow

**UNIT – II:**

**EIGENVALUES AND EIGENVECTORS (12 hours)**

Eigenvalues, Eigenvectors, Properties, Cayley - Hamilton Theorem(without proof), Quadratic forms, Reduction of quadratic form to canonical form, Rank, Positive definite, negative definite, semi definite, index, signature.

**Application:** Finding powers and inverse of a square matrix using Cayley Hamilton’s Theorem.

**UNIT – III:**

**MEAN VALUE THEOREMS (8 hours)**

Review on limits and continuity, Mean Value theorems (without proofs): Rolle’s theorem, Lagrange’s theorem, Cauchy’s theorem, Taylor’s (Generalized mean value) theorem, increasing and decreasing functions, Maxima and minima of function of single variable.

**UNIT- IV:**

**PARTIAL DIFFERENTIATION: (8 hours)**

Function of two or more variables, Partial derivatives, Total derivatives, change of variables, Jacobian - functional dependence, Taylor's theorem for Two variables. Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

**UNIT-V:**

**MULTIPLE INTEGRALS:**

**(10 hours)**

Double and triple integrals, Change of Variables, Change of order of Integration, volume.

Application: Momenta of Inertia.

**TEXT BOOK :**

1. Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 43<sup>rd</sup> Edition, Khanna Publishers, 2012.
2. B.V. Ramana, "*Higher Engineering Mathematics*", 32<sup>nd</sup> Edition, McGraw Hill Education, 2018.

**REFERENCES:**

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. Kreyszig E, "*Advanced Engineering Mathematics*", 8<sup>th</sup> Edition, John Wiley, Singapore, 2001.
3. Greenberg M D, "*Advanced Engineering Mathematics*", 2<sup>nd</sup> Edition, Pearson Education, Singapore, Indian Print, 2003.
4. Peter V. O'Neil, "*Advanced Engineering Mathematics*", 7<sup>th</sup> Edition, Cengage Learning, 2011.
5. Bhavanari Satyanarayana, Pradeep Kumar T.V. & Srinivasulu D, "*Linear Algebra and Vector Calculus*", Studera Press, New Delhi, 2017.

**WEB SOURCE REFERENCES:**

1. <https://nptel.ac.in/courses/122107036/32>
2. <https://nptel.ac.in/courses/122107036/27>
3. <https://nptel.ac.in/courses/122101003/downloads/Lecture-4.pdf>
4. <https://nptel.ac.in/courses/122101003/downloads/Lecture-6.pdf>
5. <https://nptel.ac.in/courses/122104017/28>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: R20CC1103	<b>ENGINEERING CHEMISTRY (COMMON TO ALL BRANCHES)</b>						

**COURSE OBJECTIVES:**

- To analyze water for its various parameters and its significance in industrial and domestic allocations.
- To acquire the knowledge on types of polymers, fuels and their applications.
- To provide information on exciting advanced materials available in engineering.
- To apply the electrochemical principles, understand the fundamentals of corrosion and development of different techniques in corrosion control.
- To learn the importance of engineering materials used in daily life and industry.

**COURSE OUTCOMES:**

After successful completion of this course, the students will be able to:

**CO 1:** Analyze the suitable method of water treatment depending on the quality treatment. [K4]

**CO 2:** Compare different types of polymers, fuels and their importance. [K4]

**CO 3:** Utilize the advanced materials as engineering materials and apply them in domestic and industrial life. [K3]

**CO 4:** Distinguish electrical energy sources and importance of corrosion science. [K4]

**CO 5:** Identify different types of engineering materials and applications in engineering. [K3]

**SYLLABUS****UNIT-I: WATER CHEMISTRY**

**Characteristics of water:** Sources, Impurities–Hardness & its units–Industrial water characteristics–Softening of water by external treatment methods (Lime soda process, Zeolite and Ion exchange process)–Numerical problems on lime soda process–Desalination of brackish water (Reverse osmosis and Electrodialysis).

**Water analysis techniques:** Alkalinity–hardness (Complexo-metric)–Break point chlorination–Free chlorine–DO–BOD and COD.

**UNIT-II: POLYMERS AND FUEL CHEMISTRY**

**Polymers:** Introduction to polymers–Chain growth (free radical, ionic)–Step growth polymerization–Coordination polymerization–Copolymerization with specific examples–Thermoplastics and thermosets–Plastic moulding methods (Compression & Injection moulding)–Rubbers–Natural rubber–Processing–Vulcanization.

**Fuels:** Types of fuels–Calorific value–Numerical problems based on calorific value–Analysis of coal–Liquid fuels–Refining of petroleum–Cracking of heavy oil–Knocking and anti knocking agents–Octane and cetane values.

**UNIT-III: CHEMISTRY OF ADVANCED MATERIALS**

**Nano materials:** Introduction–Sol-gel method & Chemical reduction method of preparation –

Characterization by BET method and TEM methods–Carbon nano tubes and fullerenes: Types–Preparation–Properties and Applications.

**Liquid crystals:** Introduction–Types–Applications.

**Composite materials:** Introduction–Definition–Types–Applications–Cermets.

#### **UNIT-IV: ELECTROCHEMISTRY AND CORROSION**

**Electrochemistry:** Galvanic cells–Single electrode potential–Reference electrodes–Electrochemical series–Batteries (primary, secondary and fuel cells)–Applications of secondary batteries in E-vehicles.

**Corrosion:** Causes and effects of corrosion–Theories of corrosion (chemical and electrochemical corrosion)–Factors effecting corrosion–Corrosion control methods–Cathode protection–Sacrificial anodic, Impressed current methods–Surface coatings–Methods of application on metals (Hot dipping, Galvanizing, Tinning, Cladding, Electroplating, Electroless plating)–Organic surface coatings–Paints–Constituents and their functions–Pigment Volume Concentration.

#### **UNIT-V: CHEMISTRY OF ENGINEERING MATERIALS**

**Lubricants:** Introduction–Mechanism of lubrication–Classification of lubricants–Properties and testing of lubricating oils.

**Cement & Refractories:** Manufacture–Setting and hardening of cement–Failures of cement–Slag cement–Refractory: Introduction–Classification and properties of refractories.

#### **TEXT BOOKS:**

1. Shikha Agarwal, “**Engineering Chemistry**”, ISBN 1107476410, 2<sup>nd</sup> Edition, Cambridge University Press, New Delhi, (2019).
2. O.G. Palana, “**Engineering Chemistry**”, ISBN 0070146101, Tata McGraw Hill Education Private Limited, New Delhi, (2009).
3. B. Rama Devi, Ch. Venkata Ramana Reddy, Prashantharath, “**Text Book of Engineering Chemistry**”, ISBN 9789353500511, Cenage Learning India Pvt. Ltd, (2016).

#### **REFERENCE BOOKS:**

1. P.C. Jain and M. Jain “**Engineering Chemistry**”, ISBN 8187433175, 15/e, Dhanpat Rai & Sons, Delhi, (2015).
2. B.S Murthy and P. Shankar, “**A Text Book of NanoScience and NanoTechnology**”, University Press (2013).
3. K. Sessa Maheshwaramma and Mridula Chugh, “**Engineering Chemistry**”, Pearson India Edn services, (2016).
4. S.S. Dara, “**A Textbook of Engineering Chemistry**”, ISBN 8121932645, S.Chand Publisher, (2010)

### **WEB REFERENCES:**

1. URL: <https://www.youtube.com/watch?v=CWOJW4357Bg>
2. URL: <https://www.youtube.com/watch?v=H1Y1oxQ5eUA&t=627s>
3. URL: <https://www.youtube.com/watch?v=1xWBPZnEJk8>
4. URL: <https://www.youtube.com/watch?v=p9vPXdT0k48&t=225s>
5. URL: [https://www.youtube.com/watch?v=xb\\_xndPe4n0&t=390s](https://www.youtube.com/watch?v=xb_xndPe4n0&t=390s)

### **E-BOOKS:**

1. “**Engineering Chemistry**” (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1105	<b>PROBLEM SOLVING USING C</b> (Common to All Branches)						

**COURSE OBJECTIVE:**

- To know the basic problem solving process using Flow Charts and algorithms.
- To understand the basic concepts of control structures in C.
- To learn concepts of arrays, functions, pointers and Dynamic memory allocation in C.
- To use the concepts of structures, unions, files and command line arguments in C.

**COURSE OUTCOMES:**

After completion of this course, the students would be able to:

**CO1:** Develop algorithms and flow charts for simple problems. [K3]

**CO2:** Utilize suitable control structures for developing code in C. [K3]

**CO3:** Make use of functions and arrays in developing modular programs. [K3]

**CO4:** Make use of structures and pointers to write well-structured programs. [K3]

**CO5:** Make use of file Operations in C programming for a given application. [K3]

**SYLLABUS****UNIT I**

**Introduction to Algorithms and Programming Languages:** Algorithm – Key features of Algorithms – Some more Algorithms – Flow Charts – Pseudo code – Programming Languages – Generation of Programming Languages – Structured Programming Language.

**Introduction to C:** Structure of C Program – Writing the first C Program -Compiling and Executing C Programs - Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C - Operators in C -Programming Examples – Type Conversion and Type Casting.

**UNIT II**

**Decision Control and Looping Statements:** Introduction to Decision Control Statements – Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement.

**Functions:** Introduction – using functions – Function declaration/ prototype – Function Definition – function call – return statement – Passing parameters – Scope of variables –Storage Classes – Recursive functions – Recursion vs Iteration.

**UNIT III**

**Arrays:** Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array – Calculating the length of the Array – Operations on Array — Two Dimensional Arrays – Operations on Two Dimensional Arrays.

**Strings:** Introduction – Reading Strings – Writing Strings – String Manipulation functions -Array of Strings.

#### **UNIT IV**

**Pointers:** Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Passing Arguments to Functions using Pointer, Dynamic Memory Allocation.

**Structure, Union, and Enumerated Data Types:** Introduction – Nested Structures –Arrays of Structures – Structures and Functions – Self-referential Structures – Union –Enumerated Data Types.

#### **UNIT V**

**Files:** Introduction to Files – Using Files in C – Reading Data from Files – Writing Data To Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments – Functions for Selecting a Record Randomly - Remove –Renaming a File – Creating a Temporary File

#### **TEXT BOOKS:**

1. Reema Thareja, “Programming in C”, First **edition**, OXFORD University Press 2018.

#### **REFERENCE BOOKS**

1. REEMA THAREJA, “Introduction to C programming” OXFORD UNIVERSITY PRESS
2. Rachhpal Singh, “Programming in C”, kalyani publishers.
3. E Balagurusamy, “computing fundamentals & c programming”, isbn 978-0-07- 066909-3, Tata McGraw-Hill, Second Reprint, 2008.
1. Ashok N Kamthane, “Programming with ANSI and Turbo C”, Pearson Edition Publications, 2002.
5. Dennis Richie and Brian Kernighan, “The C programming Language”, 2<sup>nd</sup> edition.

#### **WEB REFERENCES:**

1. <http://cprogramminglanguage.net/>
2. <http://lectures-c.blogspot.com/>
3. [http://www.coronadoenterprises.com/tutorials/c/c\\_intro.htm](http://www.coronadoenterprises.com/tutorials/c/c_intro.htm)
4. [http://vfu.bg/en/e-Learning/Computer-Basics--computer\\_basics2.pdf](http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf)
5. <https://www.edx.org/learn/c-programming>
6. <https://www.programiz.com/c-programming>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1111	<b>ELECTRONIC DEVICES AND LOGIC DESIGN</b>						

**COURSE OBJECTIVES:**

- To discuss the characteristics of semiconductor diodes.
- To illustrate the different types of Transistors and their applications.
- To demonstrate the basics of Boolean algebra and reduction techniques.
- To design of combinational circuits.
- To design sequential circuits like registers and counters.

**COURSE OUTCOMES:**

After completion of this course, the students will be able to

**CO1:** Apply P-N diodes and Special diodes in electronic circuits.[K3]

**CO2:** Compare different types of transistors (BJT, FET and MOSFET) with their working principles.[K2]

**CO3:** Make use of Boolean algebra and K-map and to minimize combinational functions.[K3]

**CO4:** Develop combinational circuits and sequential circuits.[K3]

**CO5:** Construct different types of registers and counters.[K3]

**SYLLABUS:****UNIT I: Junction Diode Characteristics**

Open circuited PN Junction, Forward and Reverse bias, V-I characteristics, Applications of Diode – Switch, Rectifiers (without and with filters), Zener Diode characteristics, Zener as voltage regulator, LED.

**UNIT II: Transistors**

BJT, Configuration of BJT, Input and Output Characteristics of CB, CE and CC Configuration, JFET, MOSFETs – Construction, Characteristics and Applications, Comparison between BJT and JFET, Comparison between JFET and MOSFET.

**UNIT III: Number Systems, Logic Gates and Boolean algebra**

Binary, Octal, Decimal and Hexadecimal Number Systems, Conversion of Numbers from one Radix to another Radix, 1's Complement and 2's Complement.

Basic Gates- AND, OR and NOT, Universal Gates- NAND and NOR, EX-OR and EX-NOR Gates, De-Morgan's Laws, Minimization of Logic Functions using Boolean Theorems and Karnaugh map method.



### **UNIT IV: Combinational and Sequential Logic Circuits**

Combinational: Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Design of Decoders, Encoders, Multiplexers, Demultiplexers. Sequential: Basic sequential logic circuits: Latch and Flip-Flop, Truth tables and excitation tables of RS, JK, T and D Flip-Flops.

### **UNIT V: Registers and Counters**

Buffer Register, Control Buffer Register, Bidirectional Shift Registers, Universal Shift Registers. Synchronous Counter, Ripple Counter, Ring Counter, Modulus Counter.

### **TEXT BOOKS:**

1. Electronic Devices and Circuits – J. Millman, C.C. Halkias, TMGH, 2<sup>nd</sup> Edition 1998.
2. Digital Design – M. Morris Mano, Pearson, 3<sup>rd</sup> Edition, 2009.

### **REFERENCES:**

1. Electronic Devices and Circuits Theory- Robert L. Boylestad and Louis Nashelsky, Pearson Education, 9<sup>th</sup> Edition, 2008.
2. Fundamentals of Logic Design- Charles H. Roth, Jr, Thomson Learning, 5<sup>th</sup> Edition, 2005.

### **WEB REFERENCES:**

1. Student Resources provided in <https://www.electronics-tutorials.ws/> for basic electronic circuits
2. <http://nptel.ac.in/courses/117105080/> on Electronics and Communication Engineering
3. <http://www2.ece.ohio-state.edu/ee327/> Electronic Devices and Circuit laboratory
4. <https://searchworks.stanford.edu/view/11352963> for fundamentals of Electronics available in Digital Library
5. <https://archive.org/details/ElectronicDevicesCircuits>
6. <https://www.youtube.com/watch?v=CeD2L6KbtVM>
7. [http://onlinecourses.nptel.ac.in/noc20\\_ee70/preview](http://onlinecourses.nptel.ac.in/noc20_ee70/preview)

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC11L1	<b>SOFT SKILLS &amp; COMMUNICATION SKILLS LAB (Common to All Branches)</b>						

**COURSE OBJECTIVES:**

- To build confidence in the students to communicate effectively in English.
- To strengthen the oral communication skills to enable them to interact with the people in various social situations.
- To enable the learners improve pronunciation with the knowledge of phonetics.
- To provide exposure to students to soft skills like Goal Setting, Time Management, Interpersonal Skills, and Intra Personal Skills.

**COURSE OUTCOMES:**

After successful completion of this course, the students will be able to:

- CO1:** Communicate effectively with good pronunciation, overcoming mother tongue influence in academic and professional environment.[K3]  
**CO 2:** Listen and comprehend several accents of English Language.[K4]  
**CO 3:** Take part in various conversations/discourses using formal and informal expressions.[K4]  
**CO 4:** Adapt soft skills successfully in personal and professional life.[K5]

**UNIT– I**

- Introduction to Phonetics.
- Listening - TEDx Talks ( [https://www.ted.com/talks/ashweetha\\_shetty\\_how-education-helped-me-rewrite-my-life?language-en#t-623369](https://www.ted.com/talks/ashweetha_shetty_how-education-helped-me-rewrite-my-life?language-en#t-623369))
- Self-Introduction

**UNIT–II**

- Pronunciation Rules & Common Errors in Pronunciation.
- Listening -TEDx Talks([https://www.youtube.com/watch?v=Dk20-E0yx\\_s](https://www.youtube.com/watch?v=Dk20-E0yx_s))
- Role Play

**UNIT–III**

- Situational Dialogues (Inviting, Accepting and Declining Invitations)
- Listening - TEDx Talks (<https://www.youtube.com/watch?v=IgAnj6r1O48>)
- JAM

**UNIT-IV**

- Situational Dialogues (Commands, Instructions and Requests)
- Listening -TEDx Talks(<https://youtu.be/SKvMxZ284AA>)
- Telephonic Etiquette.

## UNIT-V

- a. Time Management.
- b. Goal Setting.
- c. Interpersonal Skills & Intra personal skills.

## TEXT BOOKS:

“Strengthen Your Communication Skills”, Maruthi Publications, 2013.

## REFERENCE BOOKS:

1. Meenakshi Raman, Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford University Press, 2015
2. J.D.O Conner, Better English Pronunciation, Cambridge University Press 1980.
3. T.Balasubramanian, “A Text Book of English Phonetics for Indian Students”, Macmillan,1981
4. Penny ur Grammar Practice Activities, Cambridge University Press, 2010.
5. Mark Hancock, Pronunciation in Use, Oxford University Press 2007.
6. K. R Lakshmi Narayanan, T. Murugavan, Managing Soft Skills, Scitech Publications, 2010.
7. K V S G Murali Krishna, K V K K Prasad, Placement and Personality Development, Second Edition, Reem Publications Pvt. Limited, 2012
8. Shiv Khera, You can Win, Bloomsbury Publication, 2014
9. Stephen R. Covey, The 7 Havits of Highly Effective People, Free Press, 1989

## ONLINE SOURCES:

1. [www.enchantedlearning.com](http://www.enchantedlearning.com)
2. <https://www.englisch-hilfen.de/en/>
3. <https://www.bbc.co.uk/learningenglish/>
4. <https://in.usembassy.gov/education-culture/american-spaces/american-space-new-delhi/collection/>
5. [https://www.talkenglish.com/speaking/basics/speaking\\_basics\\_ii.aspx](https://www.talkenglish.com/speaking/basics/speaking_basics_ii.aspx)
6. <https://www.englishclub.com/speaking/>
7. <https://agendaweb.org/listening-exercises.html>
8. <https://www.esolcourses.com/content/topicsmenu/listening.html>
9. <https://www.esl-lab.com/>
10. [https://www.eagetutor.com/eage-fluent-english-speaking-search-p.htm?gclid=EAIaIQobChMIpr-F5OzH7QIVChsrCh1kBAkzEAMYASAAEgINpfD\\_BwE](https://www.eagetutor.com/eage-fluent-english-speaking-search-p.htm?gclid=EAIaIQobChMIpr-F5OzH7QIVChsrCh1kBAkzEAMYASAAEgINpfD_BwE)
11. [https://www.myenglishpages.com/site\\_php\\_files/reading.php](https://www.myenglishpages.com/site_php_files/reading.php)
12. <https://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC11L2	<b>PROBLEM SOLVING USING C LAB</b> (Common to All Branches)						

**COURSE OBJECTIVE:**

- The purpose of this course is to introduce to students to the field of language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

**COURSE OUTCOMES:**

After completion of this C Programming Lab, students would be able to:

**CO 1:** Study, analyze and understand logical structure of computer programming and different constructs to develop programs in C Language. [K4]

**CO 2:** Compare and contrast various data types and operator precedence. [K2]

**CO 3:** Analyze the use of conditional and looping statements to solve problems associated with conditions and repetitions. [K4]

**CO 4:** Analyze simple data structures, use of pointers and dynamic memory allocation techniques. [K4]

**CO5:** Make use of functions and file I/O operations in developing C Programs. [K3]

**EXERCISE 1**

Construct Flowcharts for the following through Raptor:

- Develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
- Calculate simple and compound interest for various parameters specified by the user.
- Calculate the average of n numbers.

**EXERCISE 2**

- Write a C Program to calculate the area of triangle using the formula  

$$\text{Area} = \sqrt{s * (s - a) * (s - b) * (s - c)}$$
 where  $s = (a+b+c)/2$ .
- Write a C Program to find the largest of three numbers using ternary operator.
- Write a C Program to swap two numbers without using a temporary variable.

**EXERCISE 3**

- Write a C program to find the roots of a quadratic equation.
- Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. Consider the operators +, -, \*, /, % and use Switch Statement.

**EXERCISE 4**

- a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
- b) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

**EXERCISE 5**

- a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.
- b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
- c) Write a C Program to check whether the given number is Armstrong number or not.

**EXERCISE 6**

- a) Write a C program to interchange the largest and smallest numbers in the array.
- b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

**EXERCISE 7**

- a) Write a C Program to find sum of following series for a given n value.
  - i.  $1+(1+2)+(1+2+3)+(1+2+3+4)+(1+2+3+4+5)+\dots+(1+2+\dots+n)$ .
  - ii.  $1+(2+2)+(3+3+3)+(4+4+4+4)+\dots+(n+n+n+n\dots+n)$ .
- b) Write a C Program to display following patterns for a given n value
  - i.
 

1		
2	2	
3	3	3

 if n =3
  - ii.
 

1		
2	2	
3	3	3
2	2	
1		

 if n=3.

**EXERCISE 8**

- Draw a flow chart using Raptor and write C programs that use both recursive and non-recursive Functions for the following
- i) To find the factorial of a given integer.
  - ii) To find the GCD greatest common divisor of two given integers.

**EXERCISE 9**

- a) Write a C Program to find Fibonacci sequence.
- b) Write C programs illustrating call by value and call by reference concepts.

**EXERCISE 10**

- Write C Programs for the following string operations without using the built in functions - to concatenate two strings
- a) To append a string to another string
  - b) To compare two strings

### EXERCISE 11

Write C Programs for the following string operations without using the built in functions

- a) To find whether a given string is palindrome or not
- b) Write a C Program to count number of occurrences of each character in a given string. Example: if input 'APPLE' then output is 'A count 1, P count 2, L count 1, E count 1'

### EXERCISE 12

Write a C program that uses functions to perform the following operations:

- a) To insert a sub-string in to given main string from a given position.
- b) To delete n Characters from a given position in a given string.
- c) To replace a character of string either from beginning or ending or at a specified location

### EXERCISE 13

- a) Write a C Program to Implement Taylor series method
- b) Write a C Program to Implement Euler's method
- c) Write a C Program to Implement Runge Kutta method

### EXERCISE 14

- a) Write C Program to reverse a string using pointers
- b) Write a C Program to compare two arrays using pointers
- c) Write a C program to swap two numbers using pointers

### EXERCISE 15

- a) Write the following C Programs using Dynamic memory management functions.
  - i. Accept size of array from user then read n elements into two arrays and store sum of those two arrays in third array, display three arrays using pointers.
  - ii. User will specify data type and data to store, use generic pointer to store that data and display given input.

### EXERCISE 16

Examples which explores the use of structures, union and other user defined variables

### EXERCISE 17

- a) Write a C program which copies one file to another.
- b) Write a C program to count the number of characters and number of lines in a file.
- c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

### EXERCISE 18

**Virtual Lab:** <http://cse02-iiith.vlabs.ac.in/>

Any three programs must be submitted with result from the above link.

**\* At the end of the semester the student has to submit a Mini-Project on Computer Programming. The list of Mini-Projects is available in the department.**

**Virual Lab :** <http://ps-iiith.vlabs.ac.in/>

### TEXT BOOKS:

1. Reema Thareja, " Programming in C", OXFORD.
2. The C programming Language by Dennis Richie and Brian Kernighan 2<sup>nd</sup> ed.

**REFERENCE BOOKS:**

1. Dr.E.Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill Education.
2. Hanly, "Problem Solving and Program Design in C", Koffman, 7<sup>th</sup> ed, PEARSON.
3. Forouzan, Gilberg, Prasad, "C Programming, A Problem Solving Approach", CENGAGE.
4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

**WEB REFERENCES:**

1. <https://www.topcoder.com/community/competitive-programming/>
2. <https://cboard.cprogramming.com/c-programming/158586-project-euler-problem-2-solution.html>
3. <https://www.hackerrank.com/domains/c>
4. <https://leetcode.com/discuss/general-discussion/144138/C-programming-solutions/>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC11L5	<b>ENGINEERING CHEMISTRY LAB (COMMON TO ALL BRANCHES)</b>						

**COURSE OBJECTIVES:**

- To provide the students with a solid foundation in chemistry laboratory required to solve the engineering problems.
- To expose the students in practical aspects of the theoretical concepts.
- To train the students on how to handle the instruments.

**COURSE OUTCOMES:**

After successful completion of this course, the students will be able to:

**CO 1:** Develop and perform analytical chemistry techniques to address the water related problems (hardness, alkalinity, Chlorine, DO). [K6]

**CO 2:** Explain the functioning of different analytical instruments.[K5]

**CO 3:** Compare viscosity and surface tension of different oils.[K4]

**CO 4:** Measure molecular/system properties such as strength of solutions, conductance of solutions and acid number of lubricating oils, etc.[K5]

**LIST OF EXPERIMENTS**

Introduction to chemistry laboratory–Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis etc.

1. Estimation of NaOH using standard HCl solution
2. Determination of hardness of water sample by EDTA method
3. Determination of alkalinity of water sample
4. Determination of Dissolved Oxygen content of water sample by Winkler's method
5. Determination of Dissolved Chlorine by Mohr's method
6. Estimation of  $\text{Fe}^{+2}$  by using  $\text{KMnO}_4$
7. Preparation of phenol formaldehyde resin/Urea formaldehyde
8. Conductometric titration between strong acid and strong base
9. Determination of viscosity of a liquid by Ostwald's viscometer
10. Determination of surface tension of a liquid by Stalagmeter
11. Determination of moisture content present in given coal sample
12. Determination of acid value of an oil



**VIRTUAL LABS:**

1. Soil Analysis- Determination of pH of soil
2. Water analysis - Determination of Physical parameters

**TEXT BOOKS:**

1. N.K Bhasin and Sudha Rani “**Laboratory Manual on Engineering Chemistry**” 3/e, Dhanpat Rai Publishing Company (2007).
2. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B “**Vogel’s Quantitative Chemical Analysis**” 6/e, Pearson publishers (2000).
3. Sudharani, “**Lab manual on Engineering Chemistry**” Dhanpat Rai Publications, Co., New Delhi. (2009).

**WEB REFERENCES:**

1. URL: <https://vlab.amrita.edu>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	-	-	-	-	-	0
SUBCODE: R20CC11MC1	<b>ENVIRONMENTAL STUDIES (COMMON TO ALL BRANCHES)</b>						

**COURSE OBJECTIVES:**

- To make the students aware about the environment and it's inter-disciplinary, to familiarize the concept of ecosystem and their importance, basic understanding of the ecosystem and its diversity.
- Overall understanding of the natural resources.
- To bring the awareness among students about the importance of biodiversity and the need for its conservation.
- To make the students understand the adverse effects of environmental pollution, its causes and measures to control it.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities. Awareness on the social issues, environmental legislation and global treaties understanding the environmental policies and regulations.

**COURSE OUTCOMES:**

*After successful completion of this course, the students will be able to:*

- CO 1:** Explain the concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.[K2]
- CO 2:** Analyze the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.[K4]
- CO 3:** Explain the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.[K2]
- CO 4:** Distinguish various attributes of the pollution, their impacts and measures to reduce or control the pollution along with waste management practices.[K4]
- CO 5:** Interpret Environmental policy, legislation, environmental assessment and the stages involved in EIA Environmental audit.[K2]

**UNIT – I**

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness. Institutions and people in Environment.

**Ecosystems:**

Definitions and concepts – Characteristics of ecosystem – Structural and functional features – Producers, consumers and decomposers and food webs – Types of ecosystems – Forests, grassland, desert, crop land, pond, lake, river and marine ecosystems – Energy flow in the ecosystem –

Ecological pyramids – Ecological successions.

## UNIT – II

Natural Resources: Water resources–Use and over utilization of surface and natural resourced ground water–Floods, drought, conflicts over water, dams–benefits and problems on tribal population & Environment. Forest resources: Use and over–exploitation, deforestation.

Mineral resources: Use and exploitation, tribal & environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer–pesticide problems, water logging, salinity–concept of sustainable agricultural methods.

Energy Resources: Renewable (wind energy, tidal energy) and non-renewable energy resources (Fossil fuels, coal).

## UNIT – III

**Biodiversity:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity

Conservation of biodiversity: Threats to biodiversity: habitat loss, man wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: In-Situ conservation and Ex- situ conservation.

## UNIT – IV

Environmental Pollution and Control Technologies: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, and nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Good Agricultural Practices – Drip irrigation, soil erosion and desertification.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.Covid-19- and environmental Health –Impact of the Coronavirus-Precautions and infection control.

## UNIT – V

Environmental Policy, Legislation and Environmental Management: Environmental ethics: Issues and possible solutions. Environmental Protection Act, Legal aspects -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.

Impact Assessment and its significance - various stages of EIA, preparation of EMP and EIS, Environmental audit, Ecotourism.

Visit to some local Polluted Site: Study of an industrially Polluted area.

## TEXT BOOKS:

1. AnubhaKaushik& C. P. Kaushik, Environmental Studies,NewAge International (P) Ltd., New Delhi. Fourth edition,2014.

2. P. N. Palanisamy, P. Manikandan, A. Geetha, and K. ManjulaRani, Environmental Studies, Pearson Education, Chennai. ISBN 978-93-325-2052-3, Second edition-2014.

### REFERENCE BOOKS:

1. Deekshita Dave & P. UdayaBhaskar, Text Book of Environmental Studies Cengage Learning.
2. Shaashi Chawla, a Textbook of Environmental Studies, TMH, New Delhi.
3. Benny Joseph Environmental Studies, Tata McGraw Hill Co, New Delhi.
4. Dr.K.V.S.G. Murali Krishna, Environmental Studies VGS Publishers, Vijayawada, First Edition 2016.
5. Bharucha, E. Text book of Environmental Studies, First edition, Universities Press (India) Pvt., Ltd., Hyderabad, 2005.

### WEB REFERENCES:

1. URL: [https://www.youtube.com/watch?v=7G3eXI\\_DPn8](https://www.youtube.com/watch?v=7G3eXI_DPn8)
2. URL: <https://www.eolss.net/sample-chapters/C09/E6-70-05-01.pdf>
3. URL: <https://www.youtube.com/watch?v=QuRL6NbyvEQ>
4. URL: [https://google/ Introduction to Environmental Studies5JM1G2](https://google/Introduction+to+Environmental+Studies5JM1G2)
5. URL: <http://www.teacherspayteachers.com/Product/Food-Chains-Trophic-Levels-and-Ecological-Pyramids-PowerPoint> Click the above

**I B.TECH. – II SEMESTER**

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC1201	Differential Equations & Vector Calculus	BS	30	70	100	2	1	0	3
2	R20CC1205	Applied Physics	BS	30	70	100	3	0	0	3
3	R20CC1206	Problem Solving Using PYTHON	ES	30	70	100	3	0	0	3
4	R20CC1218	Technical and Communicative English-II	ES	30	70	100	3	0	0	3
5	R20CC12L10	Applied Physics Lab	BS	15	35	50	0	0	3	1.5
6	R20CC12L12	Problem Solving using PYTHON Lab	ES	15	35	50	0	0	3	1.5
7	R20CC12L15	IT Workshop	ES	15	35	50	0	0	3	1.5
8	R20CC12L16	UNIX Programming Lab	ES	15	35	50	0	0	3	1.5
9	R20CC12L14	Engineering Graphics	ES	15	35	50	0	0	3	1.5
<b>TOTAL</b>										<b>19.5</b>

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
Code: R20CC1201	<b>DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to Civil, EEE, ME, ECE, CSE(AI-ML), CSE(DS) and CSE(CS) )</b>						

### COURSE OBJECTIVES:

1. To formulate and solve first order ordinary differential equations.
2. To solve second order differential equations of various kinds.
3. To find the solution of first order linear and non-linear partial differential equations.
4. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

### COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

1. Apply first order ordinary differential equations to real life situations. [Apply - K3]
2. Identify and apply suitable methods in solving the higher order differential equations. [Apply - K3]
3. Solve the partial differentiation equations. [Apply - K3]
4. Interpret the physical meaning of different operators as gradient, curl and divergence. [Understanding - K3]
5. Estimate the work done against a field, circulation and flux using vector calculus. [Evaluating – K5]

#### UNIT I: DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE: (10 hours)

Linear-Bernoulli's-Exact equations and equations reducible to exact form.

**Applications:** Newton's Law of cooling, Law of natural growth and decay, Orthogonal trajectories, Electrical circuits.

#### UNIT-II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER: (10 hours)

Finding the complementary functions, Inverse operator, Rules for finding the particular integrals, Method of variation of parameters. Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.

Application: L-C-R Circuit problems.

#### UNIT – III: FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS: (10 hours)

Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange's) equations.

#### UNIT- IV: VECTOR DIFFERENTIATION: (8 hours)

Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

#### UNIT- V: VECTOR INTEGRATION: (10 hours)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

**TEXT BOOKS :**

1. Dr. B.S. Grewal, “*Higher Engineering Mathematics*”, 43<sup>rd</sup> Edition, Khanna Publishers, 2012.
2. B.V.Ramana, “*Higher Engineering Mathematics*”, 32<sup>nd</sup> Edition, McGraw Hill Education, 2018.
3. Bhavanari Satyanarayana, Pradeep Kumar T.V. & Srinivasulu D, “*Linear Algebra and Vector Calculus*”, Studera Press, New Delhi, 2017.

**REFERENCES:**

1. Kreyszig E, “*Advanced Engineering Mathematics*”, 8<sup>th</sup> Edition, John Wiley, Singapore, 2001.
2. Greenberg M D, “*Advanced Engineering Mathematics*”, 2<sup>nd</sup> Edition, Pearson Education, Singapore, Indian Print, 2003.
3. Peter V. O’Neil, “*Advanced Engineering Mathematics*”, 7<sup>th</sup> Edition, Cengage Learning, 2011.
4. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, “*Engineering Mathematics*”, University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1205	<b>APPLIED PHYSICS</b> <b>(Common to ECE,EEE,CSE,IT,CAI,CSC,CSD&amp;CSM)</b>						

**COURSE OBJECTIVES:**

- To impart knowledge in basic concepts of wave optics, fiber optics, properties of solid crystal materials and magnetic materials, acoustics, superconductors.
- To familiarize the applications of materials relevant to engineering field.

**COURSE OUTCOMES:**

After successful completion of this course, the students will be able to:

**CO 1:** Interpret the experimental evidence of wave nature of light and interference in thin films, Diffraction grating and Polarization in various fields. [K2]

**CO 2:** Analyze and understand various types of lasers & optical fibers. [K4]

**CO 3:** Identify the crystal structures and XRD techniques. [K3].

**CO 4:** Apply the magnetic materials in engineering field. [K3]

**CO 5:** Identify the various applications of semiconductors in engineering field. [K3]

**SYLLABUS****UNIT– I**

**Interference & Diffraction:** Introduction -Interference in thin films by reflection – Newton’s rings, introduction to diffraction – difference between Fresnel’s and Fraunhofer diffraction - Fraunhofer diffraction at single slit (qualitative) - Diffraction grating.

**Polarization:** Introduction – Types of Polarization – Double refraction – Nicol’s prism-Quarter wave plate and Half Wave plate – Applications.

**UNIT–II**

**Lasers:** Introduction – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Population inversion – Ruby laser – Helium Neon laser-Applications.

**Fiber Optics:** Introduction- Basic Structure and Principle of optical fiber - Acceptance angle – Acceptance cone - Numerical Aperture-Applications.

**UNIT–III**

**Crystallography :** Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC.

**X-Ray Diffraction:** Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg’s law.



#### UNIT-IV

**Electromagnetic Fields:** Gauss divergence theorem - Stokes theorem (Quantitative) – Fundamental laws of electromagnetism – Maxwell’s Electromagnetic Equations.

**Magnetic materials:** Magnetic Susceptibility- Magnetic permeability –Classification of Magnetic materials – Dia, Para, and Ferro – Hysteresis Loop- Soft and Hard magnetic materials – Applications- Superconductivity- Properties, Meissner effect - Type-I and Type-II super conductors.

#### UNIT-V

**Quantum Mechanics:** Introduction –de-Broglie’s concept of Matter waves – Physical significance of wave function - Schrodinger Time Independent wave equations – Particle in a one dimensional potential box.

**Semiconductor Physics:** Origin of energy band formation in solids- classification of materials into conductors, semiconductors and insulators, Intrinsic and Extrinsic semiconductor- Hall Effect.

#### REFERENCE BOOKS:

1. Charles Kittel, “Introduction to solid state physics” ISBN: 9788126578436, Wiley India Pvt.Ltd, 5<sup>TH</sup> edition, 2012.
2. M.Arumugam, “Applied Physics”, ISBN: 81-89638-01-7, Anuradha Agencies, 4<sup>th</sup> edition, 2013.
3. D.K.Bhattacharya, “Engineering Physics”, ISBN: 0198065426, 9780198065425, Oxford University press, 2<sup>nd</sup> edition, 2010.
4. Sanjay D Jain and Girish G Sahasrabudhe “Engineering Physics”, University Press ISBN: 8173716781, 1<sup>st</sup> edition, 2010.
1. B.K.Pandey & S. Chaturvedi “Engineering Physics” ISBN: 8131517616, Cengage Learning, 1<sup>st</sup> edition, 2012.

#### WEB REFERENCES:

1. <http://link.springer.com/physics>
2. <http://www.thphys.physics.ox.ac.uk>
3. <http://www.sciencedirect.com/science>
4. <http://www.e-booksdirectory.com>

#### E-BOOKS:

1. <http://www.peaceone.net/basic/Feynman>
2. <http://physicsdatabase.com/free-physics-books>
3. <http://www.damtp.cam.ac.uk/user/tong/statphys/sp.pdf>
4. <http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1206	<b>PROBLEM SOLVING USING PYTHON</b> (Common to CSE, IT,CSC,CSD&CSM)						

**COURSE OBJECTIVE:**

- To teach problem solving through flow charting tool-Raptor.
- To elucidate problem solving through python programming language.
- To introduce function oriented programming paradigm through python.
- To train in development of solutions using modular concepts.

**COURSE OUTCOMES:**

After successful completion of this course, the students would be able to:

**CO 1:** Summarize the fundamental concepts of python programming. [K2]

**CO 2:** Interpret object oriented and event driven programming in python. [K2]

**CO 3:** Apply the suitable data structures to solve the real time problems. [K3]

**CO 4:** Apply regular expressions for many different situations. [K3]

**SYLLABUS:****UNIT-I**

**Introduction to python:** Numbers, strings, variables, operators, expressions, Indentation, String operations and functions, math function calls, Input/output statements, conditional if, while and for loops,

**UNIT-II**

**Functions:** user defined functions, parameters to functions, recursive functions, and lambda function.

**Event driven programming:** Turtle graphics, Turtle bar chart, Widgets, key press events, mouse events, timer events.

**UNIT-III**

**Data structures:** List- list methods & functions, Tuple-tuple methods & functions, Dictionaries-dictionary methods & functions, traversing dictionaries. Sets-methods & functions, Files.

**UNIT-IV**

**OOP:** class, object, methods, constructors, inheritance, inheritance types, polymorphism, operator overloading, abstract classes, exception handling.

### UNIT-V:

**Regular expressions:** Power of pattern matching and searching using regex in python, Meta characters and Sequences used in Patterns, Password, email, URL validation using regular expression, Pattern finding programs using regular expression.

### TEXT BOOKS:

1. Kenneth Lambert, "Fundamentals of Python: First Programs" , ISBN-13: 978-1337560092, cengage learning publishers, first edition, 2012.
2. Allen B. Downey, "think python: how to think like a computer scientist", ISBN-13: 978-1491939369, O'reilly, 2<sup>nd</sup> edition, 2016.
3. Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13:978-0-19-948017-3, Oxford University Press, 2017.

### REFERENCE BOOKS:

1. Vamsi kurama, "Python programming : A modern approach", ISBN-978-93-325-8752-6, pearson, 2018.
2. Mark Lutz , "Learning python", ISBN: 1-56592-464-9, Orielly, 4th edition, 1999 .
3. W.Chun, "Core python programming", ISBN-13: 978-0132269933, pearson, 2nd edition, 2016.

### WEB RESOURCES:

1. <https://raptor.martincarlisle.com/>
2. <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
3. [https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode\\_2.pdf](https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf)
4. <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
5. <https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf>
6. <https://nostarch.com/scratchplayground>
7. <http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1218	<b>TECHNICAL AND COMMUNICATIVE ENGLISH - II</b> (Common to All Branches)						

**COURSE OBJECTIVES:**

- To equip the students with appropriate oral and written communication skills.
- To inculcate the skills of listening, reading and critical thinking.
- To enhance the students' proficiency in reading skills enabling them meet the academic needs of their course.
- To enable the engineering students develop their basic communication skills in English for academic and social purposes.

**COURSE OUTCOMES:**

After successful completion of this course, the students will be able to:

**CO 1:** Infer explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it (**Apply-3**).

**CO2:** Compose paragraphs, essays, emails, letters, reports, resume and transfer information into tables, Pie and bar diagrams. (**Creating-5**).

**CO3:** Build grammatically correct sentences using a variety of sentence structures (**Apply3**).

**CO4:** Enhance word power and usage of lexicons (**Apply3**).

**UNIT– I****1. A Proposal to Griddle the Earth, Nellie Bly**

- Placement Papers.**
- Reading:** Skimming for main idea, scanning for specific piece of information.
- Writing:** Note – making flowed by paragraph writing, effective opening sentences, introducing the topic, key words, main idea, summarize the main idea.
- Grammar and Vocabulary:** Content words and function words, verbs, nouns, adjectives and adverbs. Basic sentence structure and simple question form, framing jargon, technical vocabulary (15 words)

## UNIT-II

2. **The District School As It Was by One who Went to It, Warren Burton**
  - a) **Placement Papers.**
  - b) **Reading:** Identifying the sequence of ideas and recognizing verbal techniques to link the ideas in a paragraph.
  - c) **Writing:** Paragraph writing, using key words/phrases and organizing points in a coherent manner.
  - d) **Grammar and Vocabulary:** Linkers, articles and prepositions.

## UNIT-III

3. **The future of Work- Jacob Morgan**
  - a) **Placement Papers.**
  - b) **Reading:** Sequencing of ideas and recognizing verbal techniques to link the ideas in a paragraph.
  - c) **Writing:** Paragraph writing, using key words/phrases and organizing points in a coherent manner.
  - d) **Grammar and Vocabulary:** Cohesive devices, articles and prepositions.

## UNIT-IV

4. **H.G.Wells and the Uncertainties of Progress, Peter J. Bowler**
  - a) **Placement Papers.**
  - b) **Reading:** Understand and interpret graphic elements used in texts.
  - c) **Writing:** Information transfer.
  - d) **Grammar and Vocabulary:** Adjectives, adverbs and antonyms.

## UNIT-V

5. **Leaves from the Mental Portfolio of a Eurasian, Sui Sin Far**
  - a) **Placement Papers.**
  - b) **Reading:** Reading for comprehension.
  - c) **Writing:** Essay writing
  - d) **Grammar and Vocabulary:** Articles, prepositions, tenses, subject verb agreement and technical jargon (15 words)

## TEXT BOOKS:

1. English All Round -I (Communication skills for Under Graduate Learners)– Orient Black Swan Pvt.Ltd.Publisher, 1<sup>st</sup>edition,2019

**REFERENCE BOOKS:**

1. Raymond Murphy, *Murphy's English Grammar*, Cambridge University Press 2004
2. Meenakshi Raman, Sangeeta Sharma, *Technical Communication: English Skills for Engineers*, Oxford University Press, 2009
3. Michael Swan, *Practical English Usage*, Oxford University Press, 1996

**WEB REFERENCES:**

1. <https://www.grammarly.com/blog>
2. <https://www.englishclub.com/>
3. [www.nonstopenglish.com/](http://www.nonstopenglish.com/)
4. <https://www.fluentu.com/blog/english/>
5. <https://beta.freerice.com/>
6. <https://prepinsta.com/cognizant/>
7. <https://www.geeksforgeeks.org/tcs-placement-paper-mcq-1/>
8. <https://www.firstnaukri.com/career-guidance/infosys-placement-papers-with-solutions-2019-firstnaukri-prep>
9. <https://in.usembassy.gov/education-culture/american-spaces/dostihouse-mumbai/library-services/>
10. <https://www.youtube.com/user/bbclearningenglish>
11. <https://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/>
12. <https://englishlive.ef.com/blog/language-lab/5-simple-ways-improve-written-english/>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	15	35	50	1.5
SUBCODE: R20CC12L10	<b>APPLIED PHYSICS LAB</b> (Common to CSE, ECE, IT, CAI, CSC, CSD, CSM, EEE)						

**COURSE OBJECTIVES:**

To impart physical measurement skills and make the students understand coherence between theoretical and practical knowledge.

**COURSE OUTCOMES:**

After successful completion of this course, the students will be able to:

**CO1:** Apply the principle of physics in engineering field **(K3)**

**CO2:** Utilize the modern engineering physics techniques and tools in real time applications. **(K3)**

**CO3:** Analyse characteristics, usage and the behaviour of materials. **(K4)**

**LIST OF EXPERIMENTS:**

1. Rigidity modulus of material by wire-dynamic method (torsional pendulum)
2. Determination of wavelength of a source-Diffraction Grating-Normal incidence
3. Newton's rings –Radius of Curvature of Plano Convex Lens.
4. Determination of thickness of thin wire- Air wedge method
5. Determination of wavelength of Laser Source-single slit diffraction.
6. Determine the Numerical aperture of an optical fiber.
7. Melde's experiment – Transverse and Longitudinal modes.
8. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
9. Verification of laws of stretched string by using Sonometer.
10. Calculate the energy loss in a given ferromagnetic material by plotting B-H Curve.
11. Energy Band gap of a Semiconductor p - n junction.
12. Characteristics of Thermistor – temperature coefficient

**TEXT BOOKS:**

1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links).
2. Physics Practical Manual, Lorven Publications
3. S. Balasubramanian , M.N. Srinivasan " A Text book of Practical Physics"- S Chand Publishers, 2017.

**WEB REFERENCES:**

1. <https://www.youtube.com/watch?v=NDsSPtL9dyQ>
2. <https://www.youtube.com/watch?v=9agoJRCnu4w>
3. <https://www.youtube.com/watch?v=bv-llJreyCU>
4. <http://vlab.amrita.edu/index.php>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC12L12	<b>PROBLEM SOLVING USING PYTHON LAB</b> (Common to CSE,IT,CSC,CSD & CSM)						

**COURSE OBJECTIVE:**

- To introduce programming through Visual programming tool - Scratch
- To teach problem solving through Flow charting tool - Raptor
- To elucidate problem solving through python programming language
- To introduce function-oriented programming paradigm through python
- To train in development of solutions using modular concepts
- To teach practical Python solution patterns

**COURSE OUTCOMES:**

After successful completion of this course, the students would be able to:

**CO1:** Develop interactive visual programs using Scratch.[K3].

**CO2:** Develop Python programs for numerical and text based problems. [K3].

**CO3:** Develop graphics and event based programming using Python. [K3].

**CO4:** Develop Python programs on object oriented programming and regular expressions. [K3].

**LABORATORY EXPERIMENTS****WEEK-1:**

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, and Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.

**WEEK-2:**

3. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
4. Design a Python script to determine if a given string is a Palindrome using recursion
- 5.

**WEEK-3:**

6. Design a Python script to sort numbers specified in a text file using lists.
7. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format  $0 \leq YYYY \leq 9999$ ,  $1 \leq MM \leq 12$ ,  $1 \leq DD \leq 31$  following the leap year rules.

**WEEK-4:**

8. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
9. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.  $0 \leq HH \leq 23$ ,  $0 \leq MM \leq 59$ ,  $0 \leq SS \leq 59$ .



10. Write a Python program to convert a date of yyyy-mm-dd format to dd-mm-yyyy format.

**WEEK-5:**

11. Design a Python Script to convert a given number to words
12. Design a Python Script to convert a given number to roman number.

**WEEK-6:**

13. Design a Python Script to generate the frequency count of words in a text file.
14. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.

**WEEK-7:**

15. Write a Python program to convert a given tuple of positive integers into an integer.
16. Write a Python program to create a dictionary grouping a sequence of key-value pairs into a dictionary of lists.  
Original list:  
[('yellow', 1), ('blue', 2), ('yellow', 3), ('blue', 4), ('red', 1)]  
Grouping a sequence of key-value pairs into a dictionary of lists:  
{'yellow': [1, 3], 'blue': [2, 4], 'red': [1]}

**WEEK-8:**

17. Write a Python program to remove the intersection of a 2nd set from the 1st set.
18. Write a Python program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.  
SampleList:['abc','xyz','aba','1221']  
Expected Result : 2

**WEEK-9:**

19. Design a Python script to generate statistical reports Minimum, Maximum, Count, Average, Sum etc) on public datasets.
20. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

**WEEK-10:**

21. Write a Python program to replace all occurrences of space, comma, or dot with a colon.
22. Write a Python program to match a string that contains only upper and lowercase letters, numbers, and underscores.

**WEEK-11:**

23. Write a Python program to check that a string contains only a certain set of characters in this case a-z, A-Z and 0-9
24. Write a Python program to find the occurrence and position of the substrings within a string.

**WEEK-12:**

25. Design a Python script on oop's concepts: Class variables and instance variable  
i. Robot ii) ATM Machine
26. Virtual Lab: <http://ps-iiith.vlabs.ac.in/> any three programs must be submitted with result from the above link.

### **TEXT BOOKS:**

1. Kenneth Lambert, "Fundamentals of Python: First Programs" , ISBN-13: 978-1337560092,cengage learning publishers, first edition,2012.
2. Allen B. Downey, "think python: how to think like a computer scientist", ISBN-13: 978-1491939369, O'reilly, 2<sup>nd</sup> edition, 2016.
3. Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13:978-0-19-948017-3, Oxford University Press, 2017.

### **REFERENCE BOOKS:**

1. Vamsi kurama, "Python programming : A modern approach", ISBN-978-93-325-8752-6,pearson,2018.
2. Mark Lutz , "Learning python", ISBN: 1-56592-464-9,Orielly, 4<sup>th</sup> edition, 1999 .
3. W.Chun, "Core python programming", ISBN-13: 978-0132269933, pearson, 2<sup>nd</sup> edition, 2016.

### **WEB RESOURCES:**

1. <https://raptor.martincarlisle.com/>
2. <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
3. [https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode\\_2.pdf](https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf)
4. <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
5. <https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf>
6. <https://nostarch.com/scratchplayground>
7. <http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC12L15	<b>IT WORKSHOP</b>						

**COURSE OBJECTIVES:**

- Enabling the student to understand basic hardware and software tools through practical exposure.

**COURSE OUTCOME:**

After completion of this course, the student should be able to

**CO1:** Demonstrate the need of PC hardware components, applications and softwares.[K2]

**CO2:** Explain the knowledge of networks, internet and World Wide Web, Search engines, Netiquette. [K2]

**CO3:** Install and use different software like Windows XP, Linux.

**CO4:** Identify and fix the defective PC and software related issues.[K3]

**CO5:** Formalize with parts of windows word, Excel and Power point.

**PC Hardware**

**Task 1: Identification of the peripherals of a computer.** To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

**Task 2: (Optional):** A Practice on disassembling the components of a PC and assembling them to back to working condition.

**Task 3:** Examples of Operating Systems- DOS, MS Windows, Installation of MS windows on a PC

**Task 4:** Introduction to Memory and Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters, Linkers, Loaders.

**Task 5: Hardware Troubleshooting (Demonstration):** Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

**Software Troubleshooting (Demonstration):** Identification of problem and fixing the PC for any software issues.

**Internet & Networking Infrastructure**

**Task 6:** Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth technology, Wireless Technology, Modem, DSL, and Dialup Connection.

**Orientation & Connectivity Boot Camp and Web Browsing:** Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

**Task 7: Search Engines & Netiquette:**

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

**Task 8: Cyber Hygiene (Demonstration) :** Awareness of various threats on the internet. Importance of Security patch updates and Anti-Virus solution Ethical Hacking, Firewalls, Multi-factors authentication techniques including Smart card Biometrics and also practiced.

### **Word**

**Task 9: MS Word Orientation:** Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

**Task 10 : Creating Project :** Abstract Features to be covered:-Formatting Styles, Inserting Table, Bullets and Numbering, Changing Text Direction, Cell alignment, footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

### **Excel**

**Task 11:** Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

**Creating Scheduler** - Features to be covered:-Gridlines, Format Cells, Summation, auto fill, Formatting Text.

**Task 12: Performance Analysis:** Features to be covered:-Split cells, freeze panes, group and outline, Sorting, Boolean and Logical operators, Conditional Formatting.

### **Power Point**

**Task 13:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in PowerPoint.

**Task 14:** Focusing on the power and potential of Microsoft power point Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes:- Master Layouts (slide, template and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background , textures, Design Templates, Hidden slides, OLE in PPT.

### **TEXT BOOKS:**

**Faculty to consolidate the workshop manuals using the following references.**

1. Anita Goel , Computer Fundamentals, Pearson
2. Scott. Mueller QUE , Scott Mueller’s Upgrading and Repairing PCs, 18/e, Pearson, 2008

### **REFERENCE BOOKS:**

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Venkateswarlu.
2. G Praveen Babu, M V Narayana, “Information Technology Workshop”, BS Publications, 3e
3. Vikas Gupta, “Comdex Information Technology”, Dreamtech.

**WEB REFERENCES:**

1. <https://www.microsoft.com/en-us/garage/profiles/script-lab/>
2. <https://algonquincollege.libguides.com/slc/library-lab>
3. <https://technology.ku.edu/services/training-workshops>
4. <https://appsource.microsoft.com/en-us/product/office/wa104380862?tab=overview>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	15	35	50	1.5
SUBCODE: R20CC12L16	<b>UNIX PROGRAMMING LAB</b>						

### COURSE OBJECTIVES:

- Facility with UNIX command syntax and semantics.
- Ability to read and understand specifications, scripts and programs.
- Individual capability in problem solving using the tools presented within the class.

### COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

**CO 1:** Apply the fundamental UNIX utilities. [K3]

**CO 2:** Utilize the Unix file system[K3]

**CO 3:** Experiment with shell and UNIX filters. [K3]

**CO 4:** Analyze the Shell Programming constructs to develop shell scripts. [K4]

### LIST OF EXPERIMENTS

#### WEEK1

1. Execution of various basic and file related commands in unix.  
basic and file related commands: man, echo, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, ln.

#### WEEK2

2. Execution of various disk related commands.  
disk related commands: df, dfspace, du, ulimit
3. Execution of various process related commands.  
process related commands: ps, kill, nice, at, batch, crontab

#### WEEK3

4. Use the following file permission related commands.  
a) chmod, b) chown, c) chgrp d) umask
5. Execution of various basic filters in unix.  
Filters: head, tail, cut, paste, sort, uniq, cmp, diff, comm and tr

#### WEEK4

6. Use the following shell metacharacters.
  - a) I/O Redirection (>, <, >>, <<, |)
  - b) Filename substitution ( ?, \*, [...])
  - c) Quoting metacharacters (\, "...", '...', `cmd`)
  - d) Process execution (;, (), &, &&, ||)
  - e) Positional parameters (\$1 to \$9)

#### WEEK5

7. a) Write a grep command that selects the lines from the file1 that have exactly three

characters

- b) Write a grep command that selects the lines from the file1 that have at least three characters.
- c) Write a grep command that selects the lines from the file1 that have three or fewer characters
- d) Write a grep command that selects the lines from the file1 that have the string UNIX.
- e) Write a grep command that selects the lines from the file1 that have only the string UNIX.

#### WEEK6

- 8. a) Write a sed command that deletes the first character in each line in a file
- b) Write a sed command that deletes the character before the last character in each line in a file.

#### WEEK7

- 9. a) Write an awk command to print the lines and line number in the given input file
- b) Write an awk command to print first field and second field only if third field value is  $\geq 50$  in the given input file.

#### WEEK8

- 10. a) Write A shell script that takes a command –line argument and reports on whether it is directory, a file, or something else
- b) Write a shell script that accepts one or more file name as a arguments and converts all of them to uppercase, provided they exist in the current directory
- c) Write a shell script that determines the period for which a specified user is working on the system

#### WEEK9

- 11. a) Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers
- b) Write a shell script that deletes all lines containing a specified word I one or more files supplied as arguments to it.

#### WEEK10

- 12. a) Write a shell script that computes the gross salary of an employee according to the following
  - 1) If basic salary is  $< 1500$  then HRA 10% of the basic and DA =90% of the basic
  - 2) If basic salary is  $> 1500$  then HRA 500 and DA =98% of the basicThe basic salary is entered interactively through the key board
- b) Write a shell script that accepts two integers as its arguments and computes the value of first number raised to the power of the second number

#### WEEK 11

- 13. a) Write an interactive file handling shell program. Let it offer the user the choice of copying, removing, renaming or linking files. Once the user has made a choice, have the program ask the user for necessary information, such as the file name ,new name and so on.
- b) Write a shell script that takes a login name as command–line argument and reports when that person logs in
- c) Write a shell script which receives two files names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.

**WEEK 12**

14. a) Write a shell script that displays a list of all files in the current directory to which the user has read write and execute permissions
- b) Develop an interactive script that asks for a word and file name and then tells how many times that word occurred in the file.
- c) Write a shell script to perform the following string operations.
- 1) To extract a sub string from a given string
  - 2) To find the length of a given string

**WEEK 13**

15. a) Write a shell script to display reverse numbers from given argument list
- b) Write a shell script to display factorial value from given argument list
- c) Write a shell script to search given number using binary search.
- d) Write a shell script to sort the elements in a array using bubble sort technique

**WEEK 14**

16. a) Write a C program that simulate the following unix commands
1. mv
  2. cp
- b) Write a C program that simulates ls command.

**TEXT BOOKS:**

1. The Unix programming Environment by Brian W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

**REFERENCE BOOKS:**

1. Unix and shell programming by B.M. Harwani, OXFORD university press.
2. Unix Concepts and Applications by Sumitabha Das, 4thEdition., Tata McGraw Hill.

**WEB REFERENCES:**

2. <https://www.learnshell.org>
3. <https://www.udemy.com/shellprogramming/> 3
4. <https://www.edureka.co/unix>
5. <https://www.goeduhub.com/8761/online-tutorial-training-certification-in-linux-unix>



<b>I B. TECH II SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>INTERNAL MARKS</b>	<b>EXTERNAL MARKS</b>	<b>TOTAL MARKS</b>	<b>CREDITS</b>
	<b>0</b>	<b>0</b>	<b>3</b>	<b>15</b>	<b>35</b>	<b>50</b>	<b>1.5</b>
SUBCODE: R20CC12L14	<b>ENGINEERING GRAPHICS (for AI&amp;ML, Data Science &amp; Cyber Security)</b>						

**COURSE OBJECTIVES:**

- The students to use drawing instruments and to draw polygons, engineering Curves & engineering scales.
- The students use to make orthographic projections, projections of points, simple lines & projections of the lines inclined to both the lines.
- The students use to draw the projections of the plane inclined to both the plane.
- Develop surfaces of regular solids, and solids inclined to one Axis using drafting software.
- Convert and develop the isometric views onto orthographic views.

**COURSE OUTCOMES:**

After successful completion of this course, the students will be able to:

CO 1: construct the geometrical shapes of regular polygons, Engineering Curves, and scales. CO 2: illustrate the orthographic projections, projections of points, and lines.

CO 3: construct the projection of planes inclined to both the planes. CO 4: construct the projection of solids for engineering applications.

CO 5: construct the conversion of isometric views to orthographic views vice versa.

**UNIT– I**

**THE BASIC CONCEPTS IN ENGINEERING DRAWING:** introduction to engineering drawing instruments, lettering and dimensioning practice. Geometrical constructions- Constructing regular polygons by general methods.

**CURVES USED IN ENGINEERING PRACTICE:** Introduction to conic sections, construction of ellipse, parabola, hyperbola by eccentricity method. Construction of ellipse by - Arcs of circles Method, Concentric Circles Method and Oblong Method, & parallelogram methods.

**UNIT–II**

**ORTHOGRAPHIC PROJECTIONS-** introduction to type of projections, first angle and third angle projections. Projection of points: Principles of orthographic projection – Convention – First angle projections, projections of points.

**PROJECTIONS OF STRAIGHT LINES:** Projections of straight lines parallel to both the planes,

parallel to one plane and inclined to the other plane. Lines inclined to both the planes -  
Projections of straight lines inclined to both the planes- determination of true lengths, angle of inclination and traces.

#### UNIT-III

PROJECTIONS OF PLANES: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

#### UNIT-IV

INTRODUCTION TO AUTOCAD SOFTWARE: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

PROJECTIONS OF SOLIDS: introduction to projections of solids, types of solids: prisms, pyramids, cones and cylinders –simple positions and the axis inclined to one of the planes.

#### UNIT-V

Introduction of isometric views, isometric projections & orthographic projections. Conversion of isometric views to orthographic views and orthographic views to isometric views.

#### TEXT BOOKS

1. Engineering Drawing by N.D. Butt, Chariot Publications.
2. Engineering Drawing & Graphics by K.Venu gopal, New age international Publishers.
3. Dhananjay A Jolhe, “Engineering Drawing with an introduction to AutoCAD”, Tata McGraw- Hill Publishing company limited.
4. D.M. Kulkarni, A.P. Rastogi and A.K.Sarkar; “Engineering Graphics with AutoCAD”, PHI Learning Private Limited, New Delhi.

#### REFERENCE BOOKS:

1. Engineering Graphics for Degree by K.C. John, PHI Publishers.
2. Engineering Drawing by Basant Agarwal & CM. Agarwal, Tata McGraw Hill Publishers.
3. Venugopal. K, “Engineering Drawing and Graphics+ AutoCAD”, NewAge International.

Web References:

1. <https://nptel.ac.in/courses/112103019/17>

E-Books:

1. <https://www.pdfdrive.com/textbook-of-engineering-drawing-e28918244.html>

**II B.TECH - I SEMESTER**

S.No	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC2106	Probability & Statistics	BS	30	70	100	2	1	0	3
2	R20CC2103	OOPs through Java	PC	30	70	100	3	0	0	3
3	R20CC2104	Data Structures	PC	30	70	100	3	0	0	3
4	R20CI2101	Computer Organization	PC	30	70	100	3	0	0	3
5	R20AC2105	Software Engineering	PC	30	70	100	3	0	0	3
6	R20CC21L1	Data Structures Lab	PC	15	35	50	0	0	3	1.5
7	R20CC21L2	OOPs through Java Lab	PC	15	35	50	0	0	3	1.5
8	R20AC21L3	Software Engineering and UML Lab	PC	15	35	50	0	0	3	1.5
9	R20CC21SC1	Data Science Lab	SOC	-	50	50	0	0	4	2
10	R20CC21MC2	Constitution of India	MC	-	-	-	2	0	0	0
<b>Total</b>										<b>21.5</b>

II B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
<b>SUB CODE: R20CC2106</b>	<b>PROBABILITY AND STATISTICS CSE(AI-ML), CSE(Cyber Security), CSE(Data Science)</b>						

**COURSE OBJECTIVES:**

1. To familiarize the students with the foundations of probability and statistical methods
2. To impart probability concepts and statistical methods in various applications Engineering

**COURSE OUTCOMES:**

Upon successful completion of this course, the student should be able to

1. Classify the available data to apply in the domain of data science. [Analyzing – K4]
2. Select the associated characteristics in view of correlation and regression. [Apply – K3]
3. Apply discrete and continuous probability distributions. [Apply – K3]
4. Design the components of a classical hypothesis test [Creating – K6]
5. Apply the statistical methods based on small and large sampling tests. [Apply – K3]

**UNIT I: Descriptive statistics and methods for data science (10 hours)**

Descriptive statistics and methods for data science: Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance) – Skewness Kurtosis.

**UNIT II: Correlation and Curve fitting: Correlation (8 hours)**

Correlation and Curve fitting: Correlation – correlation coefficient – rank correlation – regression coefficients and properties – regression lines – Method of least squares – Straight line – parabola – Exponential – Power curves.

**UNIT III: Probability and Distributions: (10 hours)**

Probability and Distributions: Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

**UNIT IV: Sampling Theory: (10 hours)**

Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t,  $\chi^2$  and F-distributions – Point, and Interval estimations – Maximum error of estimate.

**UNIT V: Tests of Hypothesis: (10 hours)**

Tests of Hypothesis: Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples) – Tests on proportions

**Text Books:**

- 1) Miller and Freund's, "**Probability and Statistics for Engineers**", 7/e, Pearson, 2008.

- 2) S. C. Gupta and V.K. Kapoor, “*Fundamentals of Mathematical Statistics*”, 11/e, Sultan Chand & Sons Publications, 2012.

**Reference Books:**

- 1) Shron L. Myers, Keying Ye, Ronald E Walpole, *Probability and Statistics Engineers and the Scientists*, 8<sup>th</sup> Edition, Pearson 2007.
- 2) Jay I. Devore, *Probability and Statistics for Engineering and the Sciences*, 8<sup>th</sup> Edition, Cengage.
- 3) Sheldon M. Ross, “*Introduction to probability and statistics Engineers and the Scientists*”, 4<sup>th</sup> Edition, Academic Foundation, 2011.
- 4) Johannes Ledolter and Robert V. Hogg, “*Applied statistics for Engineers and Physical Scientists*”, 3<sup>rd</sup> Edition, Pearson, 2010.

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC2103	<b>OOPS THROUGH JAVA</b> (Common to CSE,IT,CSC,CSD & CSM)						

**COURSE OBJECTIVE:**

- The course provides fundamentals of object-oriented programming in Java and development of user interface.

**COURSE OUTCOMES:**

After completion of this course, the students would be able to:

- CO1:** Interpret the syntax and semantics of java programming language and OOPs concepts. [K2]  
**CO2:** Make use of different predefined classes and packages and interfaces to develop programmes using OOPs concepts. [K3]  
**CO3:** Apply exception handling and multithreading mechanisms on java programs.[K3]  
**CO4:** Develop java programmes using collection framework & I/O. [K3]  
**CO5:** Make use of AWT, Applets and Event-Handling to develop GUI. [K3]

**SYLLABUS****UNIT-I**

Oriented Languages (Classes, Objects, Abstraction, Encapsulation, Inheritance, Polymorphism), Procedural languages Vs. OOP. The History and Evolution of Java, Java Buzzwords, java program structure.

**Data Types, Variables, and Arrays:** The primitive types, variables, type conversion and casting, Automatic Type Promotion in Expressions, Arrays, Operators, Control statements.

**Introducing Classes :** Class fundamentals, Declaring the objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this keyword, Garbage Collection, the finalize() Method.

**UNIT-II**

**A Closer Look at Methods and Classes:** Overloading Methods, Using objects as Parameters, Returning Objects, Understanding static, Nested and Inner Classes.

**Inheritance:** Inheritance Basics and types of inheritance, Using super, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, using final with Inheritance, The Object class. **Packages and Interfaces:** Packages, Access Protection, Importing Packages, Interfaces, Default Interface Methods, Use static Methods in an Interface.

**UNIT-III**

**String Handling:** String class, StringBuffer class, StringBuilder Class,

**Exception Handling:** Fundamentals, Exception types, Uncaught Exceptions, Using try and catch, multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses.

**Multithreaded Programming :** The Java Threaded Model, The Main Thread, Creating a

Thread, Creating Multiple Threads, Using is Alive() and join(), Thread Priorities, Synchronization, Inter Thread Communication, Suspending, Resuming, Stopping Threads.

#### **UNIT-IV**

**Collections Framework in Java-** Introduction to Java collections, Overview of Java collection frame work, Commonly used Collection classes- ArrayList,LinkedList, HashSet, Hash table, HashMap, TreeSet,TreeMap , StringTokenizer.

**Input/Output:** reading and writing data - Byte Stream, Console, Character Stream, Buffered Byte Stream, Buffered Character Stream; java.io package.

#### **UNIT-V**

**The Applet Class:** Applet Basics, Applet Architecture, An Applet Skeleton, Simple Applet Display Methods, Requesting Repainting, The HTML APPLET Tag, Passing Parameters to Applets.

**Event Handling:** Two Event Handling Mechanisms, The Delegation Event Model, Event Classes, The KeyEvent Class, Sources of Events, Event Listener Interfaces, Using The Delegation Event Model, Adapter Classes , Inner Classes.

**Introducing the AWT:** java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar.

#### **TEXT BOOKS:**

1. Herbert Schildt, “The Complete Reference Java”, 8/e, , TMH, 2011. (UNITS : I, IV, V
2. Sachin Malhotra, Saurabh Choudhary, “Programming in JAVA”, 2/e, , Oxford, 2014. (UNITS: I, II & III)

#### **REFERENCE BOOKS:**

1. JAVA Programming, K. Rajkumar, 1/e, Pearson, 2013.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, 1/e, Dream Tech, 2012.

#### **WEB REFERENCES:**

<https://www.tutorialspoint.com/java/index.html>



II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC2104	<b>DATA STRUCTURES</b> (Common to CSE, IT, CAI, CSC, CSD, CSM)						

**COURSE OBJECTIVE:**

- Comprehensive knowledge of data structures and exposure to algorithmic complexities, recursive algorithms, searching, sorting and hashing techniques
- Applying Stack and Queue techniques for logical operations
- Understand Linked-list representation models in various types of applications
- Implementation of tree in various forms, orientation on graphs, representation of graphs, graph traversals, spanning trees Graphs

**COURSE OUTCOMES:**

After the completion of this course the student should be able to:

**CO1 :** Apply Searching, Sorting and Hashing techniques to solve problems.[K3]

**CO2 :** Analyze basic data structures such as Stacks, Queues and Linked List. [K4]

**CO3 :** Solve problems involving Advanced concepts of Trees. [K3]

**CO4 :** Analyze variety of Graph data structures that are used in various applications. [K4]

**SYLLABUS:****UNIT – I**

**Introduction to Data Structures and Algorithms:** Basic Terminology – Preliminaries of algorithms. Data Structures, Abstract Data Types (ADTs) Algorithms, Time and Space Complexity (worst-case, average-case, best-case).

**UNIT-II**

**Searching and Sorting :** Introduction to Searching, Linear Search, Binary Search, Fibonacci Search. Introduction to Sorting, Bubble sort, Selection sort, Insertion sort , Merge sort Algorithm, Heap sort, Quick sort Algorithm.

**UNIT – III**

**Stacks:** Definition, Representation of Stack, Stack ADT, Applications, Implementation, Reversing List. **Queues:** Definition, Representation of Queue, Queue ADT, Implementation of Queue using two Stacks, Exceptions, Applications, Circular Queues , Priority Queues. Infix to Postfix Conversion, Factorial Calculation,

**UNIT - IV**

**Linked Lists:** Introduction, Singly linked list, Representation of Single Linked List, Operations of SLL-Insertion, Deletion, Applications of Single Linked List: Polynomial Expression Representation. Doubly linked list, Representation of Double Linked List, Operations of Double Linked List- Insert, Delete. Circular linked list, Representation of Circular Linked List, Operations of Circular Linked List.

## UNIT – V

**Trees:** Introduction, Binary Trees, Traversing a Binary Tree. Binary Search Trees, operations on Binary Search Trees (insertions and deletions), AVL Trees.

**Graphs:** Introduction, Graph Terminology, Directed Graphs, Representations of Graphs, Adjacency Matrix Representation, (Adjacency List Representation), Applications (Minimum Spanning Tree Using Prim's & Kruskal's Algorithm, Dijkstra's shortest path)

### TEXT BOOKS:

1. "Data Structures and Algorithmic Thinking with Python", Narasimha Karumanchi, IIT Bombay, CareerMonk Publications, First Edition, 2018.
2. Data Structures and Algorithms in Python, Michael T. Goodrich, Second Edition, 2013.

### REFERENCE BOOKS:

1. Python Data Structures and Algorithms, Benjamin Baka, Kindle Edition.
2. Hands-On Data Structures and Algorithms with Python, Dr. Basant Agarwal and Benjamin Baa, 2nd Edition.

### WEB REFERENCES:

1. [https://www.youtube.com/watch?v=YWnBbNj\\_G-U](https://www.youtube.com/watch?v=YWnBbNj_G-U)
2. <https://www.youtube.com/watch?v=RBxS6niE6q4>

II B.TECH. I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: R20CI2101	<b>COMPUTER ORGANIZATION</b> (Common to CSE, IT, CAI, CSC, CSD & CSM)						

**COURSE OBJECTIVES:**

- Comprehensive knowledge of computer system including the analysis and design of components of the system.
- Describes different parameters of a memory system, organization and mapping of various types of memories.
- Illustrates algorithms for basic arithmetic operations using binary representation.
- Describes the means of interaction of devices with CPU, their characteristics and operating modes.

**COURSE OUTCOMES:**

After completion of this course, the students would be able to

**CO 1:** Interpret the computer system from user's perspective and can explain how Arithmetic Logic Unit works. [K2]

**CO 2:** Explain of basic components of the system and illustrate data paths and control flow for sequencing in CPUs. [K2]

**CO 3:** Interpret the Micro operations and Microprogramming for design of control unit of CPU. [K2]

**CO 4:** Develop Main Memory Interfacing Circuit and can apply various cache memory mapping techniques. [K3]

**CO 5:** Apply algorithms to perform arithmetic operations on binary representation of fixed point data. [K3]

**CO 6:** Interpret various I/O interface devices. [K2]

**SYLLABUS:****UNIT - I**

**Introduction:** Types of Computers, Functional units of Basic Computer (Block diagram of Micro Computer).

**Register Transfer and Micro-operations:** Register Transfer language, Register Transfer, Bus and memory transfers - Three-State Bus Buffers, Memory Transfer; Arithmetic micro operations, Binary Adder, Binary Adder \_Subtractor, Binary Incrementer, Arithmetic Circuit; Logical micro operations-List of Logic Microoperations, Hardware Implementation, Some Applications; Shift micro operations-Hardware Implementation, Arithmetic logic shift unit.

**UNIT - II**

**Basic Computer Organization and Design:** Instruction codes – Stored Program Organization, Indirect Address, Computer Registers – Common Bus Systems, Computer instructions – Instruction Set Completeness, Timing and control, Instruction cycle – Fetch and Decode, Determine the Type of Instruction, Register Reference Instructions, Memory – Reference Instructions – AND to AC, ADD to AC, LDA :Load to AC, STA: Store AC, BUN: Branch Unconditionally, BSA: Branch and Save Return Address, ISZ: Increment and Skip if Zero, Control Flow Chart, Input – Output Instructions and Interrupt – Input – Output Configuration, Input-Output Instructions.

**UNIT - III**

**Central Processing Unit:** Instruction formats – Three Address Instructions, Two Address Instructions, One Address Instructions, Zero Address Instructions, RISC Instructions, Addressing modes – Numerical Example, Data Transfer and manipulation – Data Transfer Instructions, Data Manipulation Instructions, Arithmetic Instructions, Logical and Bit Manipulation Instructions, Shift Instructions, Program control – Status Bit Conditions, Conditional Branch Instructions, Subroutine Call and Return, Program Interrupt, Types of Interrupts, Reduced Instruction Set Computer – CISC Characteristics, RISC Characteristics. Micro Programmed Control Unit: Control memory, Address sequencing – Conditional Branching, Mapping of Instructions, Subroutines, Micro program example – Computer Configuration, Microinstruction Format, Symbolic Microinstructions, The Fetch Routine, Symbolic Microprogram, Design of control unit – Microprogram Sequencer.

#### **UNIT - IV**

**The Memory System:** Memory Hierarchy, Main memory - RAM and ROM Chips, Memory Address Maps, Memory Connection to CPU, Auxiliary memory – Magnetic Disks, Magnetic Tape, Associative Memory – Hardware Organization, Match Logic, Cache Memory – Associative Mapping, Direct Mapping, Set- Associative Mapping, Writing into Cache. Computer Arithmetic: Addition and subtraction – Addition and Subtraction with Signed Magnitude Data, Hardware Implementation, Hardware Algorithm, Addition and Subtraction with Signed 2's Complement Data, Multiplication Algorithms –Booth Multiplication Algorithm.

#### **UNIT – V**

**Input-Output Organization:** Peripheral Devices – ASCII Alphanumeric Characters, Input Output Interface – I/O Bus and Interface Modules, I/O vs Memory Bus, Isolated vs Memory Mapped I/O, Example of I/O Interface, Asynchronous data transfer – Strobe Control, Handshaking, Asynchronous Serial Transfer, Modes of Transfer – Example of Programmed I/O, Interrupt Initiated I/O, Priority Interrupts – Daisy Chaining Priority, Parallel Priority Interrupt, Priority Encoder, Interrupt Cycle, Direct memory Access – DMA Controller, DMA Transfer.

#### **TEXT BOOKS:**

1. M. Morris Mano, “Computer System Architecture”, Third Edition, Pearson.2008

#### **REFERENCE BOOKS:**

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, “Computer Organization”, McGraw Hill, 5/e, 2002.
2. William Stallings, “Computer Organization and Architecture”, Pearson 6/e, 2006.
3. Structured Computer Organization, Andrew S. Tanenbaum, Pearson, 4/e, 2005.
4. Sivarama P. Dandamudi, “Fundamentals of Computer Organization and Design”, Springer, 2006.

#### **WEB REFERENCES:**

1. [nptel.ac.in/courses/106106092](http://nptel.ac.in/courses/106106092)
2. [nptel.ac.in/courses/106103068](http://nptel.ac.in/courses/106103068)

II B. TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20AC2105	<b>SOFTWARE ENGINEERING</b>						

**COURSE OBJECTIVE:**

The student will have a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

**COURSE OUTCOMES:**

After completion of this course, the students will be able to

CO1 : Compare and contrast basic software engineering methods and practices. [K2].

CO2 : Analyze the project management essentials [K4].

CO3 : Analyze the software process models. [K4].

CO4 : Outline the importance of software testing and quality control approaches [K2].

**SYLLABUS:****UNIT - I**

**Introduction to Software Engineering:** Software-Software classification, Engineering Discipline; Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies - exploratory, structured, data structure, object oriented, component based development; Software Engineering Challenges- problem understanding, quality and product, cycle time and cost, reliability, change and maintenance, usability and reusability, repeatability and process maturity, estimation and planning.

**Software Processes:** Software Process- software process model, elements of software process, characteristics of software process; Phased development life cycle- phased life cycle activity; Software Development Process Models- classical waterfall model, iterative waterfall, prototyping, incremental, spiral, agile process, RUP process model.

**UNIT - II**

**Requirements Engineering:** Software Requirements- business, user, system, functional and nonfunctional; Requirements engineering Process, Requirements elicitation-fact finding techniques; Requirements Analysis, Structured Analysis - data flow diagram, data dictionary, Structured analysis, pros and cons of structured analysis; Prototyping Analysis- throwaway, evolutionary; Requirements Specification- characteristics, components, structure, requirement specification methods; Requirements Validation- review, inspection, test case generation, reading, prototyping; Requirements Management.

**UNIT - III**

**Software Design:** Software Design Process, Characteristics of Good Software Design, Design Principles- abstraction, information hiding, functional decomposition, design strategies, modularity; Modular Design-coupling, cohesion; Design Methodologies- function oriented design, object oriented design; Structured Design- structure chart, structure vs flow chart; Structured Design Methodology- review and refine data flow diagram, identify boundaries between input process and output segments, apply design principles modularization criteria.

#### UNIT - IV

**Implementation:** Coding Principles- information hiding, structure programming, max cohesion and min coupling, code reusability, kiss, simplicity extensibility , code verification, code documentation; Coding Process- traditional coding process, test driven development. **Software Testing:** Testing Fundamentals- errors, faults, failures, cost of defects, testing process, role of software testers; Test Planning- create a test plan, design test cases, test stubs and test drivers, test case execution, test summary report, defect tracking and statistics; Black Box Testing-equivalence class partitioning, boundary value analysis, cause effect graphing, error guessing; White Box Testing- control flow based, path, data flow based, mutation; Levels of Testing- unit, integration, system, acceptance.

#### UNIT - V

**Project Planning and Estimation:** Project Planning activities, Software Metrics and measurements, Project Size Estimation - lines of code, functional point analysis; Effort Estimation Techniques- COCOMO cost models, analytical estimation.

**Software Quality:** software quality concept, Software Quality Factors, Verification & Validation, Software Quality Assurance- SQA activities, SQA plan; Capability Maturity Model (CMM) - SEI-CMM vs ISO standard.

#### TEXT BOOKS:

1. Ugrasen Suman, “Software Engineering, concepts and practices”, Cengage learning, 1/e,2015.

#### REFERENCE BOOKS:

1. W S Jawadekar, “Software Engineering principles and practice”, TMH, 2006

2. Sommerville, “Software Engineering”, 8/e, , Pearson.
3. Roger S. Pressman, “Software Engineering”, 7/e, TMH

**ADDITIONAL RESOURCES:**

1. [nptel.ac.in/courses/106101061](https://nptel.ac.in/courses/106101061)

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC21L1	<b>DATA STRUCTURES LAB</b> (Common to CSE, IT, CAI, CSC, CSD & CSM)						

**COURSE OBJECTIVES:**

- To teach efficient storage mechanisms of data for an easy access
- To design and implementation of various basic and advanced data structures.
- To introduce various techniques for representation of the data in the real world.
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

**COURSE OUTCOMES:**

After the completion of this course the student should be able to

**CO 1:** Analyze algorithms, Searching, Sorting and hashing Techniques.[K4]

**CO 2:** Make use of elementary data structures such as stacks, Queues and linked list to develop

their applications.[K3]

**CO 3:** Examine different tree traversal techniques. [K4]

**CO 4:** Experiment with different graph traversal techniques.[K4]

**LABORATORY EXPERIMENTS****WEEK - 1**

- Write a recursive Python program which computes the nth Fibonacci number, for appropriate values of n.
- Write recursive Python programs for the following
  - Factorial of a given number
  - GCD Computation
  - Towers of Hanoi

**WEEK - 2**

- Write a Python program that use both recursive and non-recursive functions to perform linear search.
- Write a Python program that use both recursive and non-recursive functions to perform binary search.

**WEEK - 3**

- Write a Python program to implement Bubble sort.
- Write a Python program to implement Insertion sort.
- Write a Python program to implement Selection sort.



#### **WEEK - 4**

- a) Write a Python program to implement Quick sort.
- b) Write a Python program to implement Merge sort.
- c) Write a Python program to implement Heap sort.

#### **WEEK - 5**

- a) Write a Python program to implement Stack operations using arrays
- b) Write a Python program to implement Queue operation using arrays.

#### **WEEK – 6**

- a) Write a Python program to convert infix expression into postfix expression using Stack.

#### **WEEK - 7**

- a) Write a Python program to implement Stack operation using Linked list.
- b) Write a Python program to implement Queue operations using Linked lists.

#### **WEEK - 8**

Write a Python program to implement the following operations on a singly linked using functions

- i) Insertion
- ii) Deletion
- iii) Displaying
- iv) Reversing

#### **WEEK - 9**

- a) Write a Python program to store a polynomial expression in memory using linked list
- b) Write a Python program to representation the given sparse matrix using arrays.

#### **WEEK - 10**

- a) Write a Python program to implement following Operations on a Binary Tree
  - i) Create
  - ii) In-order traversal
  - iii) Pre-order traversal
  - iv) Post-order traversal
- b) Write a Python program to implement following Operations a Binary Search Tree
  - i) Create
  - ii) Insert
  - iii) Delete

#### **WEEK - 11**

- a) Write a Python program to compute the shortest path of a graph using Dijkstra's algorithm
- b) Write a Python program to find the minimum spanning tree using Krushkall's Algorithm.

**WEEK - 12**

Virtual Lab: <http://cse01-iiith.vlabs.ac.in/>

Any three programs must be submitted with result from the above link.

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC21L2	<b>OOPS THROUGH JAVA LAB</b>						

**COURSE OBJECTIVE:**

- The course provides user interface and application development program implementation using core java principles.

**COURSE OUTCOMES:**

After completion of this course, the student will be able to:

**CO1:** Develop java programs by using OOP concepts. [K3]

**CO2:** Make use of interfaces, exception handling and threads to develop JAVA programs. [K3]

**CO3:** Make use of exception handling and collections in Java Programming. [K3]

**CO4:** Develop GUIs with AWT, Applets and Event Handling. [K3]

**LIST OF PROGRAMS:**

- Write a JAVA program to display default value of all primitive data types of JAVA.
- Write a JAVA program to display the Fibonacci sequence
- Write a JAVA program give example for command line arguments.
- Write a JAVA program to sort given list of numbers.
- Write a JAVA program to search for an element in a given list of elements (linear search).
- Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- Write a JAVA program to determine multiplication of two matrices.
- Write a JAVA program to sort an array of strings
- Write a JAVA program to check whether given string is palindrome or not.
- Write a JAVA program to give the example for 'this' operator. And also use the 'this' keyword as return statement.
- Write a JAVA program to demonstrate static variables, methods, and blocks.
- Write a JAVA program to give the example for 'super' keyword.
- Write a JAVA program that illustrates simple inheritance.
- Write a JAVA program to maintain Student Grading Database using multilevel inheritance. Student is Super class, which contains roll no, name, address. Marks derived from Student class, which contains subject names and respective marks. Result is derived from Marks class, which contains total, grade.
- Write a JAVA program demonstrating the difference between method overloading and method overriding.
- Write a JAVA program demonstrating the difference between method overloading and

- constructor overloading.
17. Write a JAVA program to create a package named pl, and implement this package in Ex class.
  18. Write a JAVA program to create a package named mypack and import it in Circle class.
  19. Write a JAVA program illustrating multiple inheritance using interfaces.
  20. Write a JAVA program for example of try and catch block. In this check whether the given array size is negative or not.
  21. Write a JAVA program for creation of user defined exception.
  22. Write a JAVA program to illustrate creation of threads using runnable interface (start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).
  23. Write a JAVA program to create a class MyThread in this class a constructor, call the base class constructor, using super and starts the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently.
  24. 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 contains only the method numberOfSides (), that contains the number of sides in the given geometrical figure.
  25. Write a Java Program to Implement HashMap API.
  26. Write a Java Program to Implement HashSet API.
  27. Write a Java Program to Implement ArrayList API.
  28. Write a Java Program to Implement TreeSet API.
  29. Write a Java Program to Implement TreeMap API.
  30. Write a JAVA program using StringTokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.
  31. Write a JAVA program that displays number of characters, lines and words in a text file.
  32. Write a JAVA program that describes the life cycle of an applet.
  33. Write a JAVA program that describes passing parameters to an applet.
  34. Write a JAVA program that allows user to draw lines, rectangles and ovals.
  35. Write a JAVA program that displays the x and y position of the cursor movement using Mouse.
  36. Write a JAVA program to create a border layout control.
  37. Write a JAVA program to create a grid layout control.
  38. Write a JAVA program to create a simple calculator.

**Virtual Lab:** <http://ps-iiith.vlabs.ac.in/>, [www.w3schools.com](http://www.w3schools.com)

Any three programs must be submitted with result from the above link.

II B.TECH- I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	15	35	50	1.5
SUBCODE: R20AC21L3	<b>SOFTWARE ENGINEERING AND UML LAB</b>						

**COURSE OBJECTIVES:**

- To Classify the requirements and prepare software requirement documents for analyzing the projects.
- To learn importance of modelling in Software Development Life Cycle.
- To know about different diagrams and relationships.
- To develop a unified application for a system.

**COURSE OUTCOMES:**

After successful completion of this course, the students will be able to :

- CO 1:** Compare the process of requirements development and requirements management and Examine the importance of requirements classification. [K4]
- CO 2:** Build use case diagrams that specify requirements for a software system.[K3]
- CO 3:** Develop class diagrams that demonstrate design model of a software system. .[K3]
- CO 4:** Make use of interaction diagrams to model the dynamic aspects of a software system[K3]
- CO 5:** Develop various applications using unified modeling language. .[K3]

**LIST OF EXPERIMENTS**

1. Requirements Development
2. Requirements Classification and Verification
3. Learning the usage of Rational Rose Software and different tools that are helpful to implement UML.
4. Create UML for Library Management system
5. Create UML for ATM system
6. Create UML for Online Railway Reservation system.
7. Create UML for Banking System.
8. Create UML for Airlines System.
9. Create UML for Student Information System.

**ONLINE REFERENCES:**

1. <https://www.udemy.com/uml-fundamentals/>
2. [https://www.youtube.com/watch?v=OkC7HKtiZC0&list=PLGLfVvz\\_LVvQ5G-LdJ8RLqe-ndo7QITYc](https://www.youtube.com/watch?v=OkC7HKtiZC0&list=PLGLfVvz_LVvQ5G-LdJ8RLqe-ndo7QITYc)
3. <https://www.youtube.com/watch?v=RRXe1omEGWQ&list=PLD4EF3E3AD055F3C7>

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDI TS
	0	0	4	0	50	50	2
SUBCODE: R20CC21SC1	<b>DATA SCIENCE LAB</b>						

**COURSE OBJECTIVE:**

- To familiarize students with how various statistics like mean median etc. can be collected for data exploration in Python
- To provide a solid undergraduate foundation in both probability theory and mathematical statistics and at the same time provides an indication of the relevance and importance of the theory in solving practical problems in the real world

**COURSE OUTCOMES:**

After completion of this course, the students will be able to:

**CO 1:** Demonstrate the basic arithmetic programming in python[K3]

**CO 2:** Analyze different data structures and choose suitable one for a given problem[K4]

**CO 3:** Demonstrate Data cleaning, processing for the given dataset using respective packages.[K3]

**CO 4:** Perform Data visualization[K3]

**CO 5:** Solve the problems related to Descriptive and Inferential Statistics for a given scenario.[K4]

**Syllabus:****Experiment 1: Basic Arithmetic with Python**

- A. Develop a python program to calculate the Greatest Common Divisor for two numbers. Create two separate procedures(functions) to illustrate the iterative and recursive solutions.
- B. Develop a python program to calculate the next number in the Fibonacci series for a given number(which may or may not be in the Fibonacci series).
- C. Develop a python program to calculate the square root of (N+1)th Prime number for a given number N using binary search with a precision of upto 7 decimal places.(Avoid built-in square root function)
- D. Design a Python program to determine the difference in days for two dates in YYYY:MM:DD format( $0 \leq YYYY \leq 9999$ ,  $1 \leq MM \leq 12$ ,  $1 \leq DD \leq 31$ ) following the leap year rules.

**Experiment 2: Text file processing & Basic Statistics**

- A. Develop Python program to generate count of words in a text file
- B. Write a program in Python with functions to calculate the following for comma-separated numbers in a text file(.txt)
  - a. 3rd Maximum number
  - b. 9th Minimum number

- c. Total Unique Count
- d. Mean
- e. Standard Deviation
- f. Number(s) with maximum frequency
- g. Number(s) with minimum frequency

### **Experiment 3: Exploring the Numpy library for multi-dimensional array processing**

- A. Develop programs in Python to implement the following in Numpy
  - a. Array slicing, reshaping, concatenation and splitting
  - b. Universal functions in Numpy
  - c. Aggregations
  - d. Broadcasting
  - e. Fast sorting

### **Experiment 4: Data cleaning and Processing with Pandas**

- A. Develop the following programs in Python
  - a. Implementing and querying the Series data structure
  - b. Implementing and querying the DataFrame data structure
  - c. Perform DataFrame indexing
  - d. Merge DataFrames

### **Experiment 5: Advanced Data Processing and Transformation**

- A. Implement the following using the Pandas library
  - a. Pandas idioms
  - b. Groupby
  - c. Scales
  - d. Pivot tables

### **Experiment 6: Data Visualization-I**

- A. Write programs to demonstrate different plots like Line Chart, Bar Chart, Histogram, Pie Chart, Stacked Bar Chart, Scatter Plot, Box Plot, Heat Map by loading the real-time data.
- B. Write programs to create subplots.

### **Experiment 7: Data Visualization-II**

- A. Write programs to illustrate different plotting data distributions like Univariate Distributions, Bivariate Distributions.
- B. Write programs to demonstrate plotting Categorical and Time-Series Data.

### **Experiment 8: Probability Distributions**

- A. Generate and Visualize Discrete and continuous distributions using the statistical environment. Demonstration of normal, binomial and Poisson distributions.
- B. Generate artificial data using and explore various distributions and its properties. Various parameter changes may be studied.

**Experiment 9: Building Confidence in Confidence Intervals**

- A. Populations Versus Samples
- B. Large Sample Confidence Intervals
- C. Simulating Data Sets
- D. Evaluating the Coverage of Confidence Intervals

**Experiment 10: Perform Tests of Hypotheses**

- A. Perform tests of hypotheses about the mean when the variance is known. Compute the p-value. Explore the connection between the critical region, the test statistic, and the p-value

**TEXT BOOKS:**

1. EMC Education Services “Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, Wiley Publishers, 2012.
2. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O’Reilly, 2015.
3. Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd ed.

**REFERENCE BOOKS:**

1. Jojo Moolayil, “Smarter Decisions : The Intersection of IoT and Data Science”, PACKT, 2016.
2. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013.
3. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.
4. Hastie, Trevor, et al., “The elements of statistical learning: Data Mining, Inference, and Prediction”, Vol. 2. No. 1. New York: Springer, 2009.



II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	-	-	-	-	-	0
SUBCODE: R20CC21MC2	<b>CONSTITUTION OF INDIA (MC)</b>						

### COURSE OBJECTIVES:

- To train students in understanding the basic structure of Indian Constitution
- To aware the students about the role of constitution in a democratic society
- To prepare students to live better and happily with other fellow beings through the application of Fundamental Rights in their lives.
- To know about the powers of Union Government and State Government

### COURSE OUTCOMES:

- CO1:** Examine salient features of Indian Constitution and live accordingly in society & interpret the meaning of Fundamental Rights of State Policy.
- CO2:** Discover various aspects of Union Government legislation and live up to the expectations of the rules.
- CO3:** Critically examine State Government legislation and improve your living standards by following the rules strictly
- CO4:** Examine powers and functions of local bodies such as Municipalities and Panchayats and, take advantage of available resources for better living
- CO5:** Analyze the powers and functions of Election Commission and The Union Public Service Commission and decide upon it for safe and secured life.

### UNIT-I:

#### INTRODUCTION TO INDIAN CONSTITUTION & FUNDAMENTAL RIGHTS:

Meaning of the term Indian Constitution –Preamble- Constituent Assembly- Salient Features of Indian Constitution. Fundamental Rights -Fundamental Duties -The Directive Principles of State Policy.

### UNIT-II:

**UNION GOVERNMENT:** Union Government -Union Legislature (Parliament) -Lok Sabha and Rajya Sabha (with Powers and Functions) -Union Executive -President of India (with Powers and Functions) -Prime Minister of India (with Powers and Functions) -Union Judiciary (Supreme Court) - Jurisdiction of the Supreme Court

### UNIT-III:

**STATE GOVERNMENT :**State Government -State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) -Powers and Functions of the State Legislature -State Executive-Governor of the State (with Powers and Functions) -The Chief Minister of the State (with Powers and Functions) -State Judiciary (High Courts)

### UNIT-IV:

**LOCAL SELF GOVERNANCE:** Powers and functions of Municipalities, Panchyats, ZP's and Co – Operative Societies

**UNIT-V:**

**SOVEREIGN BODIES :** Election Commission of India (with Powers and Functions) -The Union Public Service Commission (with Powers and Functions)

**TEXT BOOKS:**

1. Introduction to constitution of India, Durga Das Basu, Lexis Nexis Publications
2. Constitution of India by PROFESSIONAL BOOK PUBLISHERS
3. The Constitution of India by Arun K Tiru vengadam, Blooms bury publishers.
4. The constitution of India by PM Bakshi, Universal law publishing co
5. The Constitution of India by S.R. Bhansali, Universal law publishing co

**II B.TECH – II SEMESTER**

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC2211	Mathematical Foundations of Computer Science	BS	30	70	100	2	1	0	3
2	R20CC2203	Database Management Systems	PC	30	70	100	3	0	0	3
3	R20CC2210	Numerical Methods & Transformations	BS	30	70	100	3	0	0	3
4	R20AM2205	Artificial Intelligence	PC	30	70	100	3	0	0	3
5	R20AC2204	Operating Systems	PC	30	70	100	3	0	0	3
6	R20CC22L1	Database Management Systems Lab	PC	15	35	50	0	0	3	1.5
7	R20AM22L3	Operating Systems Lab	PC	15	35	50	0	0	3	1.5
8	R20AC22L4	Front End Web Technologies Lab	PC	15	35	50	0	0	3	1.5
9	R20CC22SC3	Mobile Application Development Lab	SOC	-	50	50	0	0	4	2
<b>TOTAL</b>										<b>21.5</b>
10	Honors/Minors Course			30	70	100	4	0	0	4
Summer Internship / Community Service Project					To be evaluated in III/I					

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: R20CC2211	<b>MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (CSE, IT, CSC, CSD, CSM)</b>						

### COURSE OBJECTIVE:

- The course provides with the basic mathematical implication for computer science, applications of mathematics in computer science.

### COURSE OUTCOMES:

After completion of this course, the students would be able to

**CO 1:** Apply the logical statements, connectivity among the statements and forms different types of normal forms. [K3]

**CO 2:** Analyze the theory of Inference for statement calculus. [K4]

**CO 3:** Classify the types of graphs and trees to formulate computational problems.[K4]

**CO 4:** Apply DNF and CNF on Boolean algebraic functions to simplify the digital (logic) circuits. [K3]

**CO 5:** Solve mathematical problems with recurrence relations using different methods. [K3]

### SYLLABUS

#### UNIT – I: Mathematical Logic:

(10 hours)

Statements and Notations, Connectives - Negation, Conjunction, Disjunction, Statement Formulas and Truth tables, Conditional Statements, Bi Conditional Statements, Well-formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Functionally Complete Sets of Connectives, Other Connectives; Normal Forms - Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms, Principal Conjunctive Normal Forms, Ordering and Uniqueness of Normal Forms.

#### UNIT – II: THE THEORY OF INFERENCE FOR THE STATEMENT CALCULUS:

(10 hours)

Validity Using Truth Tables, Consistency of Premises and Indirect method of proof.

**Predicate calculus:** Predicates, Statement Function, Variables and Quantifiers, Free and Bound Variables, Inference Theory of Predicate Calculus, Exercises.

**Mathematical Induction:** Principle of Mathematical Induction, Exercises.

#### UNIT – III: GRAPH THEORY:

(12 hours)

Definitions, finite and infinite graphs, incidence and degree, isolated pendant vertices, isomorphism, sub graphs, walk, path and circuit, connected and disconnected graphs, components, Euler graphs, Euler graph theorem, operations on graphs, decomposition of Euler graphs into circuits, arbitrarily traceable Euler graphs, Hamiltonian paths and circuits, number of edge disjoint Hamiltonian circuits in complete graph with odd number of vertices, travelling salesman problem.

**Trees:** Some properties of trees, pendant vertices, distance and centers, rooted and binary trees, spanning trees, fundamental circuit, shortest spanning trees, Kruskal's algorithm

**UNIT – IV: RECURRENCE RELATION:**

**(8 hours)**

Recurrence Relations, Formation of Recurrence Relations, Solving linear homogeneous recurrence Relations by substitution method, generating functions and The Method of Characteristic Roots. Solving Inhomogeneous Recurrence Relations.

**UNIT – V: BOOLEAN ALGEBRAS & COMBINATORICS:**

**(8 hours)**

**Boolean Algebras:** Boolean Algebras, Boolean Polynomials, Disjunctive and Conjunctive Normal forms, Switching Circuits and Applications.

**Combinatorics:** Basic Counting Principles, Permutations and Combinations: Permutations, Combinations, Restricted Combinations, Pigeonhole Principle and its Application.

**TEXT BOOKS:**

1. Tremblay & Manohar, “Discrete Mathematical Structures with Applications to Computer Science”, TMH.
2. Bhavanari Satyanarayana and Kunchan Syam Prasad “Discrete Mathematics”, PHI, India, ISBN: 978-81-203-4948-3.
3. Bhavanari Satyanarayana, T. V. Pradeep, Sk. Mohiddin Shaw, “Mathematical Foundation for Computer Science”, B.S Publications, Hyd: 2016, ISBN: 978-93-83635-81-8.

**REFERENCE BOOKS:**

1. Rosen, “Discrete Mathematics and its Applications with combinatorics and graph theory”, 7<sup>th</sup> edition, TMH
2. Purna Chandra Biswal, “Discrete Mathematics and Graph theory”, 3<sup>rd</sup> rd, PHI.
3. Joe L. Mott, Abraham Kandel, Theodore P. Baker, “Discrete Mathematics for Computer Scientists and Mathematicians”, 2<sup>nd</sup> Edition, PHI.

**ADDITIONAL RESOURCES:**

1. [nptel.ac.in/courses/106106094](https://nptel.ac.in/courses/106106094)
2. [nptel.ac.in/courses/106108054](https://nptel.ac.in/courses/106108054) (Graph Theory)

II B.TECH. II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUB CODE: R20CC2203	<b>DATABASE MANAGEMENT SYSTEMS</b> (Common to CSE, IT,CAI,CSC,CSD & CSM)						

**COURSE OBJECTIVE:**

- Provides students with theoretical knowledge and practical skills in the design, use of databases and database management systems in information technology applications.

**COURSE OUTCOMES:**

After completion of this course, the students would be able to

**CO1 :** Interpret the fundamentals of DBMS. [K2]

**CO2 :** Analyze DB design methodology and normalization process. [K4]

**CO3 :** Develop Queries in RDBMS. [K3]

**CO4 :** Compare and Contrast various transaction and concurrency management techniques. [K2]

**CO5 :** Analyze various file organizations and indexing techniques. [K4]

**SYLLABUS:****UNIT I:**

**Introduction:** History of Data base Systems, Data base System Applications, purpose of database systems, View of Data, Database Languages, Database Access from applications Programs, data base System Structure, data base Users and Administrators, Transaction Management, Storage Manager, the Query Processor.

**UNIT-II:**

**Introduction to Database Design:** Data base design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Case Study .

**The Relational Model:** Introduction to the Relational Model, Integrity Constraint Over relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design ER to Relational, Introduction to Views, Destroying /altering Tables and Views.

**UNIT III:**

**Relational Algebra:** Relational Algebra.

**SQL: Queries, Constraints, Triggers:-** Form of Basic SQL Query, Union, Intersect and Except, Nested Queries, Aggregative Operators, NULL values, Complex Integrity Constraints in SQL, Triggers and Active Data bases.

**UNIT IV:**

**Schema Refinement and Normal Forms:** Introduction to Schema Refinement, Functional Dependencies, reasoning about FDS, FIRST, SECOND and THIRD Normal forms, BCNF, Properties of Decomposition, Multi valued Dependencies, FOURTH Normal Form.

**UNIT V:**

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

**Concurrency Control:** Lock-based protocols, Timestamp-based protocols.

**Overview of Storage and Indexing:**

Data on External Storage, File Organization and Indexing, Index data Structures

**Tree Structured Indexing:** Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic index Structure.

**TEXT BOOKS:**

1. Raghuram Krishnan, Johannes Gehrke, “Database Management Systems”, TMH, 3/e, 2008.
2. Silberschatz, Korth, “Database System Concepts”, TMH, 6/e, 2010.

**REFERENCE BOOKS:**

1. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, PEA, 6/e, 2011.
2. C J Date, “Introduction to Database Systems”, PEA, 8/e, 2006.
3. Database System Concepts, Peter ROB, Coroneel, Ceneage, 6/2, 2011.

**WEB REFERENCES:**

1. [nptel.ac.in/courses/106106093](http://nptel.ac.in/courses/106106093)
2. [nptel.ac.in/courses/106104135](http://nptel.ac.in/courses/106104135)

II B.TECH- II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
<b>Sub Code: R20CC2210</b>	<b>NUMERICAL METHODS AND TRANSFORMATIONS</b> (CSE(AI-ML), CSE(DS), CSE(CS) )						

**COURSE OBJECTIVES:**

1. To elucidate the different numerical methods to solve nonlinear algebraic equations.
2. To propagate the use of different numerical techniques for carrying out numerical integration.
3. Explore the use of Laplace transform method to solve with initial value problems of ODE.
4. To acquire fundamental Knowledge of Fourier series and Fourier Transform and able to give Fourier expansions of a given function.

**COURSE OUTCOMES:**

Upon successful completion of the course, the students should be able to

1. Evaluate approximating roots of polynomials and transcendental equations by different algorithms. **[Evaluating – K5]**
2. Apply Newton's forward backward and Lagrange's interpolation for equal and unequal intervals. **[Apply – K3]**
3. Apply different algorithms for approximating solutions of ordinary differential equation to its analytical computations. **[Apply – K3]**
4. Select appropriate technique of Laplace transforms in solving differential equations. **[Apply – K3]**
5. Apply Fourier series, integral, transforms techniques in their core. **[Apply – K3]**

**UNIT –I: ITERATION METHODS:**
**(6 hours)**

Solution of Algebraic and Transcendental Equations: Introduction- Bisection method, Method of false position, Iteration method, Newton-Raphson method (One variable and simultaneous Equations).

**UNIT –II: INTERPOLATION:**
**(8 hours)**

Interpolation: Introduction- Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Symbolic relations and separation of symbols - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals – Newton's Divided difference formula, Lagrange's interpolation formula.

**UNIT –III: NUMERICAL DIFFERENTIATION AND INTEGRATION: (10 hours)**

Numerical Differentiation, Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Numerical integration- trapezoidal rule, Simpson's 1/3rd and 3/8<sup>th</sup> rules.

**UNIT – IV: FOURIER SERIES & FOURIER TRANSFORMS:**
**(12**
**hours)**

Introduction, Euler's formulae, Periodic functions, Dirichlet's conditions, conditions for a Fourier expansion, functions of any period, functions having points of discontinuity, odd and even functions - half range series. Fourier integral theorem (without proof), Fourier cosine



and sine integrals, Fourier transform, Fourier sine and cosine transforms, properties of Fourier Transforms, convolution theorem (without proof).

**UNIT-V: LAPLACE & Z- TRANSFORMATIONS:**

**(12 hours)**

Laplace transform and its properties, Transform of derivatives and integrals, Multiplication by  $t^n$ , division by  $t$ , Unit step function and unit impulse function. Transform of periodic functions, Evolutions of integrals by Laplace Transforms. Finding inverse transforms by the method of partial fractions, other methods of finding inverse Laplace Transforms, Convolution theorem(without proof), Solutions of Initial and Boundary Value Problems.

**z-transform:** Introduction, properties, Damping rule, Shifting rule, Initial and Final value theorems, Inverse z-transform, Convolution theorem, Solutions of difference equations.

**TEXT BOOK:**

1. B.S.Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publisher.
2. B.V.Ramana, "Higher Engineering Mathematics", 32<sup>nd</sup> Edition, McGraw Hill Education, 2018.

**REFERENCES:**

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "Engineering Mathematics", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, Wiley-India.
3. Peter V. O'Neil, "Advanced Engineering Mathematics", 7<sup>th</sup> Edition, Cengage Learning, 2011.

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDIT S
	3	0	0	30	70	100	3
SUBCODE: R20AM2205	<b>ARTIFICIAL INTELLIGENCE</b>						

**COURSE OBJECTIVE:**

- Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic and learning.
- The knowledge of artificial intelligence plays a considerable role in some applications students develop for courses in the program.

**COURSE OUTCOMES:**

After completion of this course, the students would be able to

**CO 1:** Summarize the characteristics of AI that make it useful to real-world problems. [K2]

**CO 2:** Analyse different search techniques and predicate logic in artificial Intelligence. [K4]

**CO 3:** Interpret knowledge representation and symbolic reasoning using different rules. [K2]

**CO 4:** Apply the basic knowledge on learning and reinforcement learning. [K3]

**CO 5:** Make use of the power of AI in Natural language processing as an advanced Application of AI. [K3]

**UNIT - I**

**Introduction to AI, Problems, Problem Spaces and Search:** Defining the Problem as a State space Search, Production Systems, Problem Characteristics, Production system characteristics, Issues in the Design of Search Programs.

**UNIT - II**

**Heuristic Search Techniques:** Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

**Knowledge Representation Using Predicate Logic:** Representing Simple Facts in logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution.

**UNIT - III**

**Representing Knowledge Using Rules:** Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge.

**Weak slot-and-filler structures:** Semantic Nets, Frames,

**Strong slot-and-filler structures:** Conceptual dependency, Scripts

#### UNIT - IV

**Learning:** Rote learning, learning by taking advice, learning in problem solving,

**Reinforcement Learning:** Markov Decision Problem, Q-Learning, Q-Learning Algorithm, temporal difference Algorithm

#### UNIT – V

**Natural Language Processing:** Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing, Statistical Natural language Processing, Spell Checking,

**Parallel and Distributed AI:** Parallelism in Reasoning Systems, Distributed Reasoning Systems.

#### TEXT BOOKS:

1. Elaine Rich & Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill Edition, 3<sup>rd</sup> Edition, Reprint 2008.
2. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
3. Carl Townsend, “Introduction to TURBO PROLOG”, BPB Publications. 2011
4. Tom M Mitchell, “Machine Learning”, McGraw-Hill Science/Engineering/Math, 1997.

#### REFERENCE BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Patrick Henry Winston, ‘Artificial Intelligence’, Pearson Education, 2003
3. Russel and Norvig, ‘Artificial Intelligence’, Pearson Education, PHI, 2003

#### WEB REFERENCES

1. <https://www.coursera.org/learn/machine-learning>
2. <https://www.simplilearn.com/big-data-and-analytics/machine-learning>
3. <https://www.applidaicourse.com/course/applied-ai-course-online>
4. <http://nptel.ac.in/courses/106105152>

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
<b>Sub Code: R20AC2204</b>	<b>OPERATING SYSTEMS</b>						

**COURSE OBJECTIVES:**

- To gain knowledge about the Operating Systems concepts such as process, main memory management, secondary memory management, Deadlocks, CPU and disk scheduling etc.,

**COURSE OUTCOMES:**

After completion of this course, the students would be able to

- CO 1:** Classify various operating system functionalities and generations. [K2]
- CO 2:** Interpret process management and exemplify the process synchronization techniques. [K2]
- CO 3:** Apply various process scheduling algorithms. [K3]
- CO 4:** Distinguish various memory management techniques and apply various deadlock techniques. [K4]
- CO 5:** Compare and contrast various disk scheduling algorithms and can interpret the filesystem implementations. [K2]

**SYLLABUS:****UNIT - I**

**Computer System and Operating System Overview:** Overview of Operating System - What operating systems do, User view, System view, defining operating systems; Operating Systems functions- Process Management, Memory Management, Storage Management, File- System Management, Mass-Storage Management, Caching, Protection and security; Distributed systems, Special purpose systems, Real-Time Embedded Systems, Multimedia Systems, Handheld Systems, Operating Systems Structures, Simple Structure, Layered Approach, Micro Kernels, Modules; Systems Calls- Process control, File management, Device management, Information maintenance, Communication; Operating systems generation.

## UNIT - II

**Process Management:** Process, Process States, Process Control Block, Process Scheduling- Scheduling Queues, Schedulers; Operations- Process Creation, Process termination; Inter process communication- Shared-Memory Systems, Message-Passing Systems, Naming, Synchronization, Buffering; Multi Thread programming models- Many to one, One to one, Many to Many model;  
Process Scheduling Criteria- CPU scheduler, Pre-emptive scheduling, Dispatcher, Scheduling Criteria; CPU Scheduling Algorithms- First Come First Serve, Shortest job first, Priority Scheduling, Round robin scheduling.

## UNIT - III

**Concurrency:** Process Synchronization, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware. Semaphores- Usage, Implementation, Deadlock and Starvation; Classic Problems of Synchronization- Bounded buffer problem, Readers writers' problem, Dining-Philosophers problem; Monitors- Usage, Dining-Philosophers solution using monitors.

**Memory Management:** Swapping, Contiguous Memory Allocation- Memory Allocation, Fragmentation; Paging- Basic Method, Hardware Method, Protection, shared pages; Structure of the Page table- Hierarchical Paging, Hashed Page Tables. Segmentation- Basic Method, hardware.

## UNIT - IV

**Virtual Memory Management:** Virtual Memory. Demand Paging- Basic concept, copy on write; Page-Replacement Algorithms- Basic page replacement, FIFO page replacement, optimal page replacement, LRU page replacement, LFU page replacement; Thrashing- Cause of Thrashing, Working set model, Page fault frequency.

**Principles of Deadlock:** Deadlock System Model. Deadlock Characterization- Necessary Conditions, Resource allocation graph; Deadlock Prevention- Mutual exclusion, Hold andwait, No pre-emption, Circular wait; Deadlock Detection and Avoidance- Resource allocation Graph algorithm, Banker's algorithm, Single instance of each resource type, several instances of each resource type; Recovery Form Deadlock- Process termination, Resource pre-emption.

## UNIT - V

**File System:** The Concept of a File- file attributes, file operations, file

types, file structures; Access Methods- sequential access, direct access, other access methods; Directory Structure-single level directory, two level directories, tree structured directory, general graph directory; File Sharing- multiple users, remote file systems; Protection- types of access, access control. **Implementing File System:** File System Structure. File System Implementation- overview, partitions and mounting, virtual file systems; Allocation Methods- contiguous allocation, linked allocation, indexed allocation; Free-Space Management- linked list, grouping, counting. **Disk Scheduling-** FCFS scheduling, SSTF scheduling, SCAN scheduling, C-SCAN scheduling, LOOK scheduling.

### **TEXT BOOKS:**

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, “Operating System Concepts”, JohnWiley, 7/e, 2016.

### **REFERENCE BOOKS:**

1. William Stallings, “Operating Systems – Internal and Design Principles”, PearsonEducation, 6/E, 2005.
2. D.M.Dhamdhare, “Operating Systems – A Concept based Approach” –, TMH, 2/e, 2005.
3. Crowley, “Operating System a Design Approach”, TMH, 1/e, 2005.
4. Andrew S Tanenbaum , “Modern Operating Systems”, PHI, 3/e, 2013.

### **WEB REFERENCES:**

1. [nptel.ac.in/courses/106108101](http://nptel.ac.in/courses/106108101)
2. [nptel.ac.in/courses/106106144](http://nptel.ac.in/courses/106106144)

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC22L1	<b>DATABASE MANAGEMENT SYSTEMS LAB</b> (Common to CSE, IT, CAI, CSC, CSD & CSM)						

**COURSE OUTCOMES:**

After Completion of this course student must be able to

**CO1 :** Apply SQL commands like DDL, DML and DCL to perform different Database operations [K3].

**CO2 :** Develop PL/SQL block statements, control statements and cursors. [K3]

**CO3 :** Develop PL/SQL programs using functions and procedures. [K3]

**CO4 :** Develop PL/SQL programs using packages and Triggers. [K3]

**PROGRAMS LIST:**

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries using Conversion functions (to\_char, to\_number and to\_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next\_day, add\_months, last\_day, months\_between, least, greatest, trunc, round, to\_char, to\_date).
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.  
Example:- Select the roll number and name of the student who secured fourth rank in the class.
5. i) Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)  
ii) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR.
8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
10. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.
11. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

12. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

**TEXT BOOKS:**

1. SCOTT URMAN, “ORACLE DATA BASE LOG PL/SQL Programming”, Tata Mc-Graw Hill.

**REFERENCES:**

1. Benjamin Rosenzweig, Elena Silvestrova “ORACLE PL/SQL by example”, Pearson Education 3/e
2. Dr.P.S. Deshpande, “SQL & PL/SQL for Oracle 10g”, Black Book.
3. Pranab kumar Das Gupta, P Radha Krishna, “Data Base Management System, Oracle SQL and PL/SQL” , PHI.

**WEB REFERENCES:**

3. [nptel.ac.in/courses/106106093](http://nptel.ac.in/courses/106106093)
4. [nptel.ac.in/courses/106104135](http://nptel.ac.in/courses/106104135)
5. <https://www.edx.org/course/databases-5-sql>
6. <https://www.coursera.org/projects/introduction-to-relational-database-and-sql>



II B.TECH	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
II SEMESTER	0	0	3	15	35	50	1.5
CODE:R20AM22L3	OPERATING SYSTEMS LAB						

**COURSE OBJECTIVE:**

- To enlighten the student with knowledge base in Operating Systems

**COURSE OUTCOMES:**

After successful completion of this course, the students will be able to:

**CO 1:** Apply various scheduling, page replacement and Deadlock avoidance algorithms for effective utilization of the CPU. [K3]

**CO 2:** Demonstrate various Memory Management Techniques. [K2]

## LIST OF EXPERIMENTS

Week 1: Simulate the following CPU scheduling algorithms. a) FCFS b) SJF c) Round Robin

d) Priority.

Week 2: Write a C program to simulate producer-consumer problem using Semaphores

Week 3: Write a C program to simulate the concept of Dining-philosophers problem.

Week 4: Simulate MVT and MFT.

Week 5: Write a C program to simulate the following contiguous memory allocation Techniques a) Worst fit b) Best fit c) First fit.

Week 6: Simulate all page replacement algorithms a) FIFO b) LRU c)

OPTIMAL

Week 7: Simulate all File Organization Techniques a) Single level directory b) Two level directory.

Week 8: Simulate all file allocation strategies a) Sequential b) Indexed c) Linked.

Week 9: Simulate Bankers Algorithm for Dead Lock Avoidance.

Week 10: Simulate Bankers Algorithm for Dead Lock Prevention.

Week 11: Write a C program to simulate disk scheduling algorithms. a) FCFS b) SCAN  
c) C-SCAN

### **REFERENCE BOOKS:**

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin,  
Greg Gagne 7thEdition, John Wiley.

### **WEB REFERENCES:**

1. <https://www.udemy.com/uml-fundamentals/>
2. [https://www.youtube.com/watch?v=OkC7HKtiZC0&list=PLGLfVvz\\_LVvQ5G-LdJ8RLqe-ndo7QITYc](https://www.youtube.com/watch?v=OkC7HKtiZC0&list=PLGLfVvz_LVvQ5G-LdJ8RLqe-ndo7QITYc)
3. <https://www.youtube.com/watch?v=RRXe1omEGWQ&list=PLD4EF3E3AD055F3C7>

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20AC22L4	<b>FRONT END WEB TECHNOLOGIES LAB</b>						

### COURSE OBJECTIVES:

- This course provide students with theoretical and practical skills in the design and development of web pages using HTML5,CSS, JS and jQuery.

### COURSE OUTCOMES:

After Completion of this course, students would be able to:

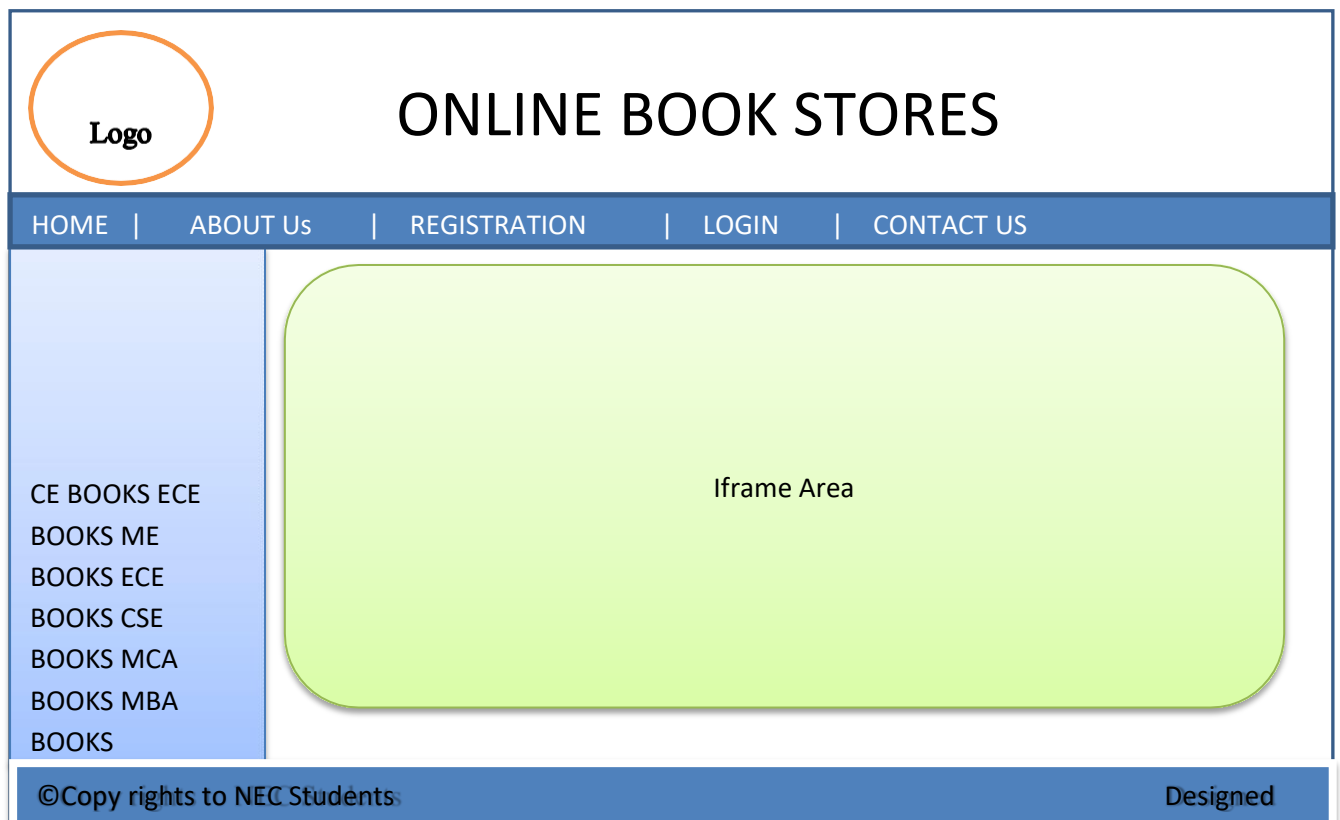
**CO 1:**Develop static html pages [K3].

**CO 2:** Develop Interactive Web Pages with different styles and client side validations[K3].

**CO 3:** Make use of JQuery programming to develop Web pages [K3].

**CO 4:** Apply JQuery UI to HTML pages [K3].

### LIST OF PROGRAMS:



**LAB 1:** Create the following web

1. Welcome.html

It explain about website

(Hint: Heading the website (Preferable H1, Describe website) it includes minimum two

paragraphs)

2. Aboutus.html (Hint: About owner of website)
3. Contactus.html
4. List.html (Hint: Mention List of courses)

**Lab 2:**

- a. Create web pages for each course. Example cse.html (Hint: It contains Heading and List of subjects in tabular form) Example

SNo	Title Book	Author	Publisher	Price	Image
--	--	--	--	--	--

- b. Create Registration and Login forms  
 Registration Form: It contains Student Name, Roll Number, Password, Gender, Email ID, Phone Number, opted course and languages known.  
 Login Form: It contains roll number as User ID, password, submit button and cancel button.

**Lab 3:** Apply CSS 3 on web-pages created on Lab 1 and Lab2.

Make use of the selectors like class, id, html elements, pseudo classes and elements

**Lab 4:**

- a. Apply validation on Registration and Login forms.
- b. In contactus.html web-page add Google maps.

**Lab 5:**

- a. Design HTML5 web page by embedding Audio, Video elements.
- b. Write HTML5 and JavaScript code to draw Arc, Circle, Rectangle and Triangle using Canvas.

**Lab 6:** Bootstrap Concepts on Grid System, Menu

**Lab 7:** Create index.html page and design it as shown in above screen (Hint: Use Bootstrap Grid System, Horizontal and vertical menus, footer, table etc.)

**Lab 8:** Write a jQuery code to make draggable Rectangle

**Lab 9:** Write jQuery code to demonstrate the usage of important options disabled, delay, distance and clone in the drag function of jQuery UI.

**Lab 10:** Write jQuery code to demonstrate three options addClass, disable and tolerance in the drop function of jQuery UI.

**Lab 11:** Write jQuery code to demonstrates the use of two options delay and distance of selectable() method.

**Lab 12:** Write jQuery code to demonstrate Accordion and Date Picker.

**Lab 13: Virtual Lab :** [www.w3schools.com](http://www.w3schools.com)

**WEB REFERENCES:**

1. <https://www.w3schools.com/>
2. <https://jqueryui.com/>
3. <https://api.jquery.com/>
4. <https://www.educba.com/software-development/software-development-tutorials/html-tutorial/>

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	4		50	50	2
SUBCODE: R20CC22SC3	<b>MOBILE APPLICATION DEVELOPEMET LAB</b>						

**COURSE OBJECTIVES:**

- To enlighten the student with knowledge base in Android Applications Development.

**COURSE OUTCOMES:**

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

**CO1 :** Demonstrate various components of Android Framework.[K2].

**CO2 :** Develop user Interfaces for the Android Application.[K3].

**CO3 :** Develop Android Applications using Android API and Services.[K3].

**CO4 :** Develop Android Applications which access data from Internet.[K3].

**LIST OF EXPERIMENTS**

- Create Hello World Android App using **Android Studio** and explain each step in detail.
- Create an Activity that receive name form the user and displays **Hello Name** to the user using Android Studio.
- Create an Activity that demonstrates the Life Cycle of an Activity.
- Create an Android Application which receives URL form the user and open appropriate page in the system browser with the help of Implicit Intents using Android Studio.
- Create an Android App which receives name form the user and displays welcome name in Second Activity.
- Create Login Screen Application which shows Home screen if Login success otherwise displays error message using Android Studio.
- Write an Android application program that demonstrate the use of
  - RelativeLayout.
  - LinearLayout.
  - GridLayout.
  - TableLayout.
- Write an Android application program that demonstrates the use ImageView.
- Write an Android application program that demonstrates the use of ListView and ArrayAdapter.
- Write an Android application program that demonstrates how to create Custom ListView and Custom Adapters.
- Write an Android application program that demonstrates the use of SQLite Database and Cursor.
- Write an Android application program that demonstrates the use AsyncTask.
- Write an Android application program that demonstrates Notifications.
- Write an Android application program that demonstrates Shared Preferences.
- Write an Android application program that connect to the internet, gets JSON data and displays the result in UI by parsing JSON data.

**ONLINE REFERENCES:**

1. <https://developer.android.com/index.html>
2. <http://nptel.ac.in/courses/106106147/10>
3. <https://www.edx.org/course/introduction-mobile-application-hkustx-comp107x-2>
4. <https://www.coursera.org/specializations/android-app-development>