

ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS

CSE (ARTIFICIAL INTELLIGENCE)

B.Tech - Four Year Degree Course

(Applicable for the Batches Admitted from 2020-21)

R-20

(Choice Based Credit System)



Kotappakonda Road, Yellamanda (P),
Narasaraopet - 522 601, Guntur Dist.,
Andhra Pradesh, INDIA.



Course Structure and Syllabus

(R20 Regulations)



NARASARAOPETA **ENGINEERING COLLEGE**

(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, RTA Approved Pollution test Centre, ISO 9001: 2008 Certified Institution
Phone: 08647-239905 [Website: www.nrtec.in](http://www.nrtec.in)

INSTITUTE VISION AND MISSION

VISION:

To emerge as a Centre of excellence in technical education with a blend of effective student centric teaching learning practices as well as research for the transformation of lives and community.

MISSION:

M1: Provide the best class infrastructure to explore the field of engineering and research.

M2: Build a passionate and a determined team of faculty with student centric teaching, imbuing experiential and innovative skills.

M3: Imbibe lifelong learning skills, entrepreneurial skills and ethical values in students for addressing societal problems.

DEPARTMENT VISION AND MISSION

VISION:

To be renowned department that imparts creative, learning and research skills to students in the domain of artificial intelligence.

MISSION:

The department of CSE (AI) is committed to

M1: To establish high performance computational facilities and tools to develop innovative and intelligent solutions.

M2: To collaborate with renowned companies for multidisciplinary research and development.

M3: To guide the students in learning and creative for developing intelligent technology based solutions to societal problems.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The graduates of the programme are able to:

PEO1: To Formulate, analyze and solve Engineering problems with strong foundation in Mathematical, Scientific, Engineering fundamentals and modern computing practices through advanced curriculum.

PEO2: Analyze the requirements, realize the technical specification and design the Engineering solutions by applying artificial intelligence theory and principles.

PEO3: Demonstrate technical skills, competency in AI and promote collaborative learning and team work spirit through multi -disciplinary projects and diverse professional activities.

PEO4: Equip the graduates with strong knowledge, competence and soft skills that allows them to contribute ethically to the needs of society and accomplish sustainable progress in the emerging computing technologies through life-long learning.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

PSO1: Ability to analyse and apply the knowledge of human cognition, Artificial Intelligence, Machine Learning and data engineering in terms of real world problems to meet the challenges of the future.

PSO2: Ability to develop computational knowledge and project development skills using innovative tools and techniques to solve problems in the areas related to Deep Learning, Machine learning, Artificial Intelligence.

PSO3: Ability to lead a product development company/team and use the acquired knowledge to identify real-world research problems.

PROGRAM OUTCOMES (POs):

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

**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:

- 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.

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- (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 1st 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):**

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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 3rd 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 5th 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 |

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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.

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- 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

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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.

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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 4th semester provided that the student must have acquired a minimum of 8.0 SGPA upto the end of 2nd semester without any backlogs. In case of the declaration of the 3rd semester results after the commencement of the 4th 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

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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 4th 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 2nd semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4th semester. If a student fails to acquire 8 SGPA upto 3rd semester or

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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

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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.

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- 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	-

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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.

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

Where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{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.

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

Where 'S_i' is the SGPA of the i^{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:

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

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:

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.75 (With No subject failures)
First Class	≥ 6.75 (With subject failures)
Second Class	≥ 5.75 & < 6.75
Pass Class	≥ 4.75 & < 5.75
FAIL	< 4.75

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.

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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.

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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 INEXAMINATIONS

➤ 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.

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➤ 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:

	Nature of Malpractices/ Improper conduct	Punishment
	<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 practical) in which the candidate is appearing.	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 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

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		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 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	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 of outsiders, they will be handed over to the police and a police case is registered against them.

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	<p>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>	
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 connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</p>	<p>Student of the college 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. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them.</p>
10.	<p>Comes in a drunken condition to the examination hall.</p>	<p>Expulsion from the examination hall and cancellation of the performance in that subject</p>

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		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.

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- 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 relations.

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	 6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

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 and Communicative English -I	HS	30	70	100	3	0	0	3
2	R20CC1102	Linear Algebra and Calculus	BS	30	70	100	2	1	0	3
3	R20CC1104	Applied Physics	BS	30	70	100	3	0	0	3
4	R20CC1105	Problem Solving Using C	ES	30	70	100	3	0	0	3
5	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	R20CC11L4	Applied Physics Lab	BS	15	35	50	0	0	3	1.5
8	R20AI11L7	CSE Workshop	BS	30	70	100	1	0	4	3
TOTAL										19.5

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	R20CC1202	Numerical Methods and Statistics	BS	30	70	100	2	1	0	3
2	R20CC1204	Engineering Chemistry	BS	30	70	100	3	0	0	3
3	R20CC1206	Problem Solving Using Python	ES	30	70	100	3	0	0	3
4	R20CC1208	Electronic Devices and Logic Design	ES	30	70	100	3	0	0	3
5	R20CC12L2	Engineering Chemistry Lab	BS	15	35	50	0	0	3	1.5
6	R20CC12L3	R Programming Lab	ES	15	35	50	0	0	3	1.5
7	R20CC12L8	LINUX Programming	ES	15	35	50	0	0	3	1.5
8	R20CC12L12	Problem Solving Using Python Lab	ES	30	70	100	1	0	4	3
9	R20CCMC1	Environmental Studies	MC	-	-	-	2	0	0	0
TOTAL										19.5

DEPARTMENT OF CSE (AI)

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	R20CC2102	Mathematical Foundations of Computer Science	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	R20AI2101	Data Science	PC	30	70	100	3	0	0	3
5	R20CC2105	Front End Web Technologies	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	R20CC21L3	Front End Web Technologies Lab	ES	15	35	50	0	0	3	1.5
9	R20CC21SC1	Data Science Tools	SOC	-	50	50	1	0	2	2
10	R20CCMC2	Constitution of India	MC	-	-	-	2	0	0	0
21.5										

DEPARTMENT OF CSE (AI)

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	R20CC2201	Technical and Communicative English -II	HS	30	70	100	3	0	0	3
2	R20CC2203	Database Management Systems	PC	30	70	100	3	0	0	3
3	R20AI2202	Automata and Compiler Design	PC	30	70	100	3	0	0	3
4	R20CC2204	Software Engineering	PC	30	70	100	3	0	0	3
5	R20AI2205	Introduction to Artificial Intelligence	PC	30	70	100	3	0	0	3
6	R20CC22L1	Database Management Systems Lab	PC	15	35	50	0	0	3	1.5
7	R20CS22L2	Mobile Application Development Lab	PC	15	35	50	0	0	3	1.5
8	R20AI22L3	AI Lab	PC	15	35	50	0	0	3	1.5
9	R20CC22SC2	IOT	SOC	-	50	50	1	0	2	2
TOTAL										21.5

R20 COURSE STRUCTURE

III B.TECH – I SEMESTER

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1		Operating Systems	PC	30	70	100	3	0	0	3
2		Computer Networks	PC	30	70	100	3	0	0	3
3		Machine Learning	PC	30	70	100	3	0	0	3
4		Open Elective-1	PC	30	70	100	3	0	0	3
5		<u>Professional Elective – I</u> 1. Design and Analysis of Algorithms 2. DataWarehousing and Data Mining 3. Computer Graphics	PE	30	70	100	3	0	0	3
6		CN & OS Lab	PC	15	35	50	0	0	3	1.5
7		Machine Learning Lab	PC	15	35	50	0	0	3	1.5
8		English Employability Skills	SOC	-	50	50	1	0	2	2
9		Summer Internship/Practical Training/Mini Project/Community Service Project	PR	-	50	50	0	0	0	1.5
10		Essence of Indian Traditional Knowledge	MC	-	-	-	2	0	0	0
TOTAL										21.5

DEPARTMENT OF CSE (AI)

R20 COURSE STRUCTURE

III B.TECH – II SEMESTER

S.No .	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1		Deep Learning	PC	30	70	100	3	0	0	3
2		Natural Language Processing	PC	30	70	100	3	0	0	3
3		Advanced Java and Web Technologies	PC	30	70	100	3	0	0	3
4		Professional Elective – II 1. Cryptography & Network Security 2. High Speed Networks 3. Mobile Computing	PE	30	70	100	3	0	0	3
5		Open Elective – II	OE	30	70	100	3	0	0	3
6		Advanced Java and Web Technologies Lab	PC	15	35	50	0	0	3	1.5
7		Deep Learning Lab	PC	15	35	50	0	0	3	1.5
8		Natural Language Processing Lab	ES	15	35	50	0	0	3	1.5
9		Design Thinking and Innovation	SOC	-	50	50	1	0	2	2
10		PE and HV	MC	-	-	-	2	0	0	0
TOTAL										21.5

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

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1		<u>Professional Elective – III</u> 1. Sentiment Analysis 2. Computer Vision & Perception 3. Artificial Neural Networks	PE	30	70	100	3	0	0	3
2		<u>Professional Elective – IV</u> 1.Reinforcement Learning 2.Software Project Management 3. Human Computer Interaction	PE	30	70	100	3	0	0	3
3		<u>Professional Elective – V</u> 1. E-Commerce 2. Humans and Intelligent Machines 3. Speech Processing	PE	30	70	100	3	0	0	3
4		Open Elective – III	OE	30	70	100	3	0	0	3
5		Open Elective – IV	OE	30	70	100	3	0	0	3
6		Business Management Concepts for Engineers/Entrepreneurship and Innovation	HS	30	70	100	3	0	0	3
7		Agile with SCRUM	SOC	-	50	50	1	0	2	2
8		Industrial/Research Internship/ Mini Project/Community Service Project	PR	-	50	50	0	0	0	3
TOTAL										23

DEPARTMENT OF CSE (AI)

R20 COURSE STRUCTURE

IV B.TECH – II SEMESTER

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1		Major Project	PR	60	140	200	-	-	-	12
TOTAL										

DEPARTMENT OF CSE (AI)

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 and Communicative English -I	HS	30	70	100	3	0	0	3
2	R20CC1102	Linear Algebra and Calculus	BS	30	70	100	2	1	0	3
3	R20CC1104	Applied Physics	BS	30	70	100	3	0	0	3
4	R20CC1105	Problem Solving Using C	ES	30	70	100	3	0	0	3
5	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	R20CC11L4	Applied Physics Lab	BS	15	35	50	0	0	3	1.5
8	R20AI11L7	CSE Workshop	BS	30	70	100	1	0	4	3
TOTAL										19.5

DEPARTMENT OF CSE (AI)

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

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.
- Reading** : Identifying sequence of ideas; recognising verbal techniques.
- 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
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
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=EA1aIQobChMIpr-F5OzH7QIVChsrCh1kBAkzEAMYASAAEgINpFD_BwE
11. https://www.myenglishpages.com/site_php_files/reading.php
12. <https://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/>

DEPARTMENT OF CSE (AI)

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	30	70	100	3
SUBCODE: R20CC1102	LINEAR ALGEBRA AND CALCULUS (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*”, 43rd Edition, Khanna Publishers, 2012.
2. B.V. Ramana, “*Higher Engineering Mathematics*”, 32nd 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*”, 8th Edition, John Wiley, Singapore, 2001.
3. Greenberg M D, “*Advanced Engineering Mathematics*”, 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
4. Peter V. O’Neil, “*Advanced Engineering Mathematics*”, 7th 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>

DEPARTMENT OF CSE (AI)

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1104	APPLIED PHYSICS (Common to ECE,EEE,CSE,IT&CAI)						

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, Willey India Pvt.Ltd, 5TH edition, 2012.
2. M.Arumugam, “Applied Physics”, ISBN: 81-89638-01-7, Anuradha Agencies, 4th edition, 2013.
3. D.K.Bhattacharya, “Engineering Physics”, ISBN: 0198065426, 9780198065425, Oxford University press, 2nd edition, 2010.
4. Sanjay D Jain and Girish G Sahasrabudhe “Engineering Physics”, University Press ISBN: 8173716781, 1st edition, 2010.
1. B.K.Pandey & S. Chaturvedi “Engineering Physics” ISBN: 8131517616, Cengage Learning, 1st 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 I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1105	PROBLEM SOLVING USING C (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”, 2nd edition.

WEB REFERENCES:

1. <http://cprogramminglanguage.net/>
2. <http://lectures-c.blogspot.com/>
3. http://www.coronadoenterprises.com/tutorials/c/c_intro.htm
4. 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>

DEPARTMENT OF CSE (AI)

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

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)
- Self-Introduction

UNIT–II

- Pronunciation Rules & Common Errors in Pronunciation.
- Listening -TEDx Talks(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

- Time Management.
- Goal Setting.
- 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
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
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
11. https://www.myenglishpages.com/site_php_files/reading.php
12. <https://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/>

DEPARTMENT OF CSE (AI)

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC11L2	PROBLEM SOLVING USING C LAB (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 from the user, performs the operation and then prints the result. Consider the operators +, -, *, /, % and use Switch Statement.

EXERCISE 4

- Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
- 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

- 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.
- Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
- 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
```

- i.

```
      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.**

Virtual 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 2nd 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, 7th 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/>

DEPARTMENT OF CSE (AI)

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	15	35	50	1.5
SUBCODE: R20CC11L4	APPLIED PHYSICS LAB (Common to CSE, ECE, IT, CSE(AI), 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-lJreyCU>
4. <http://vlab.amrita.edu/index.php>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	6	30	70	100	3
SUBCODE: R20CC12L13	CSE WORKSHOP						

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: Formalise 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://appssource.microsoft.com/en-us/product/office/wa104380862?tab=overview>

DEPARTMENT OF CSE (AI)

I B.TECH. – II SEMESTER

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC1202	Numerical Methods and Statistics	BS	30	70	100	2	1	0	3
2	R20CC1204	Engineering Chemistry	BS	30	70	100	3	0	0	3
3	R20CC1206	Problem Solving Using Python	ES	30	70	100	3	0	0	3
4	R20CC1208	Electronic Devices and Logic Design	ES	30	70	100	3	0	0	3
5	R20CC12L2	Engineering Chemistry Lab	BS	15	35	50	0	0	3	1.5
6	R20CC12L3	R Programming Lab	ES	15	35	50	0	0	3	1.5
7	R20CC12L8	LINUX Programming	ES	15	35	50	0	0	3	1.5
8	R20CC12L12	Problem Solving Using Python Lab	ES	30	70	100	1	0	4	3
9	R20CCMC1	Environmental Studies	MC	-	-	-	2	0	0	0
TOTAL										19.5

DEPARTMENT OF CSE (AI)

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	0	30	70	100	3
SUBCODE: R20CC1202	NUMERICAL METHODS AND STATISTICS (CSE, IT & AI)						

COURSE OBJECTIVES:

- To elucidate the different numerical methods to solve nonlinear algebraic equations.
- To propagate the use of different numerical techniques for carrying out numerical integration.

COURSE OUTCOMES:

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

CO1: Evaluate approximating roots of polynomials and transcendental equations by different algorithms. [K5]

CO2: Apply Newton's forward backward and Lagrange's interpolation for equal and unequal intervals. [K3]

CO3: Apply different algorithms for approximating solutions of ordinary differential equation to its analytical computations. [K3]

CO4: Decide whether to accept or reject a statement about parameter in decision making problems. [K5]

SYLLABUS

UNIT –I: ITERATION METHODS:

(8 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:

(10 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 3/8th rules.

UNIT IV: SAMPLING DISTRIBUTION:

(10 hours)

Estimation: Point Estimation, Interval Estimation, Bayesian Estimation.

UNIT V: TESTING OF HYPOTHESIS:

(10 hours)

Formulation of null hypothesis, critical regions, level of significance.

Large sample tests: test for single mean test for single proportion.

Small Sample tests: Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

TEXT BOOK :

1. Dr. B.S. Grewal, “*Higher Engineering Mathematics*”, 43rd Edition, Khanna Publishers, 2012.
2. **Miller and Freund’s**, Probability and Statistics for Engineers, 7/e, Pearson, 2008.

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*”, 8th Edition, John Wiley, Singapore, 2001.
3. Jaan Kiusalaas “*Numerical Methods in Engineering with Python*”, Cambridge University Press, 2005 Edition.
4. Curtis F. Gerald, Patrick O. Wheatley, “*Applied Numerical Analysis*”, 7 th edition, Pearson.

WEB SOURCE REFERENCES:

1. <https://www.youtube.com/watch?v=QqhSmdkqgjQ>
2. <https://www.digimat.in/nptel/courses/video/111107105/L01.html>
3. <https://nptel.ac.in/courses/122/102/122102009/>
4. <http://www.nptelvideos.in/2012/11/numerical-methods-and-computation.html>
5. <https://nptel.ac.in/courses/111/105/111105041/>
6. <https://nptel.ac.in/courses/111/106/111106112/>
7. https://nptel.ac.in/content/storage2/courses/103106120/LectureNotes/Lec1_2.pdf

DEPARTMENT OF CSE (AI)

I B.TECH II SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: R20CC1204	ENGINEERING CHEMISTRY (COMMON TO ALL BRANCHES)						

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, 2nd 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, Cengage 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=p9yPXdT0k48&t=225s>
5. URL: 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.

DEPARTMENT OF CSE (AI)

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

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, 2nd 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
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: R20CC1208	ELECTRONIC DEVICES AND LOGIC DESIGN						

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, 2nd Edition 1998.
2. Digital Design – M. Morris Mano, Pearson, 3rd Edition, 2009.

REFERENCES:

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

DEPARTMENT OF CSE (AI)

I B.TECH II SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC12L2	ENGINEERING CHEMISTRY LAB (COMMON TO ALL BRANCHES)						

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 Fe^{+2} by using 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 II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	15	35	50	1.5
SUBCODE: R20CC12L3	R PROGRAMMING LAB						

COURSE OBJECTIVES:

- To make the student to get a clear understanding of the core concepts of R like import data in various formats for statistical computing, data manipulation, business analytics etc.
- To implement various functions, data structures.

COURSE OUTCOMES:

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

- CO 1:** Apply the all basic operators on various data types.[K3]
- CO 2:** Develop programs using Conditional Statements and various types of loops.[K3]
- CO 3:** Develop programs using Matrices, Lists and Frames.[K3]
- CO 4:** Develop programs using Functions, Math functions and Statistical functions in R.[K3]
- CO 5:** Analyze the real word datasets presented in different formats using R libraries to perform exploratory data analysis and visualization.[K3]

LIST OF EXPERIMENTS

EXERCISE 1:

- a) Write a program to illustrate basic Arithmetic in R
- b) Write a program to illustrate Variable assignment in R
- c) Write a program to illustrate data types in R

EXERCISE 2:

- a) Write a program to illustrate if-else-else if in R
- b) Write a Program to illustrate While and For loops in R
- c) Write a program to illustrate Logical & and Logical | operators in R.

EXERCISE 3:

- a) Write a program to illustrate creating and naming a vector in R
- b) Write a program to illustrate create a matrix and naming matrix in R
- c) Write a program to illustrate Add column and Add a Row in Matrix in R
- d) Write a program to illustrate Selection of elements in Matrixes in R
- e) Write a program to illustrate Performing Arithmetic of Matrices

EXERCISE 4:

- a) How to Create a Matrix in R
- b) Print dimension of the matrix with dim()
- c) Construct a matrix with 5 rows that contain the numbers 1 up to 10 and byrow = FALSE
- d) Print dimension of the matrix with dim()
- e) Add a Column to a Matrix with the cbind()
- f) Slice a Matrix
- g) Write a program to illustrate Compare Matrices and Compare vectors

EXERCISE 5:

- a) Write a program to illustrate Factors in R
- b) Case study of why you need use a Factor in R
- c) Write a program to illustrate Ordered Factors in R

EXERCISE 6:

- a) How to Create a Data Frame
- b) Slice Data Frame
- c) Append a Column to Data Frame
- d) Select a Column of a Data Frame
- e) Subset a Data Frame
- f) Write a program to illustrate Data Frame Selection of elements in a Data frame
- g) Write a program to illustrate Sorting a Data frame
- h) Merge Data Frames in R: Full and Partial Match

EXERCISE 7:

- a) Write a program to illustrate List ? Why would you need a List
- b) Write a program to illustrate Adding more elements into a List

EXERCISE 8:

- a) Write a program to illustrate Function inside function in R
- b) Write a program to illustrate some built in Mathematical Functions.
- c) Write a program to calculate mean, mode, SD, variance.

EXERCISE 9:

Cleaning data in R:

- a) Characteristics of Clean Data and Messy Data
- b) Load Data into R with readxl
- c) View the Data with tidy::glimpse()
- d) Looking to Data Types
- e) Comparing to read.csv()
- f) Combining Datasets
- g) Clean Up Column Names with magrittr Magic!
- h) The Pipe Operation

EXERCISE 10:

Data visualization in R:

- a) Histogram
- b) Bar / Line Chart
- c) Box plot
- d) Scatter plot
- e) Heat Map
- f) Mosaic Map
- g) Map Visualization
- h) 3D Graphs
- i) Correlogram
- j) Write a program to illustrate Customizing and Saving to Graphs in R.

TEXT BOOKS:

1. Robert I. Kabacoff, R in Action-Data analysis and graphics with R, 2e, Manning Publications
2. David Dietrich, Barry Heller, and Beibei Yang, Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education Services, John Wiley & Sons, Inc.

REFERENCE BOOKS:

1. Garrett Grolemond, Hands-On Programming with R, Orielly.
2. Paul Teetor, R Cookbook, O'Reilly

WEB REFERENCES:

1. <https://rpubs.com/>
2. <https://b-ok.asia/ireader/2604048>
3. https://d1b10bmlvqabco.cloudfront.net/attach/ighbo26t3ua52t/igp9099yy4v10/igz7vp4w5su9/OReilly_HandsOn_Programming_with_R_2014.pdf
4. <https://www.guru99.com/r-matrix-tutorial.html>
5. <https://www.guru99.com/r-data-frames.html>
6. <https://www.guru99.com/r-sort-data-frame.html>
7. <https://www.guru99.com/r-dplyr-tutorial.html>
8. <https://www.guru99.com/r-merge-data-frames.html>
9. <https://www.guru99.com/r-functions-programming.html>
10. <https://www.dataquest.io/blog/load-clean-data-r-tidyverse/>
11. <https://www.analyticsvidhya.com/blog/2015/07/guide-data-visualization-r/>

DEPARTMENT OF CSE (AI)

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

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, 2nd 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
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>

DEPARTMENT OF CSE (AI)

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	1	4	30	70	100	3
SUBCODE: R20CS11L8	LINUX PROGRAMMING LAB						

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 ≥ 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 exists 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 Brain 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>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	-	-	-	-	-	0
SUBCODE: R20CCMC1	ENVIRONMENTAL STUDIES (COMMON TO ALL BRANCHES)						

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,Secondedition-2014.

REFERENCE BOOKS:

1. Deekshita Dave & P. UdayaBhaskar, Text Book of Environmental Studies CengageLearning.
2. Shaashi Chawla, a Textbook of Environmental Studies, TMH, NewDelhi.
3. Benny Joseph Environmental Studies, Tata McGraw Hill Co, NewDelhi.
4. Dr.K.V.S.G. Murali Krishna, Environmental Studies VGS Publishers, Vijayawada, First Edition2016.
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
- 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 theabove

II B.TECH - I SEMESTER

S.No	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC2102	Mathematical Foundations of Computer Science	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	R20AI2101	Data Science	PC	30	70	100	3	0	0	3
5	R20CC2105	Front End Web Technologies	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	R20CC21L3	Front End Web Technologies Lab	ES	15	35	50	0	0	3	1.5
9	R20CC21SC1	Data Science Tools	SOC	-	50	50	1	0	2	2
10	R20CCMC2	Constitution of India	MC	-	-	-	2	0	0	0
21.5										

DEPARTMENT OF CSE (AI)

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: R20CC2102	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (CSE & IT)						

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”, 7th edition, TMH
2. Purna Chandra Biswal, “Discrete Mathematics and Graph theory”, 3rd rd, PHI.
3. Joe L. Mott, Abraham Kandel, Theodore P. Baker, “Discrete Mathematics for Computer Scientists and Mathematicians”, 2nd Edition, PHI.

ADDITIONAL RESOURCES:

1. nptel.ac.in/courses/106106094
2. nptel.ac.in/courses/106108054 (Graph Theory)

DEPARTMENT OF CSE (AI)

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

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 framework, 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>

DEPARTMENT OF CSE (AI)

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC2104	DATA STRUCTURES (Common to CSE, IT & AI)						

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
2. <https://www.youtube.com/watch?v=RBxS6niE6q4>

DEPARTMENT OF CSE (AI)

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: R20AI2101	DATA SCIENCE						

COURSE OBJECTIVE:

• This course provides a comprehensive knowledge of data science and analytics techniques using Python. With this students will learn the essential concepts of Python programming and gain deep knowledge in data analytics and data visualization.

COURSE OUTCOMES:

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

CO 1: Apply principles of NumPy and Pandas to the analysis of data. [K3]

CO 2: Make use of various file formats in loading and storage of data. [K3]

CO 3: Identify and apply the need and importance of pre-processing techniques [K3].

CO 4: Analyze the results and present them in a pictorial format [K2].

CO 5: Apply Data aggregation commands and filling missing value methods [K3]

SYLLABUS:

UNIT-I

What is Data science?, The Data science process, A data scientist role in this process, NumPy Basics: The NumPy ndarray: A Multidimensional Array Object (Creating ndarrays, Data Types for ndarrays, Operations between Arrays and Scalars, Basic Indexing and Slicing, Boolean Indexing, Fancy Indexing), Data Processing Using Arrays (Expressing Conditional Logic as Array Operations, Sorting, Unique)

UNIT-II

Getting Started with pandas: Introduction to pandas, Library Architecture, Features, Applications, Data Structures (Series, DataFrame, Index Objects), Essential Functionality (Reindexing, Dropping entries from an axis, Indexing, selection, and filtering), Sorting and ranking, Summarizing and Computing Descriptive Statistics (Unique Values, Value Counts), Handling Missing Data.

UNIT-III

Data Loading, Storage, and File Formats : Reading and Writing Data in Text Format (Reading Text Files in Pieces, Writing Data Out to Text Format, Manually Working with Delimited Formats, JSON Data), Binary Data Formats (Using

HDF5 Format, Reading Microsoft Excel Files), Interacting with HTML and Web APIs, Interacting with Databases(Storing and Loading Data in MongoDB).

UNIT-IV

Data Wrangling: Clean, Transform, Merge, Reshape: Combining and Merging Data Sets(Database-style, Merging on Index, Concatenating Along an Axis, Combining Data with Overlap), Reshaping and Pivoting(Reshaping with Hierarchical Indexing), Data Transformation(Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values.

Plotting and Visualization: A Brief matplotlib API Primer (Figures and Subplots, Colors, Markers, and Line Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot, Saving Plots to File), Plotting Functions in pandas (Line Plots, Bar Plots, Histograms and Density Plots, Scatter Plots)

UNIT-V

Data Aggregation and Group Operations: GroupBy Mechanics(Iterating Over Groups, Selecting a Column or Subset of Columns, Grouping with Dicts and Series, Grouping with Functions, Grouping by Index Levels) Data Aggregation(Column-wise and Multiple Function Application, Returning Aggregated Data in “unindexed” Form), Group-wise Operations and Transformations(Apply: General split-apply-combine, Example: Filling Missing Values with Group-specific Values.

TEXT BOOKS:

1. Wes McKinney, “Python for Data Analysis”, O’REILLY, ISBN: 978-1-449- 31979-3, 1st edition, October 2012.

REFERENCE BOOKS:

1. Rachel Schutt & O’neil, “Doing Data Science”, O’REILLY, ISBN: 978-1-449- 35865-5, 1st edition, October 2013.
2. Joel Grus, “Data Science from Scratch”, O’REILLY, 1st edition, April 2015

WEB REFERENCES:

1. <https://www.greatlearning.in/>
2. https://onlinecourses.nptel.ac.in/noc20_cs62/
3. <https://nptel.ac.in/noc/courses/noc20/SEM2/noc2>

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC2105	FRONT END WEB TECHNOLOGIES						

COURSE OBJECTIVE:

- This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

COURSE OUTCOMES:

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

CO1: Interpret a webpage and identify its elements and attributes.[K2].

CO2: Build webpages using HTML5 [K3].

CO3: Make use of Cascading Style Sheets on webpages [K3].

CO4: Make use of Java Script to write nteractive webpages [K3].

CO5: Build dynamic webpages with JQuery [K3].

CO6: Make use of JQuery UI to develop dynamic webpages [K3].

SYLLABUS:

UNIT I:

HTML5: Fundamentals of HTML, working with text, organizing text in HTML, working with Links and URLs, creating tables, working with Images, Colors and Canvas, working with Forms, working with Multimedia.

UNIT II:

Cascading Style Sheets: CSS3-Introduction to Cascading Style Sheets-Features – Inline Style, – Internal or embedded style sheets, External Style Sheet, backgrounds and color gradients in CSS, fonts and text styles, creating boxes and columns using CSS. Displaying, positioning and floating an element, list styles, table layouts, pseudo-classes and pseudo-elements. Effects in CSS.

UNIT - III

Introduction to JavaScript: General syntactic characteristics, primitives, operations, expressions and Control Statements. **Objects in JavaScript:** Object creation and modification, Arrays, Functions. **Dynamic HTML with JavaScript:** Positioning elements, moving elements, element visibility, changing colors and fonts, dynamic content. **Regular Expressions in JavaScript:** Pattern matching using regular expressions. **Working with Events:** onload, onclick, onsubmit, onmouseover, onmouseout, onkeydown, onkeyup and onkeypress.

UNIT - IV

JQuery API:

Introduction: What jQuery can Do, Who Develops jQuery? Obtaining jQuery, Installing jQuery, programming conventions, markup and CSS conventions, JavaScript conventions. **Selecting and Filtering Elements:** Using the selectors API, filtering a selection, working within the context of a

selection, working with an element's relatives, slicing a selection, adding to a selection. **Events:** The various event wrapper methods, attaching other events, attaching persistent event handlers, removing event Handlers, creating custom events.

UNIT - V

JQuery UI: Drag and Drop: Implementing Drag and Drop, **Sortable:** Making a List Sortable, Customizing Sortable, **Selectable, Accordion:** Building an Accordion UI, Changing the Default Pane, Changing the Accordion Event, Setting the Header Elements, **Date picker:** Implementing a Date picker, Localizing the Date picker, **Dialogue:** Implementing a Dialog, Styling a Dialog, Making a Modal Dialog, Auto-Opening the Dialog, Controlling Dynamic Interaction, Animating the Dialog, Working with Dialog Events.

TEXT BOOKS:

1. Kogent Learning solutions Inc., "HTML 5 Black book", Dreamtech.,2011, (Unit I,II,III).
2. Uttam K Roy, "Web Technologies",Oxford,2010 (Unit IV).
3. Richard York , Web Development with JQuery, Wiley publications, 2/e ,2015(Unit V)

REFERENCE BOOKS:

1. Robert W Sebesta, "Programming the World Wide Web", 7ed, Pearson, 2012
2. Paul S Wang, Sanda S Katila, "An Introduction to Web Design, Programming", Cengage, 2003.

WEB REFERENCES:

1. <https://www.w3schools.com/>
2. nptel.ac.in/courses/106105084/13
3. <https://www.coursera.org>
4. <https://www.w3schools.com/>
5. <https://jqueryui.com/>
6. <https://api.jquery.com/>
7. <https://www.educba.com/what-is-html5/>

DEPARTMENT OF CSE (AI)

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC21L1	DATA STRUCTURES LAB (Common to CSE, IT & AI)						

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

- Write a Python program to implement Quick sort.
- Write a Python program to implement Merge sort.
- 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	OOPS THROUGH JAVA LAB						

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:

1. Write a JAVA program to display default value of all primitive data types of JAVA.
2. Write a JAVA program to display the Fibonacci sequence
3. Write a JAVA program give example for command line arguments.
4. Write a JAVA program to sort given list of numbers.
5. Write a JAVA program to search for an element in a given list of elements (linear search).
6. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
7. Write a JAVA program to determine multiplication of two matrices.
8. Write a JAVA program to sort an array of strings
9. Write a JAVA program to check whether given string is palindrome or not.
10. Write a JAVA program to give the example for ‘this’ operator. And also use the ‘this’ keyword as return statement.
11. Write a JAVA program to demonstrate static variables, methods, and blocks.
12. Write a JAVA program to give the example for ‘super’ keyword.
13. Write a JAVA program that illustrates simple inheritance.
14. 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.
15. Write a JAVA program demonstrating the difference between method overloading and method overriding.
16. 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

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: R20CC21L3	FRONT END WEB TECHNOLOGIES LAB						

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:

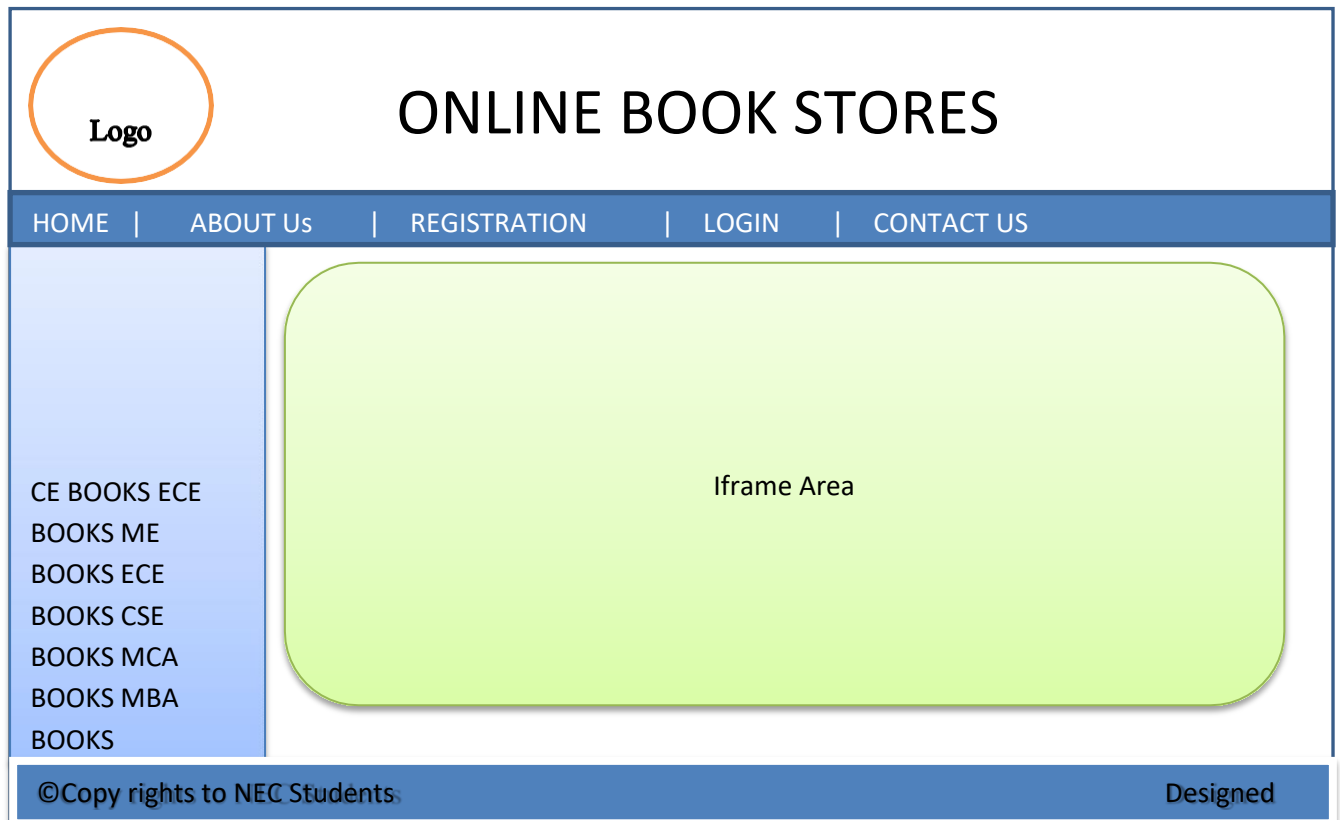
CO 1:Develop static html pages [K3].

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, Menus

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

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 I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	4	0	50	50	2
SUBCODE: R20CC21SC1	DATA SCIENCE TOOLS (SOC)						

COURSE OBJECTIVE:

- This course provides a comprehensive knowledge of data science and analytics techniques using Python. With this students will learn the essential concepts of Python programming and gain deep knowledge in data analytics and data visualization.

COURSE OUTCOMES:

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

DEPARTMENT OF CSE (AI)

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

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

DEPARTMENT OF CSE (AI)

II B.TECH – II SEMESTER

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC2201	Technical and Communicative English -II	HS	30	70	100	3	0	0	3
2	R20CC2203	Database Management Systems	PC	30	70	100	3	0	0	3
3	R20AI2202	Automata and Compiler Design	PC	30	70	100	3	0	0	3
4	R20CC2204	Software Engineering	PC	30	70	100	3	0	0	3
5	R20AI2205	Introduction to Artificial Intelligence	PC	30	70	100	3	0	0	3
6	R20CC22L1	Database Management Systems Lab	PC	15	35	50	0	0	3	1.5
7	R20CS22L2	Mobile Application Development Lab	PC	15	35	50	0	0	3	1.5
8	R20AI22L3	AI Lab	PC	15	35	50	0	0	3	1.5
9	R20CC22SC2	IOT	SOC	-	50	50	1	0	2	2
TOTAL										21.5

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC2201	TECHNICAL AND COMMUNICATIVE ENGLISH - II (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

- a) **Placement Papers.**
- b) **Reading:** Skimming for main idea, scanning for specific piece of information.
- c) **Writing:** Note – making flowed by paragraph writing, effective opening sentences, introducing the topic, key words, main idea, summarize the main idea.
- d) **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, 1st 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/
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/>

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	DATABASE MANAGEMENT SYSTEMS (Common to CSE, IT & AI)						

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, Coronel, Ceneage, 6/2, 2011.

WEB REFERENCES:

1. nptel.ac.in/courses/106106093
2. nptel.ac.in/courses/106104135

DEPARTMENT OF CSE (AI)

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20AI2202	AUTOMATA AND COMPILER DESIGN						

OBJECTIVES:

- Automata and compiler Design mainly deals with the languages which are formal and regular and also deals with grammar present in the machine.
- A compiler is a program that accepts a program in source language and converts into a machine understandable format.
- The push down automata is the major one it's a five tuple set containing states, alphabets, transition function and accept states.

COURSE OUTCOMES:

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

CO1: Summarize the concept of Automata and Construct Finite Automata Machines to recognize the languages. [K3]

CO2: Ability to implement practical aspects of automata theory. [K4]

CO3: Analyze Different parsing techniques and should be position to solve the problems. [K3]

CO4: Ability to design of a compiler given features of the languages. [K3]

CO5: Analyze the program and minimize the code by using optimizing techniques which helps in reducing the no. of instructions in a program. [K3]

SYLLABUS:

UNIT - I

Formal Language and Regular Expressions: Languages, Definition Languages, regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools.

UNIT - II

Context free grammars and parsing: Context free grammars, derivation, parse trees, LMD, RMD, ambiguity, left recursion, left factoring. Top-down parsing: FIRST and FOLLOW, LL (1) grammars, Recursive descent parsing, non-recursive predictive parsing and error recovery in predictive parsing.

UNIT - III

Bottom up parsing, handle pruning, shift- reduce parser, Construction of SLR Table. More Powerful LR parsers: Construction of CLR (1), LALR parsing table, dangling ELSE ambiguity, and error recovery in LR parsing.

UNIT - IV

Semantics: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements.

Run time storage: Storage organization, storage allocation strategies scope access to now local names.

UNIT - V:

Code optimization: Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs.

Code generation: Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block.

TEXT BOOKS:

1. Introduction to Theory of computation. Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

REFERENCES:

1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction, LOUDEN, Thomson.
3. Elements of Compiler Design, A. Meduna, Auerbach Publications, Taylor and Francis Group.
4. Principles of Compiler Design, V. Raghavan, TMH.
5. Engineering a Compiler, K. D. Cooper, L. Torczon, ELSEVIER.
6. Introduction to Formal Languages and Automata Theory and Computation - Kamala Krithivasan and Rama R, Pearson.
7. Modern Compiler Design, D. Grune and others, Wiley-India.
8. A Text book on Automata Theory, S. F. B. Nasir, P. K. Srimani, Cambridge Univ. Press.
9. Automata and Language, A. Meduna, Springer.

WEB REFERENCES:

1. <https://www.smartzworld.com/notes/automata-compiler-design-notes-pdf-acd/>
2. https://mrcet.com/downloads/digital_notes/IT/R17A1201%20ACD.pdf

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CS2205	SOFTWARE ENGINEERING						

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

- CO 1:** Analyse basic software engineering models. [K4].
- CO 2:** Demonstrate the various Object Oriented Design models [K2].
- CO 3:** Outline the software prototyping, analysis and design [K2].
- CO 4:** Outline the importance of software testing and project management [K4].

SYLLABUS

UNIT I

Introduction to software engineering : Evolution and impact of software engineering, Software life cycle models, Waterfall model, Prototyping model, Evolution and spiral models, Feasibility study, Functional and non-functional requirements, Requirement gathering, Requirement analysis and specification.

UNIT II

SRS Documentation: Requirements Elicitation, Requirements Documentation, Use Cases, Unified Modeling Language, Introduction

Conceptual Model of the UML, Architecture, **Class Diagrams**-Terms and Concepts, Common Modeling Techniques- Modeling Logical Database Schema, Forward and Reverse Engineering, **Object Diagrams**-Terms and Concepts, Common Modeling Techniques, Modeling Object Structures, Forward and Reverse Engineering, **Interaction Diagrams**- Terms and Concepts, Common Modeling Techniques-Modeling a Flows of Control by Time Ordering, Modeling a Flows of Control by Organization, Forward and Reverse Engineering.

UNIT III

Use cases- Terms and Concepts, **Use case Diagrams**- Terms and Concepts, Common Modeling Techniques-Modeling the Requirements of a System, Forward and Reverse Engineering, **Activity Diagrams**- Terms and Concepts, Common Modeling Techniques-Modeling a Workflow, Modeling an Operation, Forward and Reverse Engineering, **State Machines**-Terms and Concepts, **State Chart Diagrams**- Terms and Concepts, Common Modeling Techniques- Modeling Reactive Objects, Forward and Reverse Engineering, **Component**-Terms and Concepts, **Deployment**- Terms and Concepts, **Component Diagrams**- Terms and Concepts, Common Modeling Techniques- Modeling Executable Release, Modeling a Physical Database, Forward and Reverse Engineering and **Deployment Diagrams**- Terms and Concepts, Common Modeling Techniques-Modeling an Embedded System, Modeling a Client/Server System, Forward and Reverse Engineering.

UNIT IV

Analysis Phase: Analysis Object Model (Domain Model), Analysis Dynamic Model, Non-Functional Requirements, Analysis Patterns.

Design Phase: System Design Architecture, Design Principles, Design Concepts, Design Patterns, Architecture Styles, Dynamic Object Modeling, Static Object Modeling, Interface Specification, Object Constraint Language.

UNIT V

Testing: Fundamentals of testing, Black box testing techniques, White box testing techniques, Levels of testing, Test cases

Software project management : Project management, Project planning and control, Cost estimation, Project scheduling using PERT and GANTT charts, Software configuration management.

TEXT BOOKS:

1. Software Engineering: A Practitioner Approach By Roger S. Pressman, McGraw Hill Education
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language - User Guide", Addison Wesley 1999.

REFERENCES:

1. Software Engineering By Ian Sommerville, Pearson
2. Fundamentals Of Software Engineering By Rajib Mall, Prentice Hall
3. Software Engineering Fundamentals By Ali Behforooz And Fredericks J. Hudson, Oxford University Press

WEB REFERENCES:

1. URL: https://www.youtube.com/watch?v=BqVqjJq7_vI
2. URL: <https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/>

E-BOOKS:

1. <https://www.edutechlearners.com/object-oriented-system-development-by-ali-bahrami/>

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20AI2205	INTRODUCTION TO ARTIFICIAL INTELLIGENCE						

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

CO1: Summarize the characteristics of AI that make it useful to real-world problems. [K2]

CO2: Analyse different search techniques and predicate logic in artificial Intelligence. [K4]

CO3: Interpret knowledge representation and symbolic reasoning using different rules. [K2]

CO4: Apply the basic knowledge on learning and reinforcement learning. [K3]

CO5: Make use of the power of AI in Natural language processing as an advanced Application of AI. [K3]

SYLLABUS:

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.

TEXT BOOKS:

1. Elaine Rich & Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill Edition, 3rd 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.appliedaicourse.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	15	35	50	1.5
SUBCODE: R20CC22L1	DATABASE MANAGEMENT SYSTEMS LAB (Common to CSE, IT & AI)						

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
4. 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>

DEPARTMENT OF CSE (AI)

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20AI22L3	AI LAB						

COURSE OUTCOMES:

After Completion of this course student must be able to

CO1: Implement basic AI algorithms.[K3]

CO2: Identify problems that are amenable to solution by AI methods.[K3]

CO3: Identify appropriate AI methods to solve a given problem.[K3]

PROGRAMS LIST:

- 1) Python Installation & anaconda Installation
- 2) Numpy Installation
- 3) Basics of Numpy
- 4) Numpy operations in AI
- 5) Pandas Installation, Basics of pandas
- 6) Pandas operations in AI
- 7) Matplotlib Installation
- 8) Matplotlib operations in AI
- 9) Scikit Learn Lib Installation
- 10) Scikit Learn Lib operations in AI
- 11) Write a program to solve the Monkey Banana problem
- 12) Write a program to solve 8 queens problem
- 13) Solve any problem using depth first search.
- 14) Solve any problem using best first search.
- 15) Solve 8-puzzle problem using best first search
- 16) Solve Robot (traversal) problem using means End Analysis
- 17) Solve traveling salesman problem.
- 18) Solve the water-jug problem with test cases

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach., Russell & Norvig. 1995, Prentice Hall.
2. Artificial Intelligence, Elain Rich and Kevin Knight, 1991, TMH.

REFERENCES:

1. Artificial Intelligence-A modern approach, Stuart Russel and peter norvig, 1998, PHI.
2. Artificial intelligence, Patrick Henry Winston., 1992, Addition Wesley 3 Ed.,

WEB REFERENCES:

1. <https://nptel.ac.in>
2. <https://www.coursera.org/learn/ai-programming>
3. <https://www.AI-project.org/>

DEPARTMENT OF CSE (AI)

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCS4LB03	MOBILE APPLICATION DEVELOPMENT LAB						

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

1. Create Hello World Android App using **Android Studio** and explain each step in detail.
2. Create an Activity that receive name form the user and displays **Hello Name** to the user using Android Studio.
3. Create an Activity that demonstrates the Life Cycle of an Activity.
4. 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.
5. Create an Android App which receives name form the user and displays welcome name in Second Activity.
6. Create Login Screen Application which shows Home screen if Login success otherwise displays error message using Android Studio.
7. Write an Android application program that demonstrate the use of
 - a. RelativeLayout.
 - b. LinearLayout.
 - c. GridLayout.
 - d. TableLayout.
8. Write an Android application program that demonstrates the use ImageView.
9. Write an Android application program that demonstrates the use of ListView and ArrayAdapter.
10. Write an Android application program that demonstrates how to create Custom ListView and Custom Adapters.
11. Write an Android application program that demonstrates the use of SQLite Database and Cursor.
12. Write an Android application program that demonstrates the use AsyncTask.
13. Write an Android application program that demonstrates Notifications.
14. Write an Android application program that demonstrates Shared Preferences.
15. 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>

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	1	0	2	0	50	50	2
SUBCODE: R20AI22SC1	IOT (SOC)						

COURSE OBJECTIVES:

- To understand this fundamentals of Internet of Things.
- To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- To apply the concept of Internet of Things in the real world scenario

COURSE OUTCOMES:

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

CO 1: Analyze the requirements, specifications to design home automation applications.

CO 2: Build smart city applications using Arduino.

CO 3: Analyze domain specific applications using Arduino and Raspberry pi.

CO 4: Influence the revolution of Internet in Mobile Devices.

SYLLABUS:

EXPERIMENT -1

FUNDAMENTALS OF IoT INTRODUCTION: Characteristics-Physical design - Protocols – Logical design – Enabling technologies– IoT Levels and Deployment Templates – M2M, IoT vs M2M.

EXPERIMENT -2

IoT DESIGN METHODOLOGY: Purpose & Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specification, IoT Level Specification, Functional View Specification, Operational View specification, Device & Component Integration and Application Development.

EXPERIMENT -3

PROTOTYPING EMBEDDED DEVICE WITH ARDUINO: Sensors, Actuators, Embedded Computing Basics- Micro Controllers, System on Chips, Choosing your Platform, Arduino – Developing on the Arduino.

EXPERIMENT -4

PROTOTYPING EMBEDDED DEVICE WITH RASPBERRY PI: Raspberry PI – Introduction, cases and Extension Boards, Developing on the Raspberry PI.

EXPERIMENT -5

Familiarization with Arduino/Raspberry Pi and perform necessary software installation.

EXPERIMENT -6

To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.

EXPERIMENT -7

To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.

EXPERIMENT -8

To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.

EXPERIMENT -9

To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.

EXPERIMENT -10

To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.

EXPERIMENT -11

To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.

EXPERIMENT -12

To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.

EXPERIMENT -13

Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.

EXPERIMENT -14

Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.

TEXT BOOKS:

1. Arshdeep Bahga, Vijay Madiseti, "Internet of Things – A hands-on approach", Universities Press, 2015.
2. Adrian McEwen & Hakim Cassimally, "Designing the Internet of Things", Wiley Publications – 2014.

REFERENCES:

1. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014.
2. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
3. Walteneus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice".
4. Vijay Madiseti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",

1st Edition, VPT, 2014.

5. Charalampos Doukas “Building Internet of Things with the Arduino”.
6. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.
7. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

WEB REFERENCES:

1. <https://www.youtube.com/watch?v=G4-CtKkrOmc>
2. http://www.cse.wustl.edu/~jain/cse570-13/m_18iot.htm
3. <https://www.youtube.com/watch?v=9ZUFYyXhQm8>
4. <https://www.udemy.com/introduction-to-iot-using-raspberry-pi-2/>

EXPERIMENTS BEYOND SYLLABUS:

1. To install MySQL database on Raspberry Pi and perform basic SQL queries.
2. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
3. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
4. Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
5. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

Virtual Experiments:

1. Auto desk Eagle & Microsoft Raspberay Pi Simulation.
2. Proteus.
3. Virtronics simulation.