



SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi and Accredited by NBA, NAAC)
Sheriguda Village, Ibrahimpatnam Mandal, Ranga Reddy Dist. – 501 510

BACHELOR OF TECHNOLOGY COMPUTER SCIENCE & ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CHOICE BASED CREDIT SYSTEM (CBCS)

**ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABI FOR
II & III YEARS – I & II SEMESTERS
UNDER AUTONOMOUS STATUS FOR THE BATCHES ADMITTED FROM
THE ACADEMIC YEAR 2020 – 21**

**B.Tech. Regular Four Year Degree Programme
(For the batches admitted from the academic year 2020–21)
&
B.Tech. (Lateral Entry Scheme)
(For the batches admitted from the academic year 2021 - 22)**

Note: The regulations here under are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.



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Vision of the Institute

**To be a premier institution in engineering & technology
and management for competency, values and social
consciousness**

Mission of the Institute

**IM₁: Provide high quality academic programs,
training activities and research facilities.**

**IM₂: Promote continuous industry – institute
interaction aimed at promoting employability,
entrepreneurship, leadership and research
aptitude among stakeholders**

**IM₃: Contribute the economic and technological
development of the region, state and Nation.**



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VISION of the Department

To be a technologically adaptive centre for computing by grooming the students as top notch professionals.

MISSION of the Department

- DM1:** To offer quality education in computing.
- DM2:** To provide an environment that enables overall development of all the stakeholders.
- DM3:** To impart training on emerging technologies like Data Analytics, Artificial Intelligence and Internet of Things.
- DM4:** To encourage participation of stakeholders in Research and Development.

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 to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1	To develop software projects using standard practices and suitable programming environment.
PSO2	To identify, formulate and solve the real life problems faced in the society, industry and other areas by applying the skills of the programming languages, networks and databases learned.
PSO3	To apply computer science knowledge in exploring and adopting latest technologies in various inter-disciplinary research activities.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- PEO1: Higher Studies:** Graduate with an ability to pursue higher studies and get employment in reputed institutions and organizations.
- PEO2: Domain Knowledge:** Graduate with an ability to design and develop a product.
- PEO3: Professional Career:** Graduate with excellence by multidisciplinary approach to achieve successful professional career.
- PEO4: Life Long Learning:** Graduate with an ability to learn advanced skills to face professional competence through life long learning.



SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

ACADEMIC REGULATIONS 2020 (BR20) FOR CHOICE BASED CREDIT SYSTEM (CBCS)

B.TECH. DEGREE COURSES

(Applicable for Students admitted from the academic year 2020-2021)

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- “Autonomous Institute / College” means an institute / college designated as autonomous institute / college by the UGC, New Delhi and JNTUH Statutes, 2014.
- “Academic Autonomy” means freedom to a College in all aspects of conducting its academic programs granted by the University for promoting excellence.
- “Commission” means University Grants Commission (UGC), New Delhi.
- “AICTE” means All India Council for Technical Education.
- “University” means the Jawaharlal Nehru Technological University, Hyderabad.
- “College” means SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY, Hyderabad unless indicated otherwise by the context.
- “Programme” means: Bachelor of Technology (B.Tech) degree programme
- “Branch” means specialization in a programme like B.Tech degree programme in Electronics and Communication Engineering, B.Tech degree programme in Computer Science and Engineering etc
- “Course” or “Subject” means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester. For example, R20MTH1101: Mathematics - I, R20CSE1101 : Programming for Problem Solving etc.
- T – Tutorial, P – Practical, D – Drawing, L - Theory, C – Credits



SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

ACADEMIC REGULATIONS 2020 (BR20) FOR CHOICE BASED CREDIT SYSTEM (CBCS) B.TECH. DEGREE COURSES

(Applicable for Students admitted from the academic year 2020-2021)

1 Courses of study

The following courses of study (Branches) are offered at present by the college with specialization in the B. Tech. Course:

Sl. No.	Branch Code	Branch
1	1	CIVIL ENGINEERING
2	2	ELECTRICAL & ELECTRONICS ENGINEERING
3	3	MECHANICAL ENGINEERING
4	4	ELECTRONICS & COMMUNICATION ENGINEERING
5	5	COMPUTER SCIENCE & ENGINEERING
6	12	INFORMATION TECHNOLOGY
7.	33	COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
8.	67	CSE (DATA SCIENCE)
9.	66	CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)
10.	62	CSE (CYBER SECURITY)
11.	69	CSE – INTERNET OF THINGS (IoT)
12.	72	ARTIFICIAL INTELLIGENCE & DATA SCIENCE

1.1 Eligibility Criteria for Admission

The eligibility criteria for admission into First year of four year B.Tech. degree programme shall be as mentioned below:

- The candidate shall be an Indian National.
- The candidate should have completed 16 years of age as on 31st December of the academic year for which the admissions are being conducted
- Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, Telangana State, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana State
- Seats in each programme in the Institution are classified into category-A

and Category-B as per the Government Orders (G.Os.)

1.1.1 Category–A Seats:

These seats will be filled through counseling as per the rank at the Common Entrance Test (EAMCET) conducted by the State Government and State Government G.Os. as per other admission criteria laid down in the G.Os.

1.1.2 Category-B Seats :

These seats will be filled by the institute as per the G.Os. Issued by State Government from time to time.

1.1.3 Category: Lateral Entry

The Candidates shall be admitted into the Third semester, based on the rank secured by the candidate at Engineering Common Entrance Test (ECET (FDH)) by the Convener, ECET

1.1.4 Medium of Instruction

The medium of instructions for the entire under graduate programme in Engineering & Technology will be English only.

2. B.Tech Program Structure

2.1 Semester Scheme

Each under graduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters of 22 weeks (≥ 90 instructional days) each, semester having – ‘Continuous Internal Evaluation (CIE) ’AND‘ Semester End Examination (SEE)’ under Choice Based Credit System (CBCS) indicated by UGC, and curriculum/course structure as suggested by JNTUH & AICTE are followed.

After eight academic years of course of study, the candidate is permitted to write only supplementary examinations for two more years so that within 10 years the students can complete the B.Tech Degree.

The students, who fail to fulfill all the academic requirements for the award of the degree within ten academic years from the year of their admission, shall forfeit their seats in B. Tech. course.

2.2 Credit Courses

All subjects/ courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject/ course in an L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods: Credits) structure based on the following general pattern.

- One credit for one hour/ week/ semester for theory/ lecture (L) courses or Tutorials.
- One credit for two hours/ week/ semester for laboratory/ practical (P) courses.
- Courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization lab are mandatory courses.

These courses will not carry any credits.

2.3 Subject Course Classification

All subjects/ courses offered for the under graduate programme (B.Tech. degree programmes) are broadly classified as follows. The University has followed almost all the guidelines issued by AICTE/UGC.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes mathematics, physics and chemistry subjects
2		ES - Engineering Sciences	Includes fundamental engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to humanities, social sciences and management
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses (ElC)	PE – Professional Electives	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
6		OE – Open Electives	
7	Core Courses	Project Work	B.Tech. project or UG project or UG major project or Project Stage I & II
8		Industrial training/ Mini- project	Industrial training/ Summer Internship/ Industrial Oriented Mini-project/ Mini-project
9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch
10	Minor courses	-	of Engineering. 1 or 2 Credit courses (subset of HS)
11	Mandatory Courses (MC)	-	Mandatory courses (non-credit)

3 Attendance Requirements:

- 3.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate of all the subjects/ courses (excluding attendance in mandatory courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization lab) for that semester. Two periods of attendance for each theory subject shall be considered, if the student appears for the mid-term

examination of that subject.

- 3.2 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.
- 3.3 A stipulated fee shall be payable for condoning of shortage of attendance.
- 3.4 Shortage of attendance below 65% in aggregate shall in no case be condoned.
- 3.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester in which the student is detained, by seeking re-admission into that semester as and when offered.
- 3.6 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

4 Academic Requirements:

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no.3.

- 4.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if student secures not less than 35% (25 marks out of 70 marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing 'C' grade or above in that subject/ course.
- 4.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Industrial Oriented Mini Project/Summer Internship and seminar, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he (i) does not submit a report on Industrial Oriented Mini Project/Summer Internship, or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) does not present the seminar as required in the IV year I Semester, or (iii) secures less than 40% marks in Industrial Oriented Mini Project/Summer Internship and seminar evaluations.

4.3 Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	i) Regular course of study of first year second semester. ii) Must have secured at least 18 credits out of 37 credits i.e., 50% credits upto first year second semester from all the

		relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	i) Regular course of study of second year second semester. ii) Must have secured at least 47 credits out of 79 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	i) Regular course of study of third year second semester. ii) Must have secured at least 73 credits out of 123 credits i.e., 60% credits upto third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

- 4.4. A student (i) shall register for all courses/subjects covering 160 credits as specified and listed in the course structure, (ii) fulfills all the attendance and academic requirements for 160 credits, (iii) earn all 160 credits by securing SGPA ≥ 5.0 (in each semester), and CGPA (at the end of each successive semester) ≥ 5.0 , (iv) passes all the mandatory courses, to successfully complete the under graduate programme. The performance of the student in these 160 credits shall be taken into account for the calculation of 'the final CGPA (at the end of under graduate programme), and shall be indicated in the grade card of IV year II semester.
- 4.5 A student eligible to appear in the semester end examination for any subject/course, but absent from it or failed (thereby failing to secure 'C' grade or above) then no SGPA/CGPA will be printed on the respective Grade Card. However he may reappear for that subject/ course in the supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject/ course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.
- 4.6 A student detained in a semester due to shortage of attendance may be readmitted in the same semester in the next academic year for fulfillment of academic requirements. The academic regulations under which a student has

been readmitted shall be applicable. However, no grade allotments or SGPA/CGPA calculations will be done for the entire semester in which the student has been detained.

- 4.7 A student detained due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits. The academic regulations under which the student has been readmitted shall be applicable to him.
- 4.8 Supplementary examinations in the failed subject only for five times, in addition to one regular attempt (total six attempts). If the student is unable to clear the subject in six attempts altogether, the student shall appear for the examination in the same subjects with the revised syllabus i.e, the syllabus of equivalent subjects prevailing for the regular students in that academic year. However if no subject with 'similar title is offered in the current regulations, the examination shall be conducted in the failed subject with the syllabus which the student studied during his/her regular course of study.

5 Evaluation - Distribution and Weightage of marks

The performance of a student in every subject/course (including Practical's and Project Stage – I & II) will be evaluated for 100 marks each, with 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for SEE (Semester End-Examination).

- 5.1 For theory subjects, during a semester, there shall be two mid-term examinations conducted as per the academic calendar. Each mid examination is evaluated for 25 marks. First mid examination should be conducted for 1 to 2 ½ Units of syllabus and the second mid examination shall be conducted for 2 ½ to 5 Units of syllabus. The mid descriptive type exam paper consists of Section-A and Section-B.

Section-A [compulsory] consists of 5 short answer questions and each carries one mark.

Section-B consists of 6 questions out of which 4 are to be answered and each question carries 5 marks. The time duration of each mid examination is 90 minutes

Two assignments are to be given to students covering the syllabus of first mid and second Mid examinations and these assignments and Attendance are evaluated for 5 marks each. The first assignment shall be submitted before first mid examinations and second Assignment should be submitted before second mid examination.

At the end of the semester Internal Marks Maximum of 30 for the respective subjects are calculated as an average of the two midterm examinations

- 5.2 The semester end examinations (SEE) will be conducted for 70 marks consisting of two parts viz. i) Part- A for 20 marks, ii) Part - B for 50 marks.

Part-A is a compulsory question (numbered 1) consisting of **FIVE** short answer questions of four marks each and only one question to be set from a unit.

Part-B consists of five questions (numbered from 2 to 6) carrying 10 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.

5.2.1 For subjects like **Engineering Graphics/Engineering Drawing**, the SEE shall consist of five 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. There shall be no Part – A, and Part – B system.

5.2.2 For subjects like **Machine Drawing Practice/Machine Drawing**, the SEE shall be conducted for 70 marks consisting of two parts viz. (i) Part – A for 30 marks. 3 out of 4 questions must be answered, (ii) Part – B for 40 marks. Part – B is compulsory.

5.2.3 For the Subject Estimation, Costing and Project Management, the SEE paper should consist of Part- A, Part-B and Part C.

Part – A : 1 out of 2 questions from Unit – I for 30 Marks,

Part – B : 1 out of 2 questions from Unit – II for 10 Marks

Part – C : 3 out of 5 questions from Units – III, IV, V for 30 Marks.

5.3 For practical subjects there shall be a continuous internal evaluation during the semester for 30 marks of CIE and 70 marks for semester end examination. Out of the 30 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 15 marks conducted by the laboratory teacher concerned. The semester end examination shall be conducted with an external examiner and the laboratory teacher.

The external examiner shall be appointed by the Chief Superintendent in consultation with Dean/Controller of the Examination selects an external examiner from the list of experts in the relevant branch submitted by the HOD of the concern branch.

5.4 For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing, machine drawing practice and estimation), the distribution shall be 30 marks for continuous internal evaluation (15 marks for day-to-day work and 15 marks for internal tests) and 70 marks for semester end examination. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.

5.5 For mandatory courses of Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization lab, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. No marks or letter grades shall be allotted for mandatory/non-credit courses. Only ‘P’/‘F’ (Pass/Fail) shall be indicated in Grade Card.

- 5.6 There shall be a Technical seminar presentation in IV year I semester. For the Technical seminar, the student shall collect the information on a specialized topic, prepare a technical report, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 internal marks. There shall be no semester end examination for the seminar.
- 5.7 There shall be a Comprehensive Viva-Voce in IV year I semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects studied during the B.Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There will be no internal assessment for the Comprehensive viva-voce.
- 5.8 There shall be an Industrial Oriented Mini Project/Summer Internship, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation. Industrial Oriented Mini Project/Summer Internship shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 external marks.
- The committee consists of an external examiner, Head of the Department, supervisor of the Industrial Oriented mini project/Summer Internship and a senior faculty member of the department. There shall be no internal marks for Industrial Oriented Mini Project/Summer Internship.
- 5.9 The Project work shall be started by the student in the beginning of the IV year II Semester. Out of a total of 200 marks for the project work, 50 marks shall be for Internal Evaluation and 150 marks for the Semester end Examination. The Semester end Examination (viva-voce) shall be conducted by a committee comprising of an external examiner, Head of the Department and the project supervisor. The evaluation of project work shall be conducted at the end of the IV year II Semester. The Internal Evaluation shall be on the basis of three seminars conducted during the IV year II semester for 20 marks by the committee consisting of Head of the Department, project supervisor and senior faculty member of the Department and for 30 marks by the supervisor of the project.

6 Credit Transfer System for MOOCs against Open / Professional Electives

The credit transfers of MOOC (Offered by SWAYAM/NPTEL / COURSERA etc.) against Professional Electives **(3-I,3-II)** and Open electives **(4-I, 4-II)**. These rules shall be applicable from Academic Year 2020-2021.

- 6.1 The student shall be required to submit an **Application form/ UNDERTAKING** for final approval for credit transfer of MOOC against open elective along with the photocopy of MOOC completion certificate to chairperson through HOD before the allotment of Professional Electives **(3-I, 3-II)** and Open electives **(4-I, 4-II)** to the UG/PG students.

- 6.2 Only those registered MOOC courses are allowed for Credit Transfer which have credits more than or equal to the credits assigned to Open Elective course or the MOOC course should be of minimum **4/8/12** weeks duration. The student can also choose to register and complete more than one MOOC of same or different subject areas. However, the total number of weeks of all such individual courses should be more than or equal to 4/8/12 and should either belong to SWAYAM-NPTEL OR otherwise COURSERA. However, the candidates have to submit MOOC certificate/certificates to acquire the total number of credits offered against the elective subject.

Credit Equivalence		
S. No.	Course Duration	Credit Equivalence for Transfer of Credits
UG / PG		
1	4 Weeks	1Credit
2	8 Weeks	2 Credits
3	12 Weeks	3 Credits

- 6.3 While transferring the credit from MOOC against open elective or professional elective, the student can opt following combinations of MOOC with the approval of coordinator and head of the department.

- I) for 3 credits:
- a) 12 Weeks **(1)** (or)
 - b) 8 Weeks **(1)** + 4 Weeks **(1)** (or)
 - c) 4 Weeks **(1)** + 4 Weeks **(1)** + 4 Weeks **(1)**

- II) for 2 Credits:
- a) 8 Weeks **(1)** (or)
 - b) 4 Weeks **(1)** + 4 Weeks **(1)**

- 6.4 Credit transfer shall not be allowed, if the contents and topic of the MOOC which is identical (20% overlapping is permissible) to any of the courses including Open Elective courses offered by any department for UG/PG students. It is the responsibility of the HOD to verify and recommend the courses requested by students is satisfying criteria 2.
- 6.5 Scores of the MOOC courses completed by the students on permitted platforms satisfying all above conditions are valid till **2** years. Only such MOOC courses/Scores will be considered for credit transfer.
- 6.6 If the MOOC course in which the student is interested does not fall in the parent discipline of the student and belongs to other Engineering disciplines existing at Basic Sciences/Humanities/Management, the Departmental coordinator will seek opinion of concerned HoD to verify the matching of content of MOOC with that of Open Elective courses/Professional Elective courses offered.
- 6.7 If the above mentioned conditions are fulfilled, the Departmental Interdisciplinary coordinator will recommend the case to coordinator, Interdisciplinary Courses for final approval and accordingly notify to the students. After getting approval from HoD, the student may register for the MOOC course he/she can be allowed for and complete the same as per the

requirements for credit transfer.

- 6.8 The coordinator, Interdisciplinary Courses, will consolidate the lists from all departments and submit the same for final approval. Chairperson will submit the list to Principal / Chairman. The final list will be forwarded to the Controller of Examination for further action.
- 6.9 The department/institution is not responsible for the registration of online MOOC. The candidates have to pay for registration of such courses.
- 6.10 Alternatively for online MOOC courses, the candidates have a choice to opt a subject from open/professional electives. The credit grade point mapping framework could be awarded based on the Grading Procedure para 7.2

7 Grading procedure

- 7.1 Grades will be awarded to indicate the performance of students in each theory subject, Laboratory / Practical's, Seminar, Industry Oriented Mini Project, and Project Stage – I & II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 5 above, a corresponding letter grade shall be given.
- 7.2 As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

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

- 7.3 A student who has obtained an 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

- 7.4 To a student who has not appeared for an examination in any subject, 'F(Ab)' grade will be allocated in that subject, and he is deemed to have 'failed'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.
- 7.5 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.
- 7.6 A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'Credit Points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit points (CP) = Grade Point (GP) x Credits For a course

- 7.7 A student passes the subject/ course only when $GP \geq 5$ ('C' grade or above)
- 7.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points ($\sum CP$) secured from all subjects/ courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as

$$SGPA = \{ \sum_{i=1}^N C_i G_i \} / \{ \sum_{i=1}^N C_i \} \dots \text{For each semester,}$$

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the no. of subjects 'registered' for the semester (as specifically required and listed under the course structure of the parent department), C_i is the no. of credits allotted to the i^{th} subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

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

$$CGPA = \{ \sum_{j=1}^M C_j G_j \} / \{ \sum_{j=1}^M C_j \} \dots \text{for all S semesters registered}$$

(i.e., up to and inclusive of S semesters, $S \geq 2$),

where 'M' is the total no. of subjects (as specifically required and listed under the course structure of the parent department) the student has 'registered' i.e., from the 1st semester onwards up to and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} subject. After registration and completion of I year I semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	$4 \times 8 = 32$
Course 2	4	O	10	$4 \times 10 = 40$
Course 3	4	C	5	$4 \times 5 = 20$
Course 4	3	B	6	$3 \times 6 = 18$
Course 5	3	A+	9	$3 \times 9 = 27$
Course 6	3	C	5	$3 \times 5 = 15$
	21			152

$$\text{SGPA} = 152/21 = 7.24$$

Illustration of calculation of CGPA up to 3rd semester:

Semester	Course/Subject Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point (GP)	Credit Points (CP)
I	Course 1	3	A	8	24
I	Course 2	3	O	10	30
I	Course 3	3	B	6	18
I	Course 4	4	A	8	32
I	Course 5	3	A+	9	27
I	Course 6	4	C	5	20
II	Course 7	4	B	6	24
II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	Total Credits	69		Total Credit Points	518

$$\text{CGPA} = 518/69 = 7.51$$

- 7.10 Calculation process of CGPA will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech. Programme.

- 7.11 For merit ranking or comparison purposes or any other listing, only the 'rounded off' values of the CGPAs will be used. SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA shall be mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester.

8 Grace Marks

Examination branch adds the grace marks, not exceeding 0.15% marks of the course total marks to one or two subjects in which the student failed if adding these grace marks helps the student to

- i) Pass in these one or two failed subjects and
- ii) Get eligibility to receive the degree.

These grace marks shall be added only when the candidate submits an undertaking stating that **"he/she will never apply for the supplementary exams conducted by the Institution in the future"** to the Principal.

9 Passing standards

A student shall be declared successful or 'passed' in a semester, if he secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when the student gets an SGPA ≥ 5.00 at the end of that particular semester); and he shall be declared successful or 'passed' in the entire under graduate programme, only when gets a CGPA ≥ 5.00 for the award of the degree as required.

After the completion of each semester, a grade card or grade sheet shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, grade earned, etc.), credits earned.

10 Declaration of results

Computation of SGPA and CGPA are done using the procedure listed in 6.6 to 6.9.

For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

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

11 Award of degree

- 11.1 A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have **'Qualified'** for the award of B.Tech. degree in the chosen branch of Engineering selected at the time of admission.
- 11.2 A student who qualifies for the award of the degree as listed in item 10.1 shall be placed in the following classes.
- 11.3 A student with final CGPA (at the end of the under graduate programme) ≥ 8.00 , and fulfilling the following conditions - shall be placed in **'First Class with Distinction'**. However, he

- A. Should have passed all the subjects/courses in **'first appearance'** within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.
- B. Should have secured a CGPA ≥ 8.00 , at the end of each of the 8 sequential semesters, starting from I year I semester onwards.
- C. Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

A student not fulfilling any of the above conditions with final CGPA ≥ 8 shall be placed in **'First Class'**.

- 11.4 Students with final CGPA (at the end of the under graduate programme) ≥ 6.50 but < 8.00 shall be placed in **'First Class'**.
- 11.5 Students with final CGPA (at the end of the under graduate programme) ≥ 5.50 but < 6.50 , shall be placed in **'Second Class'**.
- 11.6 All other students who qualify for the award of the degree (as per item 10.1), with final CGPA (at the end of the under graduate programme) ≥ 5.00 but < 5.50 , shall be placed in **'Pass Class'**.
- 11.7 A student with final CGPA (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

12 Withholding of Results

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

13. Transitory Regulations

Students who have discontinued or have been detained for want of attendance or any other academic requirements, may be considered for readmission as and when they become eligible. They have to take up Equivalent subjects, as substitute subject in place of repetition of subjects as decided by the Institute Academic Committee.

- 14. There shall be **no branch transfers** after the completion of admission process.
- 15. The decision of the Institute Academic Committee will be final in respect of equivalent subjects for those students who are transferred from other colleges. The procedure for permitting students to transfer from other colleges will be decided by the principal / Institute Academic Committee keeping the Government Rules concerned in view.

16. TERMINATION FROM THE PROGRAMME

The admission of a student to the programme may be terminated and the student is asked to leave the college in the following circumstances:

- i. The student fails to satisfy the requirements of the programme within the maximum period stipulated for that programme.
- ii. The student fails to satisfy the norms of discipline specified by the institute from time to time.

17. CURRICULUM

- i. For each programme being offered by the Institute, a Board of Studies (BOS) is constituted in accordance with AICTE / UGC / JNTUH statutes.
- ii. The BOS for a programme is completely responsible for designing the curriculum once in three years for that programme.

18. GRIEVANCES REDRESSAL COMMITTEE

“Grievances and Redressal Committee” (General) constituted by the principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. The composition of the complaints cum redressal committee shall be:

Headed by Senior Faculty member

Heads of all departments

A senior lady staff member from each department (if available)

The committee constituted shall submit a report to the principal of the college, the penalty to be imposed. The Principal upon receipt of the report from the committee shall, after giving an opportunity of being heard to the person complained against, submit the case with the committee's recommendation to the Governing Body of the college. The Governing Body shall confirm with or without modification the penalty recommended after duly following the prescribed procedure.

19. MALPRACTICE PREVENTION COMMITTEE

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

Principal.

Subject expert of which the subject belongs to.

Head of the department of which the student belongs to.

The invigilator concerned.

In-charge Examination branch of the college.

The committee constituted shall conduct the meeting on the same day of examination or latest by next working day to the incidence and punish the student as per the guidelines prescribed by the JNTUH/SICET from time to time.

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

20. STUDENT'S FEEDBACK

It is necessary for the Colleges to obtain feedback from students on their course work and various academic activities conducted. For this purpose, suitable feedback forms

shall be devised by the College and the feedback obtained from the students regularly in confidence, by administering the feedback form in print or on-line in electronic form.

The feedback received from the students shall be discussed at various levels of decision making at the College and the changes/ improvements, if any, suggested shall be given due consideration for implementation.

21. CONDUCT AND DISCIPLINE

- i. Each student shall conduct himself / herself in a manner befitting his / her association with SICET.
- ii. He / she is expected not to indulge in any activity, which is likely to bring disrepute to the college.
- iii. He / she should show due respect and courtesy to the teachers, administrators, officers and employees of the college and maintain cordial relationships with fellow students.
- iv. Lack of courtesy and decorum unbecoming of a student (both inside and outside the college), willful damage or removal of Institute's property or belongings of fellow students, disturbing others in their studies, adoption of unfair means during examinations, breach of rules and regulations of the Institute, noisy and unruly behaviour and similar other undesirable activities shall constitute violation of code of conduct for the student.
- v. **Ragging in any form is strictly prohibited and is considered a serious offence. It will lead to the expulsion of the offender from the college.**
- vi. Violation of code of conduct shall invite disciplinary action which may include punishment such as reprimand, disciplinary probation, debarring from the examination, withdrawal of placement services, withholding of grades / degrees, cancellation of registration, etc., and even expulsion from the college.
- vii. Principal, based on the reports of the warden of Institute hostel, can reprimand, impose fine or take any other suitable measures against an inmate who violates either the code of conduct or rules and regulations pertaining to college hostel.
- viii. A student may be denied the award of degree / certificate even though he / she has satisfactorily completed all the academic requirements if the student is found guilty of offences warranting such an action.
- ix. Attendance is not given to the student during the suspension period.

22. Other Issues

The quality and standard of engineering professionals are closely linked with the level of the technical education system. As it is now recognized that these features are essential to develop the intellectual skills and knowledge of these professionals for being able to contribute to the society through productive and satisfying careers as *innovators, decision makers and/or leaders* in the global economy of the 21st century, it becomes necessary that certain improvements are introduced at different stages of their education system. These include:

- a) Selective admission of students to a programme, so that merit and

aptitude for the chosen technical branch or specialization are given due consideration.

- b) Faculty recruitment and orientation, so that qualified teachers trained in good teaching methods, technical leadership and student's motivation are available.
- c) Instructional/Laboratory facilities and related physical infrastructure, so that they are adequate and are at the contemporary level.
- d) Access to good library resources and Information & Communication Technology (**ICT**) facilities, to develop the student's *mind* effectively.

These requirements make it necessary for the College to introduce improvements like:

- a) Teaching-learning process on modern lines, to provide *Add-On Courses* for *audit/credit* in a number of peripheral areas useful for student's self development.
- b) Life-long learning opportunities for faculty, students and alumni, to facilitate their dynamic interaction with the society, industries and the world of work.
- c) Generous use of ICT and other modern technologies in everyday activities.

23. General

- i. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- ii. The academic regulations should be read as a whole for the purpose of any interpretation.
- iii. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.
- iv. In the case of any discrepancy/ambiguity/doubt arises in the above rules and regulations, the decision of the Principal shall be final.
- v. The College may change or amend any or all of the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students concerned with effect from the dates notified by the College.

24. Academic Regulations for B.Tech. (Lateral Entry Scheme)

(Applicable for students admitted from the academic year 2021-2022)

- 24.1**
- i. A student shall register for all 123 credits and secure 123 credits with CGPA ≥ 5 from II year to IV year B.Tech. Programme (LES) for the award of B.Tech. degree.
 - ii. A student who fails to fulfill the requirement for the award of the degree in six academic years from the year of their admission, shall forfeit their seat in B.Tech. programme and their admission stands cancelled.
 - iii. The same attendance regulations are adopted as that of B.Tech. Four year degree course.

24.2 Promotion Rule

S. No.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	<ul style="list-style-type: none"> iii) Regular course of study of second year second semester. iv) Must have secured at least 21 credits out of 42 credits i.e., 50% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	<ul style="list-style-type: none"> iii) Regular course of study of third year second semester. iv) Must have secured at least 51 credits out of 86 credits i.e., 60% credits upto third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

- 24.3** All the other regulations as applicable to B.Tech. 4 - year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme)

MALPRACTICES RULES DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS		
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.
(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 University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. 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 University 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/Asst. – 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 mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the 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.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the 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.
9.	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.	Student of the colleges 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.

10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Note : Students are advised to read the above regulations thoroughly. Ignorance with regards to the regulations cannot be construed as an excuse.

Frequently asked Questions and Answers about autonomy

1. Who grants Autonomy? UGC, Govt., AICTE or University

In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy.

2. Shall SICET award its own Degrees?

No. Degree will be awarded by Jawaharlal Nehru Technological University, Hyderabad with a mention of the name SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY on the Degree Certificate.

3. What is the difference between a Deemed University and an Autonomy College?

A Deemed University is fully autonomous to the extent of awarding its own Degree. A Deemed University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4. How will the Foreign Universities or other stake – holders know that we are an Autonomous College?

Autonomous status, once declared, shall be accepted by all the stake holders. Foreign Universities and Indian Industries will know our status through our college website.

5. What is the change of Status for Students and Teachers if we become Autonomous?

An autonomous college carries a prestigious image. Autonomy is actually earned out of continued past efforts on academic performances, capability of self-governance and the kind of quality education we offer.

6. Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?

There is a built in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee is a Non – Statutory body, which will keep a watch on the academics and keep its reports and recommendations every year. In addition to Academic Council, the highest academic body also supervises the academic matters. At the end of three years, there is an external inspection by the University for this purpose. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7. Will the students of SICET as an Autonomous College qualify for University Medals and Prizes for academic excellence?

No, SICET has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural and co-curricular organized by the University the students shall qualify.

8. Can SICET have its own Convocation?

No, since the University awards the Degree the Convocation will be that of the University.

9. Can SICET give a provisional degree certificate?

Since the examinations are conducted by SICET and the results are also declared by SICET, the college sends a list of successful candidates with their final percentage of marks to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.

10. Will Academic Autonomy make a positive impact on the Placements or Employability?

Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment, besides the autonomous status is more responsive to the needs of the industry. As a result, there will be a lot of scope for industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

11. What is the proportion of Internal and External Assessment as an Autonomous College?

Presently, it is 30% for internal assessment and 70% for external assessment. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12. Will there be any Revaluation or Re-Examination System?

No. There will not be any Revaluation system or Re-examination. But, there is a personal verification of the answer scripts.

13. How fast Syllabi can be and should be changed?

Autonomy allows us the freedom to change the syllabi as often as we need.

14. Will the Degree be awarded on the basis of only final year performance?

No. The percentage of marks will reflect the average performance of all the semesters put together.

15. Who takes Decisions on Academic matters?

The Academic Council of College is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like the BOS which are like Boards of Studies of the University.

16. What is the role of Examination committee?

The Exam Committee is responsible for the smooth conduct of inter and external examinations. All matters involving the conduct of examinations, spot valuations, tabulations, preparation of Memorandum of Marks etc fall within the duties of the Examination Committee.

17. Is there any mechanism for Grievance Redressal?

Yes, the college has grievance redressal committee, headed by a senior faculty member of the college.

18. How many attempts are permitted for obtaining a Degree?

All such matters are defined in Rules & Regulations.

19. Who declares the result?

The result declaration process is also defined. After tabulation work the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the College Academic Council for its approval. The result is then declared on the college notice boards as well put on the web site of the college. It is eventually sent to the University.

20. What is our relationship with the Jawaharlal Nehru Technological University, Hyderabad?

We remain an affiliated college of the Jawaharlal Nehru Technological University, Hyderabad. The University has the right to nominate its members on the academic bodies of the college.

21. Shall we require University approval if we want to start any New Courses?

Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.

22. Shall we get autonomy for PG and Doctoral Programmes also?

Yes, presently our PG programmes are also enjoying autonomous status.

23. How many exams will be there as an autonomous college?

This is defined in the Rules & Regulations.

24. Is the College adapting Choice Based Credit System (CBCS) or Not ?

Yes, this College has adapted CBCS system with effect from the Academic Year 2016-17.

25. Note : What is Choice Based Credit System (CBCS)?

Choice Based Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

Choice Based Credit System (CBCS)**REGULATIONS – BR20****B. Tech. CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)****I YEAR I SEMESTER****COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20MTH1101	Mathematics – I (Linear Algebra and Calculus)	3	1	0	4
2	R20ECH1101	Chemistry	3	1	0	4
3	R20EEE1101	Basic Electrical Engineering	3	0	0	3
4	R20MED1101	Engineering Workshop	1	0	3	2.5
5	R20HAS1101	English	2	0	0	2
6	R20ECH11L1	Engineering Chemistry Lab	0	0	3	1.5
7	R20HAS11L2	English Language and Communication Skills lab	0	0	2	1
8	R20EEE11L3	Basic Electrical Engineering Lab	0	0	2	1
9	R20HAS1102	Environmental Science	3	0	0	0
10	R20IPG1101	Induction Programme for Three Weeks	0	0	0	0
Total Credits			15	2	10	19

I YEAR II SEMESTER**COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20MTH1201	Mathematics – II (Advanced Calculus)	3	1	0	4
2	R20EAP1201	Applied Physics	3	1	0	4
3	R20CSE1101	Programming for Problem Solving	3	1	0	4
4	R20MED1102	Engineering Graphics	1	1	4	3
5	R20EAP12L1	Applied Physics Lab	0	0	3	1.5
6	R20CSE11L2	Programming for Problem Solving Lab	0	0	3	1.5
7	R20ITK1101	Essence of Indian Traditional Knowledge	3	0	0	0
Total Credits			13	3	10	18

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
 (An Autonomous Institution under UGC, New Delhi)
Choice Based Credit System (CBCS)

REGULATIONS – BR20

B. Tech. CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

II YEAR I SEMESTER

COURSE STRUCTURE

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CSE2201	Discrete Mathematics	3	0	0	3
2	R20CSE2101	Data Structures	3	0	0	3
3	R20MTH2104	Mathematical and Statistical Foundations	3	1	0	4
4	R20CSE2102	Computer Organization & Architecture	3	0	0	3
5	R20CSE2104	Python Programming	2	0	0	2
6	R20MBA2201	Business Economics & Financial Analysis	3	0	0	3
7	R20CSE21L1	Data Structures Lab	0	0	3	1.5
8	R20CSE21L4	Python Programming Lab	0	0	3	1.5
9	R20MAC2100	Gender Sensitization Lab (An Activity-based Course)	0	0	2	0
		Total Credits	17	1	8	21

II YEAR II SEMESTER

COURSE STRUCTURE

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CSE2206	Formal Language & Automata Theory	3	0	0	3
2	R20CSE2207	Software Engineering	3	0	0	3
3	R20CSE2202	Operating Systems	3	0	0	3
4	R20CSE2203	Database Management Systems	3	1	0	4
5	R20CSE2204	Java Programming	3	1	0	4
6	R20CSE22L1	Operating Systems Lab	0	0	3	1.5
7	R20CSE22L2	Database Management Systems Lab	0	0	3	1.5
8	R20CSE22L3	Java Programming Lab	0	0	2	1
9	R20MAC2200	Intellectual Property Rights	3	0	0	0
		Total Credits	18	2	8	21

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Choice Based Credit System (CBCS)**REGULATIONS – BR20****B. Tech. CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)****III YEAR I SEMESTER****COURSE STRUCTURE**

S.No.	Course Code	CourseTitle	L	T	P	Credits
1	R20CSE3203	Design and analysis of Algorithms	3	1	0	4
2	R20CSE4101	Cryptography and Network Security	3	0	0	3
3	R20CSE3122	Artificial Intelligence	3	0	0	3
4	R20CSM3104	Computer Vision and Robotics	3	0	0	3
5	Professional Elective-I		3	1	0	4
	R20ECE3101	Microprocessors and Microcontrollers				
	R20ECE4131	Digital Image Processing				
	R20CSM3101	Compiler Construction				
	R20CSM3102	Data Mining Concepts				
6	Professional Elective-II		3	0	0	3
	R20CSM3103	Multimedia and Spatial Databases				
	R20CSE4142	Information Retrieval Systems				
	R20CSE4153	Software Process & Project Management				
	R20CSE4143	Cloud Computing				
	R20MAC3100	MOOCs-I				
7	R20CSE41L1	Cryptography and Network Security Lab	0	0	2	1
8	R20CSM31L1	Artificial Intelligence Lab	0	0	3	1.5
9	R20CSE31L1	Software Engineering Lab	0	0	3	1.5
		Total Credits	18	2	8	24

III YEAR II SEMESTER**COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CSE3104	Web Technologies	3	0	0	3
2	R20CSM3204	DevOps	3	0	0	3
3	R20CSE3201	Machine Learning	3	1	0	4
4	Professional Elective-III		3	0	0	3
	R20CSM3201	Natural Language Processing				
	R20CSE3231	Software Testing Methodologies				
	R20CSM3202	Data Visualization Techniques				
	R20CSE3233	Mobile Application Development				
	R20MAC3200	MOOCs-II				
5		Open Elective-I	3	0	0	3
6	R20CSE32L1	Machine Learning Lab	0	0	3	1.5
7	R20CSM32L1	Web Technologies Lab	0	0	3	1.5
8	R20HAS31L1	Advanced Communication Skills Lab	0	0	2	1
9	R20COI1101	Constitution of India	3	0	0	0
		Total Credits	18	1	8	20

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Choice Based Credit System (CBCS)**REGULATIONS – BR20****B. Tech. CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)****IV YEAR I SEMESTER****COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CSM4101	Neural Networks & Deep Learning	3	0	0	3
2	R20MED4202	Reinforcement Learning	2	0	0	2
3	Professional Elective - IV		3	0	0	3
	R20CSE4102	Quantum Computing				
	R20CSM4104	Expert Systems				
	R20CSM4105	Conversational AI				
	R20CSM4106	Game Theory				
	R20CSM4102	Mobile Computing				
4	Professional Elective - V		3	0	0	3
	R20CSM4107	Social Network Analysis				
	R20CSM4201	Federated Machine Learning				
	R20CSE4201	Augmented Reality & Virtual Reality				
	R20CSI4101	Web Security				
	R20INF4101	Ad-hoc & Sensor Networks				
5	Open Elective - II		3	0	0	3
6	R20CSM41L1	Deep Learning Lab	0	0	2	1
7	R20CSM41P1	Technical Seminar	0	0	2	1
8	R20CSM41P2	Comprehensive Viva-voce	0	0	6	3
9	R20CSM41P3	Industrial Oriented Mini Project/ Summer Internship	0	0	0	2
		Total Credits	14	0	10	21

IV YEAR II SEMESTER**COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20HMS4201	Organizational Behaviour	3	0	0	3
2	Professional Elective - VI		3	0	0	3
	R20AID4202	Speech and Video Processing				
	R20MED4202	Robotics Process Automation				
	R20CSD4202	Randomized Algorithms				
	R20CSM4202	Cognitive Computing				
	R20CSM4204	Semantic Web				
3	Open Elective - III		3	0	0	3
4	R20CSM42P1	Project Work	0	0	14	7
		Total Credits	9	0	14	16

MC – Satisfactory/Unsatisfactory.

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L	T	P	C
3	1	0	4

(R20MTH1101) Mathematics – I
(Linear Algebra and Calculus)

Course Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Concept of Sequence.
- Concept of nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.

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

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
- Find the Eigen values and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Analyse the nature of sequence and series.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.

UNIT-I: Matrices

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation

UNIT-III: Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: Calculus

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V: Multivariable calculus (Partial Differentiation and applications)

Definitions of Limit and continuity.

Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence, independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCES:

- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
- Engineering Mathematics by M.K.Jain, S.R.K. Iyengar, Narosa Publications

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B.Tech. - I Year – I Semester

L	T	P	C
3	1	0	4

(R20ECH1101) CHEMISTRY

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
- To understand the concepts of Polymers and Lubricants.
- To impart the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

Course Outcomes: The basic concepts included in this course will help the student to gain:

- The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
- The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
- The knowledge of Polymers and Lubricants.
- The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.

Unit - I:

Molecular structure and Theories of Bonding: Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N₂ and O₂ molecules and their Magnetic properties.

Metallic Bonding, Valency Bond Theory(VBT), Crystal Field Theory (CFT): Salient features of CFT – Crystal Field splitting of transition metal ion d-orbitals in tetrahedral, octahedral and square planar geometries.

Unit - II:

Water and its treatment: Introduction – hardness of water – causes of hardness - types of hardness: temporary and permanent – expression and units of hardness, Numerical problems.

Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler troubles-scales & sludges, priming and foaming, caustic embrittlement, boiler feed water-internal treatment – (Calgon conditioning, Phosphate conditioning and Colloidal conditioning).

External treatment of water – ion exchange process. Desalination of water – Reverse osmosis.

Unit - III:

Electrochemistry and corrosion: Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation and its applications. Electrochemical series and its applications. Numerical problems.

Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery). Fuel cells – Hydrogen – Oxygen fuel cell, methanol – oxygen fuel cell – construction, working, advantages and applications of fuel cells.

Corrosion : Causes and effects of corrosion – theories of chemical and electrochemical corrosion –

mechanism of electrochemical corrosion, types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion – nature of metal & nature of environment. Corrosion control methods- Cathodic protection - Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings - hot dipping, (galvanizing, tinning), electroplating (copper Plating), Electroless Plating (copper plating)

Unit - IV:

Stereochemistry, Reaction Mechanism and synthesis of drug molecules: Introduction to representation of 3-dimensional structures, Classification of Isomers - structural and stereoisomers. Enantiomers, diastereomers, measurement of optical activity, absolute configuration. conformational analysis of n- butane.

Types of Organic Reactions (Addition, Substitution and Elimination Reactions).

Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N1 , S_N2 reactions.

Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule Grignard additions on carbonyl compounds. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid.

Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$.

Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Unit - V:

Polymers : Definitions, Classification, properties of polymers – crystallinity, melting Point, boiling Point, glass Transition Temperature. Preparation, properties, engineering applications of: PVC, Teflon, Nylon & Bakelite.

Lubricants: classification, characteristics of a good Lubricant, mechanism of lubrication (thick film, thin film & extreme pressure lubrication) and properties of lubricants: flash and fire point, cloud and pour point, mechanical stability of lubricants.

Suggested Text Books:

1. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2018.
2. Engineering Chemistry, by Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana Reddy, Subhendu Chakroborty, Cengage Learning India Pvt. Ltd., 2018.
3. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
4. University Chemistry, by B.M. Mahan, Pearson IV Edition.
5. Text Book of Organic Chemistry by Bahl & Bahl.
6. Text Book of Stereo Chemistry by Kalsi.

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B.Tech. - I Year – I Semester

L	T	P	C
3	0	0	3

(R20EEE1101) BASIC ELECTRICAL ENGINEERING

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To impart the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations

UNIT-I: D.C. Circuits

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

UNIT-II: A.C. Circuits

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

Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: Transformers

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

UNIT-IV: Electrical Machines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque- slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT-V: Electrical Installations

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

Suggested Text-Books/Reference-Books:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
5. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.

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B.Tech. - I Year – I Semester

L	T	P	C
1	0	3	2.5

(R20MED1101) ENGINEERING WORKSHOP**Pre-requisites:** Practical skill**Course Objectives:**

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

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

- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

Syllabus :

- **Introduction to Carpentry :** Types Wood, Sizes of Wood or Timber, Characteristics of Wood, Types of Marking and Measuring Tools, Holding Tools, Cutting Tools, Planing Tools, Types of Chisels and their specifications, Drilling and Boring Tools and their Sketches, Wood Working Lathe and its parts, Drilling Machine and its parts, Types of saws, Sawing Machines such as Jigsaw, Bandsaw, Scrollsaw etc., Care and Maintenance of Tools.
- **Introduction to Fitting :** Holding Tools, Marking and Measuring Tools, Cutting Tools, Taps and Tap Wrenches, Dies and Die Holders, Bench Drilling Machine with Sketch and Specifications, Types of Files, File Card, Types of Hammers, Spanners, Screwdrivers, Fitting operations, Forms of Materials, Care and Maintenance of Tools
- **Introduction of Tin-Smithy :** Sheet Materials, Hand Tools, Hammers, Stakes, Sheet Metal Joints, Revets and Screws, Soldering and Brazing.
- **Introduction to Foundry :** Casting and its components such as Molding sands and their types, Properties, Types patterns, Pattern making materials, Tools used for the Molding, Melting Furnaces such as Cupola, Pot Furnace, Crucible Furnace
- **Introduction to Welding :** Various Welding processes such as Arc Welding, Gas Welding, Resistance Welding, Thermit Welding, Friction Welding, Elementary Symbols of the Welding, Transformers, Motor Generators, Rectifiers, Welding cables, Electrodes and their types, Electrode Holders, Techniques of Welding, Gas Welding their Types
- **Introduction to House-wiring :** Types of the Tools using House-wiring, Types of House-wiring System, Fuses, Circuit Breakers, Switches, Sockets and Common House-wiring Methods, Various Symbol for Electrical Items.

- **Introduction to Black Smithy :** Tools and equipment used in the Black Smithy, Forging Temperatures of metals.
- Introduction to the Plumbing, Machine Shop, Metal Cutting of CNC Machines, Power Tools.

1. TRADES FOR EXERCISES:

- I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit & Drilling and tapping)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
- V. Welding Practice – (Arc Welding & Gas Welding)
- VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)
- VIII. Simple Turning, Step Turning on wood and Metal by using wood working Lathe and CNC Lathe.

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.
3. Workshop practice by Raghu Vamshi.

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech
- Workshop Manual / Venkat Reddy/ BSP

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L	T	P	C
2	0	0	2

(R20HAS1101) ENGLISH

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

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

Learning Objectives: The course will help to

- a. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- b. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- c. Develop study skills and communication skills in formal and informal situations.

Course Outcomes: Students should be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

SYLLABUS

UNIT –I

‘The Raman Effect’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures - Use of Phrases and Clauses in Sentences-Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT –II

‘Ancient Architecture in India’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

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

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III

‘Blue Jeans’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

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

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places, Process and Events

Classifying- Providing Examples or Evidence

UNIT –IV

‘What Should You Be Eating’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V

‘How a Chinese Billionaire Built Her Fortune’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary : Technical Vocabulary and their usage

Grammar : Common Errors in English

Reading : Reading Comprehension-Exercises for Practice

Writing : Technical Reports- Introduction – Characteristics of a Report – Categories of Reports
Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Prescribed Textbook:

1.Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

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B.Tech. - I Year – I Semester

L	T	P	C
0	0	3	1.5

(R20ECH11L1) ENGINEERING CHEMISTRY LAB

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- The measurement of physical properties like Surface Tension and viscosity.
- The Measurement of conductance and EMF.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness and chloride content in water.
- Determination of physical properties like adsorption and viscosity.
- Measurement of conductance and EMF.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Conductometric titration of strong acid Vs strong base (HCl Vs NaOH)
4. Conductometric titration of Weak acid Vs strong base (CH₃COOH Vs NaOH)
5. Titration of strong acid Vs strong base by potentiometry (HCl Vs NaOH)
6. Estimation of Fe²⁺ by Potentiometry using K₂Cr₂O₇ / KMnO₄.
7. Synthesis of Aspirin.
8. Synthesis of Paracetamol.
9. Determination of viscosity of lubricants by using Ostwald's viscometer.
10. Determination of surface tension of a given liquid by using stalagmometer.

References

1. Vogel's text book of practical chemistry 5th edition
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)

(An Autonomous Institution under UGC, New Delhi)**B.Tech. - I Year – I Semester**

L	T	P	C
0	0	2	1

(R20HAS11L2) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

- ✎ To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- ✎ To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
- ✎ To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- ✎ To improve the fluency of students in spoken English and neutralize their mother tongue influence
- ✎ To train students to use language appropriately for public speaking and interviews

Learning Outcomes: Students will be able to attain

- 👍 Better understanding of nuances of English language through audio- visual experience and group activities
- 👍 Neutralization of accent for intelligibility
- 👍 Speaking skills with clarity and confidence which in turn enhances their employability skills

Syllabus

English Language and Communication Skills Lab (ELCS) shall have two parts:

- a. Computer Assisted Language Learning (CALL) Lab**
- b. Interactive Communication Skills (ICS) Lab**

Listening Skills**Objectives**

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills**Objectives**

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
 - Oral practice: Just A Minute (JAM) Sessions
 - Describing objects/situations/people
 - Role play – Individual/Group activities

➤ **The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the Lab)**

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers to Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.

Practice: Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

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

System Requirement (Hardware component):

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

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

B.Tech. - I Year – I Semester

L	T	P	C
0	0	2	1

(R20EEE11L3) BASIC ELECTRICAL ENGINEERING LAB

Course Objectives:

- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:

- Get an exposure to basic electrical laws.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations:

1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator

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B.Tech. - I Year – I Semester

L	T	P	C
3	0	0	0

(R20HAS1102) ENVIRONMENTAL SCIENCE

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. **EIA:** EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.

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B.Tech. - I Year – II Semester

L	T	P	C
3	1	0	4

(R20MTH1201) MATHEMATICS – II

(Advanced Calculus)

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

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

- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelopiped
- Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: First Order ODE

Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II: Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous; terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$ and $xV(x)$; Method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped).

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

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

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCES:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

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L	T	P	C
3	1	0	4

(R20EAP1201) APPLIED PHYSICS

Course Objectives:

- Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Fiber optics and lasers, Semiconductor physics and Electromagnetic theory and a broad base of knowledge in physics.
- The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
- To study applications in engineering like memory devices, transformer core and electromagnetic machinery.

Course Outcomes: Upon graduation:

- a. The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state.
- b. The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.
- c. Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
- d. The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.

UNIT-I: Quantum Mechanics

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT-II: Semiconductor Physics

Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.

UNIT-III: Optoelectronics

Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT-IV: Lasers and Fibre Optics

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO₂) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

UNIT-V: Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarisation, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectrics. Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

TEXT BOOKS:

- i. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learning.
- ii. Halliday and Resnick, Physics - Wiley.
- iii. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

REFERENCES:

- a) Richard Robinett, Quantum Mechanics
- b) J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
- c) Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

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B.Tech. - I Year – II Semester

L	T	P	C
3	1	0	4

(R20CSE1101) PROGRAMMING FOR PROBLEM SOLVING

Course Objectives:

- a) To learn the fundamentals of computers.
- b) To understand the various steps in program development.
- c) To learn the syntax and semantics of C programming language.
- d) To learn the usage of structured programming approach in solving problems.

Course Outcomes: The student will learn

- a) To write algorithms and to draw flowcharts for solving problems.
- b) To convert the algorithms/flowcharts to C programs.
- c) To code and test a given logic in C programming language.
- d) To decompose a problem into functions and to develop modular reusable code.
- e) To use arrays, pointers, strings and structures to write C programs.
- f) Searching and sorting problems.

Unit - 1: Introduction to Algorithms and Programming, Arrays

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming Algorithms for finding roots of quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations.

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays

Unit - II: Strings, Structures and Functions:

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of Pointers: Idea of pointers,

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Unit - III: Pointers and Dynamic Memory Allocation:

Command line arguments

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions

Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

Unit - IV: Preprocessor and File handling in C:

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef

Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Unit - V: Searching and Sorting:

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

TEXT BOOKS:

- a) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- b) B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

- a) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
- b) R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
- c) Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
- d) Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
- e) E. Balaguruswamy, Programming in ANSI C, Tata McGraw - Hill

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B.Tech. - I Year – II Semester

L	T	P	C
1	0	4	3

(R20MED1102) ENGINEERING GRAPHICS

Course objectives:

- a) To provide basic concepts in engineering drawing.
- b) To impart knowledge about standard principles of orthographic projection of objects.
- c) To draw sectional views and pictorial views of solids.

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

- a) Preparing working drawings to communicate the ideas and information.
- b) Read, understand and interpret engineering drawings.

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, and Involute, Scales – Plain, Diagonal & Vernier.

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT – IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder
Introduction to the perspective views, their types & Perspective views of simple objects

UNIT – V

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions.

Introduction to CAD:

Introduction to AUTOCAD Software Package Commands.- Draw and Modified Commands Creation of 2D Sketches & 3D Sketches by CAD Package.

TEXTBOOKS:

- a) Engineering Drawing N.D. Bhatt / Charotar
- b) Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

- 1. Engineering Drawing / Basant Agrawal and McGraw/ McGraw Hill
- 2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
- 3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

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B.Tech. - I Year – II Semester

L	T	P	C
0	0	3	1.5

(R20EAP12L1) APPLIED PHYSICS LAB

List of Experiments:

1. VI Characteristics of PN junction diode:
2. Solar Cell:
To study the V-I Characteristics of solar cell.
3. Light emitting diode:
Plot V-I and P-I characteristics of light emitting diode.
4. Hall effect:
To determine Hall co-efficient of a given semiconductor.
5. Photoelectric effect:
To determine work function of a given material.
6. LASER:
To study the characteristics of LASER sources.
7. Optical fibre:
To determine the bending losses of Optical fibres.
8. BH Curve
To study the Phenomena of Magnetic Hysteresis loop

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L	T	P	C
0	0	3	1.5

(R20CSE11L2) PROGRAMMING FOR PROBLEM SOLVING LAB*[Note: The programs may be executed using any available Open Source/ Freely available IDE**Some of the Tools available are:**CodeLite: <https://codelite.org/>**Code::Blocks: <http://www.codeblocks.org/>**DevCpp : <http://www.bloodshed.net/devcpp.html>**Eclipse: <http://www.eclipse.org>**This list is not exhaustive and is NOT in any order of preference]***Course Objectives:** The students will learn the following:

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

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

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

Practice sessions:

- Write a simple program that prints the results of all the operators available in C (including pre/post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
- Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

Simple numeric problems:

- Write a program to find the max and min from the three numbers.
- Write the program for the simple, compound interest.
- Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
- Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

$$\begin{array}{l} 5 \times 1 = 5 \\ 5 \times 2 = 10 \\ 5 \times 3 = 15 \end{array}$$
- Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

- a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut + \frac{1}{2}at^2$ where u and a are the initial velocity in m/sec ($= 0$) and acceleration in m/sec^2 ($= 9.8 \text{ m/s}^2$)).
- b. 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)
- c. Write a program that finds if a given number is a prime number
- d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
- e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- f. Write a C program to generate all the prime numbers between 1 and n , where n is a value supplied by the user.
- g. Write a C program to find the roots of a Quadratic equation.
- h. Write a C program to calculate the following, where x is a fractional value. $1 - x/2 + x^2/4 - x^3/6$
- i. Write a C program to read in two numbers, x and n , and then compute the sum of this geometric progression: $1 + x + x^2 + x^3 + \dots + x^n$. For example: if n is 3 and x is 5, then the program computes $1 + 5 + 25 + 125$.

Arrays and Pointers and Functions:

- a. Write a C program to find the minimum, maximum and average in an array of integers.
- b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
- c. Write a C program that uses functions to perform the following:
 - i. Addition of Two Matrices
 - ii. Multiplication of Two Matrices
 - iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
- d. Write C programs that use both recursive and non-recursive functions
 - i. To find the factorial of a given integer.
 - ii. To find the GCD (greatest common divisor) of two given integers.
 - iii. To find x^n
- e. Write a program for reading elements using pointer into array and display the values using array.
- f. Write a program for display values reverse order from array using pointer.
- g. Write a program through pointer variable to sum of n elements from array.

Files:

- a. Write a C program to display the contents of a file to standard output device.
- b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
- c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
- d. Write a C program that does the following:

It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using `atoi` function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use `fseek` function)

The program should then read all 10 values and print them back.

- e. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Strings:

- a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
- b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
- c. Write a C program that uses functions to perform the following operations:
 - i. To insert a sub-string in to a given main string from a given position.
 - ii. To delete n Characters from a given position in a given string.
- d. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
- e. Write a C program that displays the position of a character ch in the string S or -1 if S doesn't contain ch.
- f. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

- a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
- b. Write a C program to construct a pyramid of numbers as follows:

1	*	1	1	*
1 2	* *	2 3	2 2	* *
1 2 3	* * *	4 5 6	3 3 3	* * *
			4 4 4 4	* *
				*

Sorting and Searching:

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

Suggested Reference Books for solving the problems:

- i. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- ii. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
- iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
- iv. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
- v. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
- vi. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

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B.Tech. - II Year – I Semester

L	T	P	C
3	0	0	3

(R20CSE2201) Discrete Mathematics

Prerequisites: An understanding of Mathematics in general is sufficient.

Course Objectives

- Introduces the elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes:

- Ability to understand and construct precise mathematical proofs
- Ability to use logic and set theory to formulate precise statements
- Ability to analyze and solve counting problems on finite and discrete structures
- Ability to describe and manipulate sequences
- Ability to apply graph theory in solving computing problems

UNIT - I

The Foundations: Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT - II

Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT - III

Algorithms, Induction and Recursion Algorithms, The Growth of Functions, Complexity of Algorithms Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness

UNIT - IV

Discrete Probability and Advanced Counting Techniques: An Introduction to Discrete Probability, Probability Theory, Bayes' Theorem, Expected Value and Variance

Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion- Exclusion, Applications of Inclusion-Exclusion

UNIT - V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees

TEXT BOOK:

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory- Kenneth H Rosen, 7th Edition, TMH.

REFERENCES BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblay and R. Manohar, TMH,
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Theodore P. Baker, 2nd ed, Pearson Education.
3. Discrete Mathematics- Richard Johnsonbaugh, 7thEdn., Pearson Education.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition, Pearson Education.

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L	T	P	C
3	0	0	3

(R20CSE2101) Data Structures

Prerequisites: A course on “Programming for Problem Solving”.

Course Objectives:

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

Course Outcomes:

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT - I

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

UNIT - II

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT - III

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT - IV

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning.

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B.Tech. - II Year – I Semester

L	T	P	C
3	1	0	4

(R20MTH2104) Mathematical and Statistical Foundations

Prerequisites: Mathematics courses of first year of study.

Course Objectives:

- The Number Theory basic concepts useful for cryptography etc
- The theory of Probability, and probability distributions of single random variables
- The sampling theory and testing of hypothesis and making inferences
- Stochastic process and Markov chains.

Course Outcomes: After learning the contents of this course, the student must be able to

- Apply the number theory concepts to cryptography domain
- Apply the concepts of probability and distributions to some case studies
- Correlate the material of one unit to the material in other units
- Resolve the potential misconceptions and hazards in each topic of study.

UNIT - I

Greatest Common Divisors and Prime Factorization: Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers

Congruences: Introduction to congruences, Linear congruences, The Chinese remainder theorem, Systems of linear congruences

UNIT - II

Simple Linear Regression and Correlation: Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model, Properties of the Least Squares Estimators, Inferences Concerning the Regression Coefficients, Prediction, Simple Linear Regression Case Study Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT - III

Continuous Probability Distributions: Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial

Fundamental Sampling Distributions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S^2 , t-Distribution, F- Distribution.

UNIT - IV

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation. Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean , Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

UNIT - V

Stochastic Processes and Markov Chains: Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, nstep transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS:

1. Kenneth H. Rosen, Elementary number theory & its applications, sixth edition, Addison- Wesley, ISBN 978 0-321-50031-1
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
3. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications
4. T.T. Soong, Fundamentals of Probability And Statistics For Engineers, John Wiley & Sons Ltd, 2004.

REFERENCE BOOK:

1. Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.

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B.Tech. - II Year – I Semester

L	T	P	C
3	0	0	3

(R20CSE2102) Computer Organization & Architecture

Co-requisite: A Course on “Digital Logic Design and Microprocessors”.

Course Objectives:

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
- It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
- Topics include computer arithmetic, instruction set design, microprogrammed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

Course Outcomes:

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

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT - II

Microprogrammed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT - III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT - IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

UNIT - V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

TEXT BOOK:

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS:

1. Computer Organization – Car Hamacher, Zvonks Vranesic, Safea Zaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

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B.Tech. - II Year – I Semester

L	T	P	C
2	0	0	2

(R20CSE2104) Python Programming

Prerequisites: A course on “Programming for Problem Solving using C”.

Course Objectives:

- Learn Syntax and Semantics and create Functions in Python.
- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Implement Object Oriented Programming concepts in Python.
- Build Web Services and introduction to Network and Database Programming in Python.

Course Outcomes:

- Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate proficiency in handling Strings and File Systems.
- Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

UNIT - I

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT - II

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management,

*Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT - III

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python

Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT - IV

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

WEB Programming: Introduction, Web Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application

Advanced CGI, Web (HTTP) Servers

UNIT - V

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules

TEXT BOOK:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
4. Learning Python, Mark Lutz, O'Really

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B.Tech. - II Year – I Semester

L	T	P	C
3	0	0	3

(R20MBA2201) Business Economics & Financial Analysis

Objectives:

To enable the student to understand and appreciate, with a particular insight, the importance of certain basic issues governing the business operations namely; demand and supply, production function, cost analysis, markets, forms of business organizations, capital budgeting and financial accounting and financial analysis.

Unit I

Introduction & Demand Analysis: Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

Unit II

Production & Cost Analysis: Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)- Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit III

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.

Unit IV

Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

Unit V

Introduction to Financial Accounting & Financial Analysis: Accounting concepts and Conventions - Introduction IFRS - Double - Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Tracing Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart.

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013.
3. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2012.
4. Domnick Salvatore: Managerial Economics In a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting - A Managerial Perspective, Pearson, 2012.
6. S.N. Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Shailaja & Usha: MEFA, University Press, 2012.
10. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
11. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
12. J.V. Prabhakar Rao & P.V. Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

Outcomes:

At the end of the course, the student will

- Understand the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures.
- Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
- Develop an understanding of
- Analyse how capital budgeting decisions are carried out.
- Understanding the framework for both manual and computerised accounting process
- Know how to analyse and interpret the financial statements through ratio analysis.

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B.Tech. - II Year – I Semester

L	T	P	C
0	0	3	1.5

(R20CSE21L1) Data Structures Lab

Prerequisites: A Course on “Programming for problem solving”.

Course Objectives:

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

Course Outcomes:

- Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
i) Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
i) Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
i) Bubble sort ii) Selection sort iii) Insertion sort
7. Write a program that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:
i) Linear search ii) Binary search
8. Write a program to implement the tree traversal methods.
9. Write a program to implement the graph traversal methods.

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, *PHI/ Pearson Education*.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, *Cengage Learning*.

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B.Tech. - II Year – I Semester

L	T	P	C
0	0	3	1.5

(R20CSE21L4) Python Programming Lab

Prerequisites: A course on “Programming for Problem Solving”.

Course Objectives

- To be able to introduce core programming basics and program design with functions using Python programming language.
- To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
- To understand the high-performance programs designed to strengthen the practical expertise.

Course Outcome

- Student should be able to understand the basic concepts scripting and the contributions of scripting language
- Ability to explore python especially the object oriented concepts, and the built in objects of Python.
- Ability to create practical and contemporary applications such as TCP/IP network programming, Web applications, discrete event simulations

List of Experiments:

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a python script to print the current date in the following format “SunMay2902:26:23IST2017”
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula : $c/5=f-32/9$]
10. Write a Python program to construct the following pattern,using a nestedforloop

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

11.
 - a) Write a Python script that prints prime numbers less than 20.
 - b) Write a python program to find factorial of a number using Recursion.
12.
 - a) Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).
 - b) Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
13.
 - a) Write a python program to define a module and import a specific function in that module to another program.
 - b) Write a script named copy file.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
14.
 - a) Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
 - b) Write a Python class to convert an integer to a roman numeral.
15.
 - a) Write a Python class to implement $\text{pow}(x, n)$
 - b) Write a Python class to reverse a string word by word.
16. Write a python program to implement Digital Clock using python Tkinter
17. Write a python program Simple calculator by using Tkinter
18. Write a python program to generate a registration form.
19. Create a database using database programming in Python.
20. Write a python program to insert data into database.
21. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation).
22. Exploring Pygame tool.
23. Developing a game activity using Pygame like bouncing ball, car race etc.

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B.Tech. - II Year – I Semester

L	T	P	C
0	0	2	0

(R20MAC2100) Gender Sensitization Lab
(An Activity-based Course)

Course Objectives:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT – I UNDERSTANDING GENDER:

Gender: Why Should We Study It? (Towards a World of Equals: Unit -1) Socialization: Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT – II GENDER AND BIOLOGY Missing Women:

Sex Selection and Its Consequences (Towards a World of Equals: Unit-4) Declining Sex Ratio. Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many? Struggles with Discrimination.

UNIT – III GENDER AND LABOUR Housework:

The Invisible Labour (Towards a World of Equals: Unit -3) “My Mother doesn’t Work.” “Share the Load.” Women’s Work: Its Politics and Economics (Towards a World of Equals: Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT – IV ISSUES OF VIOLENCE Sexual Harassment:

Say No! (Towards a World of Equals: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: “Chupulu”. Domestic Violence: Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice. Thinking about Sexual Violence (Towards a World of Equals: Unit -11) Blaming the Victim-“I Fought for my Life....” – Additional Reading: The Caste Face of Violence.

UNIT – V GENDER : CO – EXISTENCE Just Relationships:

Being Together as Equals (Towards a World of Equals: Unit -12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

Prescribed Textbook : All the five Units in the Textbook, “Towards a World of Equals: A Bilingual Textbook on Gender” written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

Note: Since it is an Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

REFERENCE BOOKS:

- Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
- Abdulali Sohaila. “I Fought For My Life...and Won.” Available online at: <http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/>

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B.Tech. - II Year – II Semester

L	T	P	C
3	0	0	3

(R20CSE2206) Formal Language & Automata Theory

Course Objectives:

- To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- Classify machines by their power to recognize languages.
- Employ finite state machines to solve problems in computing.
- To understand deterministic and non-deterministic machines.
- To understand the differences between decidability and undecidability.

Course Outcomes:

- Able to understand the concept of abstract machines and their power to recognize the languages.
- Able to employ finite state machines for modeling and solving computing problems.
- Able to design context free grammars for formal languages.
- Able to distinguish between decidability and undecidability.
- Able to gain proficiency with mathematical tools and formal methods.

UNIT - I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.

Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with ϵ -transitions to NFA without ϵ -transitions. Conversion of NFA to DFA, Moore and Melay machines

UNIT - II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Pumping Lemma for Regular Languages, Statement of the pumping lemma, Applications of the Pumping Lemma.

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT - III

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tree, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages. Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

UNIT - IV

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating ϵ -Productions. Chomsky Normal form Greibach Normal form.

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications

Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine

UNIT - V

Types of Turing machine: Turing machines and halting

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3rd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekar, 2nd edition, PHI.

REFERENCE BOOKS:

1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

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B.Tech. - II Year – II Semester

L	T	P	C
3	0	0	3

(R20CSE2207) Software Engineering

Course Objectives

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

Course Outcomes

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

UNIT - I

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

A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models.

Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT - II

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

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

System models: Context models, behavioral models, data models, object models, structured methods.

UNIT - III

Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV

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

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT - V

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

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

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

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B.Tech. - II Year – II Semester

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(R20CSE2202) Operating Systems

Prerequisites:

- A course on “Computer Programming and Data Structures”.
- A course on “Computer Organization and Architecture”.

Course Objectives:

- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes:

- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computer and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

UNIT - I

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

UNIT - II

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.
System call interface for process management-fork, exit, wait, waitpid, exec

UNIT - III

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock
Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors
Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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B.Tech. - II Year – II Semester

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(R20CSE2203) Database Management Systems

Prerequisites

1. A course on “Data Structures”.

Course Objectives

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

Course Outcomes:

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

UNIT - I

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

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT - II

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

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and

EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT - IV

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log-Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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B.Tech. - II Year – II Semester

L	T	P	C
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(R20CSE2204) Java Programming

Course Objectives:

- To introduce the object-oriented programming concepts.
- To understand object-oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce database connectivity
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes:

- Able to solve real world problems using OOP techniques.
- Able to understand the use of abstract classes.
- Able to solve problems using java collection framework and I/o classes.
- Able to develop multithreaded applications with synchronization
- Able to develop Database Connection oriented applications
- Able to develop applets for web applications.
- Able to design GUI based applications

UNIT - I

Object-Oriented Thinking- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

UNIT - II

Packages- Defining a Package, CLASSPATH, Access protection, importing packages.

Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Stream based I/O (java.io)– The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

Database Connectivity.

UNIT - III

Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT - IV

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hashtable, Properties, Stack, Vector

More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

UNIT - V

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, The Swing Buttons- JButton, JToggleButton, JCheckBox, JRadioButton, JTabbedPane, JScrollPane, JList, JComboBox, Swing Menus, Dialogs.

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

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B.Tech. - II Year – II Semester

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(R20CSE22L1) Operating Systems Lab

Course Objectives:

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

Course Outcomes:

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

List of Experiments:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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B.Tech. - II Year – II Semester

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(R20CSE22L2) Database Management Systems Lab

Co-requisites:

- Database Management Systems.

Objectives:

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes:

- Design database schema for a given application and apply normalization.
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers.

List of Experiments:

Roadway Travels

"Roadway Travels" is in business since 1997 with several buses connecting different places in India. Its main office is located in Hyderabad.

The company wants to computerize its operations in the following areas:

- Reservation and Ticketing
- Cancellations

Reservation & Cancellation:

Reservations are directly handled by booking office. Reservations can be made 30 days in advance and tickets issued to passenger. One Passenger/person can book many tickets (to his/her family).

Cancellations are also directly handed at the booking office.

In the process of computerization of Roadway Travels you have to design and develop a Database which consists the data of Buses, Passengers, Tickets, and Reservation and cancellation details. You should also develop query's using SQL to retrieve the data from database.

The above process involves many steps like

1. Analyzing the problem and identifying the Entities and Relationships,
2. E-R Model
3. Relational Model
4. Normalization
5. Creating the database

6. Querying. Students are supposed to work on these steps week wise and finally create a complete "Database System" to Roadway Travels. Examples are given at every experiment for guidance to students.

Example: Entities:

1. BUS
2. Ticket
3. Passenger

Relationships:

1. Reservation
2. Cancellation

PRIMARYKEYATTRIBUTES:

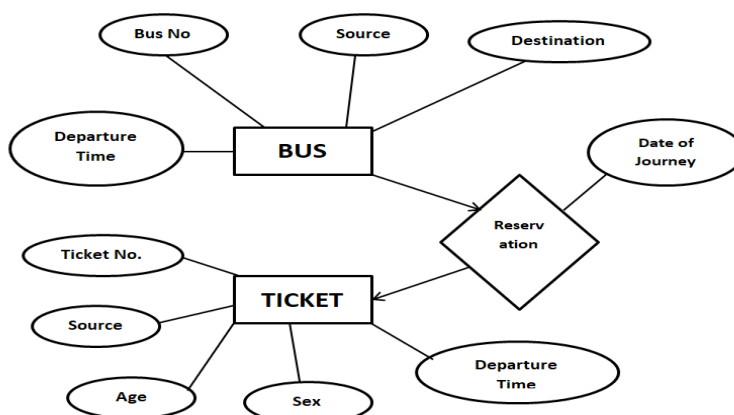
1. TicketID (Ticket Entity)
2. PassportID (Passenger Entity)
3. Bus_No (BusEntity)

Experiment 1: Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total/partial). Try to incorporate

generalization, aggregation, specialization etc. wherever required.

Example: E-R diagram for bus

**Experiment 2: Relational Model**

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the requirement. Different types of attributes (Composite, Multi-valued and, and Derived) have different way of representation.

Example: The passenger tables look as below. This is an example. You can add more attributes based on E-R model. This is not a normalized table.

Passenger

Name	Age	Sex	Address	Ticket_id	PassportID

Note: The student is required to submit a document by Represent relationships in a tabular form

Experiment 3: Normalization

Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies. For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the data within the table is updated, leading to a loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure effects the basic assumptions for when multiple instances of the same information should be represented by a single instance only.

For the above table in the First normalization we can remove the multiple valued attribute Ticket_id and place it in another table along with the primary key of passenger.

Name	Age	Sex	Address	PassportID

PassportID	Ticket_id

You can do the second and third normal forms if required. Anyhow Normalized tables are given at the end.

Experiment 4: Practicing DDL commands

In this week you will learn Creating databases, How to create tables, altering the database, dropping tables and databases if not required. You will also try truncate, rename commands etc.

Example for creation of a normalized "Passenger" table.

```
CREATE TABLE Passenger(  
    Passport_id  
    INTEGERPRIMARYKEY, Name  
    VARCHAR(50)NOTNULL,  
    Age INTEGER  
    NOTNULL, Sex  
    CHAR,  
    Address VARCHAR(50)NOT NULL  
);
```

Similarly create all other tables.

Experiment 5: Practicing DML commands

DML commands are used for managing data within schema objects. Some examples:

- SELECT-retrieve data from the database
- INSERT-insert data in to a table
- UPDATE-updates existing data within a table
- DELETE-deletes all records from a table, the space for the records remain

Insert values into "Bus" table:

```
insert into Bus values (1234, 'hyderabad', 'tirupathi');insert into Bus values(2345, 'hyderabad',  
'banglore');insert into Bus values(23, 'hyderabad','kolkata');insert into Bus values(45,  
'tirupathi','bangalore');
```

insert values into "Passenger" table:

```
Insert into Passenger values (1,45,'ramesh',45,'M','abc123');  
insert into Passenger values(2, 78, 'geetha', 36, 'F', 'abc124');  
insert into Passenger values(45, 90,'ram', 30,'M', 'abc12');  
insert into Passenger values(67,89,'ravi',50,'M','abc14');
```

Few more Examples of DML commands:

SELECT*FROM Bus; (selects all the attributes and displays)

UPDATE Bus SET Bus_No=1WHEREBus_No= 2;

Experiment 6: Querying (using ANY, ALL, IN, EXISTS, NOTEXIST, UNION, INTERSECT, Constraints etc.

In this week you are going to practice queries (along with sub queries) using ANY, ALL, IN, EXISTS, NOTEXIST, UNION, INTERSECT, Constraints etc.

Practice the following Queries:

1. Display unique PNR_No of all passengers.
2. Display all the names of male passengers.
3. Display the ticket numbers and names of all the passengers.
4. Find the ticket numbers of the passengers whose name start with 'r' and ends with 'h'.
5. Findthenamesofpassengerswhoseageisbetween30 and 45.
6. Display all the passengers names beginning with 'A'
7. Display the sorted list of passenger's names

Experiment 7: Querying using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.

You are going to practice queries using Aggregate functions GROUPBY, HAVING and Creation and dropping of VIEWS.

1. Write a Query to display the information present in the Passenger and cancellation tables.
Hint: Use UNION Operator.
2. Display the number of days in a week onwhichthe9W01busisavailable.
3. FindnumberofticketsbookedforeachPNR_NousingGROUPBYCLAUSE.Hint:UseGROUP BYonPNR_No.
4. Find the distinct PNR numbers that are present.
5. Find the number of tickets booked by a passenger where the number of seats is greater than 1. Hint: Use GROUPBY, WHERE and HAVING CLAUSES.
6. Find the total number of cancelled sets.

Experiment 8: Triggers (Creation of insert trigger, delete trigger, update trigger)

In this week you are going to work on Triggers. Creation of insert trigger, delete trigger, update trigger. Practice triggers using the above database.

E.g.

CREATE TRIGGER update check BEFORE UPDATE ON passenger FOR EACH ROWBEGIN

```
IF New.TicketNO>60THEN
  SET New.TicketNO =
TicketNo; ELSE
  SET New.TicketNo
= 0;
END IF;
```

END

Experiment 9: Procedures

In this session you are going to learn Creation of stored procedure, Execution of procedure and modification of procedure. Practice procedures using the database.

E.g:

```
CREATE PROCEDURE
myproc() BEGIN
  SELECT
    COUNT(Tickets) FROM Ticket
  WHERE age >= 40;
END;
```

Experiment 10: Usage of Cursors

In this week you need to do the following: Declare a cursor that defines a result set.

Open the cursor to establish the result set. Fetch the data into local variables as needed from the cursor, one row at a time. Close the cursor when done

```
CREATE PROCEDURE
myproc(in_customer_id INT) BEGIN
  DECLARE v_id INT;
  DECLARE v_name VARCHAR(30);
  DECLARE c1 CURSOR FOR
  SELECT stdid, stdFirstname FROM students WHERE stdid=in_customer_id;
  OPEN c1;
  FETCH c1 INTO v_id, v_name;
  WHILE v_id IS NOT NULL
  DO
    -- Process the data
    FETCH c1 INTO v_id, v_name;
  END WHILE;
  CLOSE c1;
END;
```

Tables:

BUS
BusNo: VARCHAR(10) : PK
(primarykey) Source: VARCHAR(10)
Destination: VARCHAR(50)

Passenger

PPNO: VARCHAR(15) : PK
Name: VARCHAR(50)
Age: INT(4)
Sex: CHAR(1) : Male/Female
Address: VARCHAR(100)
Passenger_Tickets
PPNO: VARCHAR(15): PK
Ticket_No: NUMERIC(9)

Reservation

PNR_No: NUMERIC(9) : FK
Journey_date: DATETIME(8)
No_of_seats: INT(4)
Address: VARCHAR(100)
Contact_No: NUMERIC(9)-->Should not less than 9 and Should not accept any other character other than interger
STATUS: CHAR(2): Yes/No

Cancellation

PNR_No: NUMERIC(9):FK

Journey_date:

DATETIME(8)

No_of_seats : INT(8)

Address:

VARCHRA(50)

Contact_No:NUMERIC(9)-->Should not less than 9 and Should not accept any other character other than interger

STATUS:CHAR(2):Yes/No

Ticket

Ticket_No:

NUMERIC(9) : FK

Journey_date:

DATETIME(8) Age:

INT(4)

Sex:CHAR(10):Male/Female

Source:VARCHAR

Destination: VARCHAR

Dep_time:VARCHAR

REFERENCES BOOKS:

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

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B.Tech. - II Year – II Semester

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(R20CSE22L3) Java Programming Lab

Course Objectives:

- To write programs using abstract classes.
- To write programs for solving real world problems using java collection frame work.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands on experience with java programming.

Course Outcomes:

- Able to write programs for solving real world problems using java collection frame work.
- Able to write programs using abstract classes.
- Able to write multithreaded programs.
- Able to write GUI programs using swing controls in Java.

Note:

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

List of Experiments:

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

5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
6. Write a Java program for the following:
 - Create a doubly linked list of elements.
 - Delete a given element from the above list.
 - Display the contents of the list after deletion.
7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in selected color. Initially, there is no message shown.
8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.
10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
12. Write a Java program that correctly implements the producer – consumer problem using the concept of interthread communication.
13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.
14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order
15. Write a Java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.

REFERENCE BOOKS

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition *Pearson* education.
2. Thinking in Java, Bruce Eckel, *Pearson* Education.
3. Java Programming, D. S. Malik and P. S. Nair, *Cengage* Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, *Pearson*.

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B.Tech. - II Year – II Semester

L	T	P	C
3	0	0	0

(R20MAC2200) Intellectual Property Rights

UNIT – I: Introduction to Intellectual property:

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II: Trade Marks:

Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III: Law of copy rights :

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV: Trade Secrets:

Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V: New development of intellectual property:

New developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOKS & REFERENCES:

- Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
- Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tate McGraw Hill Publishing company ltd.,

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B.Tech. - III Year – I Semester

L	T	P	C
3	1	0	4

(R20CSE3203) Design and Analysis of Algorithms

Objectives:

- To analyze performance of algorithms.
- To choose the appropriate data structure and algorithm design method for a specified application.
- To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
- To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
- Prerequisites (Subjects) Data structures, Mathematical foundations of computer science.

UNIT I:

Introduction: Algorithm, Psuedo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis.

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

UNIT II:

Searching and Traversal Techniques: Efficient non - recursive binary tree traversal algorithm, Disjoint set operations, union and find algorithms, Spanning trees, Graph traversals - Breadth first search and Depth first search, AND / OR graphs, game trees, Connected Components, Bi - connected components.

UNIT III:

Greedy Method: General method, applications - Job sequencing with dead lines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT IV:

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

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

UNIT V:

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

TEXT BOOKS :

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahn and Rajasekharam, Galgotia publications pvt. Ltd.
2. Foundations of Algorithm, 4th edition, R. Neapolitan and K. Naimipour, Jones and Bartlett Learning.
3. Design and Analysis of Algorithms, P. H. Dave, H. B. Dave, Pearson Education, 2008.

REFERENCES :

1. Computer Algorithms, Introduction to Design and Analysis, 3rd Edition, Sara Baase, Allen, Van, Gelder, Pearson Education.
2. Algorithm Design: Foundations, Analysis and Internet examples, M. T. Goodrich and R. Tomassia, John Wiley and sons.
3. Fundamentals of Sequential and Parallel Algorithm, K. A. Berman and J. L. Paul, Cengage Learning.
4. Introduction to the Design and Analysis of Algorithms, A. Levitin, Pearson Education.
5. Introduction to Algorithms, 3rd Edition, T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd.
6. Design and Analysis of algorithm, Aho, Ullman and Hopcroft, Pearson Education, 2004.

Outcomes:

- ☐ Be able to analyze algorithms and improve the efficiency of algorithms.
- ☐ Apply different designing methods for development of algorithms to realistic problems, such as divide and conquer, greedy and etc.
- ☐ Ability to understand and estimate the performance of algorithm.

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B.Tech. - III Year – I Semester

L	T	P	C
3	0	0	3

(R20CSE4101) Cryptography and Network Security**Course Objectives:**

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
- Discuss Web security and Firewalls

Course Outcomes:

- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

UNIT – I: Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security
Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT – II: Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4. **Asymmetric key Ciphers:** Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT – III: Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme. **Key Management and Distribution:** Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT – IV: Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH) **Wireless Network Security:** Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT – V: E-Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange **Case Studies on Cryptography and security:** Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross siteScripting Vulnerability.

TEXT BOOKS:

- Cryptography and Network Security – Principles and Practice: William Stallings, Pearson Education, 6th Edition
- Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:

- Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
- Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
- Information Security, Principles, and Practice: Mark Stamp, Wiley India.
- Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
- Introduction to Network Security: Neal Krawetz, CENGAGE Learning
- Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

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B.Tech. - III Year – I Semester

L	T	P	C
3	0	0	3

(R20CSE3122) Artificial Intelligence**Objectives:**

- To learn the difference between optimal reasoning vs human like reasoning
- To understand the notions of state space representation, exhaustive search, heuristic search alongwith the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI: namely Game Playing, Theorem proving, Expert Systems, Machine Learning and Natural Language Processing

UNIT – I

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

Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning.

UNIT – II

Login Concepts and Logic Programming: Introduction, Propositional Calculus Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositions Logic, Predicate Logic, Login Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network Extended Semantic Networks for KR, Knowledge Representation using frames.

UNIT – III

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert, Application of Expert Systems, List of Sheets and Tools.

Uncertainty Measure – Probability Theory: Introduction, Probability Theory Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory

UNIT – IV

Machine Learning Paradigms: Introduction, Machine Learning Systems, Supervised and Unsupervised Learning Inductive Learning, Learning Decision Trees (Text Book 2) Deductive Learning Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed – Forward Networks, Multi-Layer Feed – Forward Networks Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

UNIT – V

Advanced knowledge Representation Techniques: Case Grammars Semantic Web.

Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking knowledge.

TEXT BOOKS:

1. Saroj Koushik, Artificial Intelligence, Cengage Learning, 2011.
2. Russell, Novig, Artificial Intelligence, A Modern Approach, Pearson Education, Second Edition, 2004.

REFERENCE BOOK:

1) Rich Knight, Nair, Artificial Intelligence, Tata McGraw Hill, Third Edition, 2009

Outcomes:

- Possess the ability to formulate an efficient problem space for a problem expressed in English.
- Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique.
- Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning and Natural Language Processing.

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B.Tech. - III Year – I Semester

L	T	P	C
3	0	0	3

(R20CSM3104) Computer Vision and Robotics

Course Objectives : To make the students to understand

- The fundamentals of Computer Graphics and Image Processing
- The concepts related edge detection, segmentation, morphology and image compression methods.

Course Outcomes

- understanding of digital image processing fundamentals: hardware and software, digitization, enhancement and restoration, encoding, segmentation, feature detection
- ability to apply image processing techniques in both the spatial and frequency (Fourier) domains
- Ability To understand (i.e., be able to describe, analyse and reason about) how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation
- **Narrate the kinematics of Robots and device Path planning methods for navigation.**

UNIT I: Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems DDA line algorithms: Bresenham's line and circle derivations and algorithms.

2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, Composite Transformations- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm.

UNIT II: Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy.

Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection.

UNIT III: Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning, Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

UNIT IV: SEGMENTATION: Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation.

UNIT V: ROBOT LOCOMOTION: Introduction To Robotics – robot locomotion – legged mobile robots – wheeled mobile robots– aerial mobile robots.

MOBILE ROBOT KINEMATICS: Kinematic models and constraints – mobile robot maneuverability – mobile robot workspace – advanced kinematics – motion control.

ROBOT PERCEPTION: Sensors for mobile robots – computer vision for robots – image processing for robotics – place recognition – range data.

Text Books

- Computer Graphics C Version, Donald Hearn, M Paulli Baker, Pearson (Unit I and Unit II)
- Image Processing, Analysis and Machine Vision, Millan Sonka, Václav Hlavac, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V and Unit VI)

References

- Computer & Machine Vision, Theory , Algorithms , Practicles, E R Davies, Elsevier, 4ed
- Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier
- Digital Image Processing, R C Gonzalez &R E woods, Addison Pearson, 3ed.

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B.Tech. - III Year – I Semester

L	T	P	C
3	1	0	4

Professional Elective - I
(R20ECE3101) Microprocessors & Microcontrollers

Course Objective:

The course objectives are:

- To develop an in-depth understanding of the operation of microprocessors and microcontrollers.
- To write Micro Controller Programming and to design interfacing techniques.

UNIT -I:

Introduction to 8085 Architecture-Functional diagram

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086- Common Function Signals, Timing diagrams, Interrupts of 8086.

UNIT -II:

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, Simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String Manipulations.

UNIT -III:

I/O Interface: 8255 PPI, Various Modes of Operation and Interfacing to 8086, Interfacing Keyboard, Display, D/A and A/D Converter.

Interfacing with advanced devices: Memory Interfacing to 8086, Interrupt Structure of 8086, Vector Interrupt Table, Interrupt Service Routine.

Communication Interface: Serial Communication Standards, Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.

UNIT -IV:

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs

UNIT -V:

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

TEXT BOOKS:

1. D. V. Hall, Microprocessors and Interfacing, TMGH, 2nd Edition 2006.
2. Kenneth. J. Ayala, The 8051 Microcontroller , 3rd Ed., Cengage Learning.

REFERENCE BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH, 2nd Edition 2006.
2. The 8051Microcontrollers, Architecture and Programming and Applications -K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - Liu and GA Gibson, PHI, 2nd Ed.

4. Microcontrollers and Application - Ajay. V. Deshmukh, TMGH, 2005.
5. The 8085 Microprocessor: Architecture, programming and Interfacing – K.Uday Kumar, B.S.Umashankar, 2008, Pearson
6. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

Course Outcomes:

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

C312.1 Describe the internal details of microprocessors 8086

C312.2 Interpret the various types of instruction sets of microprocessor 8086 to write programs.

C312.3 Analyze and apply different interfacing techniques to interface I/O devices with microprocessor 8086.

C312.4 Describe the internal details of microcontroller 8051

C312.5 Interpret the various types of instruction sets of microcontroller 8051 to write programs.

C312.6 Analyze and Understands the internal architecture of ARM processors

Course Articulation Matrix:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C312.1	3	2	3	2	-	-	-	-	-	-	-	-	3	2	-
C312.2	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
C312.3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
C312.4	3	2	3	3	-	-	-	-	-	-	-	-	3	3	-
C312.5	3	3	3	3	2	-	-	-	-	-	-	-	3	3	-
C312.6	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
C312	3	2.6	3	2.6	2.6	-	-	-	-	-	-	-	3	2.8	-

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L	T	P	C
3	1	0	4

Professional Elective - I
(R20ECE4131) Digital Image Processing

Course Objectives:

The objectives of the course are to:

- Provide the student with the fundamentals of digital image processing.
- Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.
- Introduce the students to some advanced topics in digital image processing.
- Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

UNIT -I:

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels,

Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT -II:

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood Operation, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Obtaining Frequency Domain Filters from Spatial Filters, Generating Filters Directly in the Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT -III:

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT -IV:

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, Thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or Miss Transformation.

UNIT -V:

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS:

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010.

REFERENCE BOOKS:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools - Scotte Umbaugh, 2nd Ed, CRC Press, 2011
2. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
3. Fundamentals of Digital Image Processing – A.K.Jain , PHI, 1989
4. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.
5. Introductory Computer Vision Imaging Techniques and Solutions- Adrian low, 2008, 2nd Edition
6. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC Press, 2010.
7. Digital Image Processing with MATLAB & Labview – Vipula Singh, Elsevier.

Course Outcomes:

Upon successfully completing the course, the student should:

- C413.1: Define basics of images and analyze the various advanced image transforms and Properties. (K3-Apply).
- C413.2: Discuss different techniques employed for the enhancement (spatial and frequency domain) and restoration of images. (K2-Understanding).
- C413.3: Determine degradation model and calculate various restoration techniques. (K3-Apply).
- C413.4: Analyze the concepts of segmentation and various basic morphological operations in image processing. (K4-Analyse).
- C413.5: Describe the various compression techniques and explain redundancies and their removal methods. (K2-understanding).
- C413.6: Evaluate various compression coding techniques and compare JPEG standards. (K5-Evaluate)

Course Articulation Matrix:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C413.1	3	2	-	-	-	1	-	-	-	-	-	2	3	-	-
C413.2	3	3	-	-	-	1	-	-	-	-	-	2	3	2	-
C413.3	3	3	2	-	-	2	-	-	-	-	-	2	3	-	-
C413.4	3	2	2	-	-	2	-	-	-	-	-	2	3	2	-
C413.5	3	3	2	-	-	-	-	-	-	-	-	3	3	2	-
C413.6	3	2	2	-	-	2	-	-	-	-	-	3	3	3	-
C413	3	2.5	2	-	-	1.6	-	-	-	-	-	2.5	3	2.2	-

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(R20CSM3101) Compiler Construction

UNIT – I Undecidability

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Rice theorem for Recursive and Recursively enumerable languages – Post's Correspondence Problem.

UNIT – II Recent Trends & Applications

Matrix grammar – Programmed grammar – Random context grammar – Regular Control grammar – Lindenmayer systems – A glance on DNA computing and Membrane computing.

UNIT – III

Semantic analysis : Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker.

Symbol Tables : Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information. Block structures and non block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

UNIT – IV

Code optimization : Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

Data flow analysis : Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

UNIT – V

Object code generation : Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

TEXT BOOKS :

1. Principles of compiler design -A.V. Aho . J.D.Ullman; Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.
3. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D.Ullman, "Compilers : Principles, Techniques and Tools", Second Edition, Pearson Education, 2008.

REFERENCES :

1. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Caryl T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.
4. Compiler Construction, Loudon, Thomson.

Outcomes:

- Ability to understand the the design of a compiler given features of the languages.
- Ability to implement practical aspects of automata theory.
- Gain Knowledge of powerful compiler generation tools.

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L	T	P	C
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Professional Elective-I
(R20CSM3102) Data Mining Concepts

UNIT – I Introduction: Fundamentals of Data Mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT – II Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model. Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining

Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

UNIT – III Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

UNIT – IV Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule- Based Classification, Classification by Backpropagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

Cluster Analysis Introduction: Types of Data in Cluster Analysis,, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

UNIT – V Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multirelational Data Mining.

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web. Data Mining Applications, Data Mining System Products and Research Prototypes

Text Books:

1. Data Mining — Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, Elsevier. 2nd Edition, 2006.
2. Introduction to Data Mining — Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

References:

1. Data Mining Techniques --Arun K Pujari,2nd edition, Universities Press.
2. Data Warehousing in the Real World — Sam Anahory & Dennis Murray Pearson Edo Asia.
3. Insight into Data Mining,K.P.Soman,S.Diwakar,VAjay,PHI,2008.
4. Data Warehousing Fundamentals — Paulraj Ponnaiah Wiley student Edition
5. The Data Warehouse Life cycle Tool kit — Ralph Kimball Wiley student edition
6. Building the Data Warehouse By William H Inmon, John Wiley & Sons Inc, 2005.
7. Data Mining Introductory and advanced topics —Margaret H Dunham, Pearson education
8. Data Mining,V.Pudi and P.Radha Krishna,Oxford University Press.
9. Data Mining: Methods and Techniques, A.B.M Shawkat AR and S. A.Wasimi, Cengage Learning.
10. Data Ware house 2.0,The Architecture for the next generation of Data Warehousing W.H. Inmon, D. Strauss, G.Neushloss, Elsevier, Distribution by SPD.

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Professional Elective-II (R20CSM3103) Multimedia and Spatial Databases

Unit – I

Introduction : An introduction to Object-oriented Databases; Multidimensional Data Structures: k-d Trees, Point Quadrees, The MX-Quadtree, R-Trees, comparison of Different Data Structures

Image Databases : Raw Images, Compressed Image Representations, Image Processing: Segmentation, Similarity-Based Retrieval, Alternative Image DB Paradigms, Representing Image DBs with Relations, Representing Image DBs with R-Trees, Retrieving Images By Spatial Layout, Implementations

Unit – II

Text/Document Databases : Precision and Recall, Stop Lists, Word Stems, and Frequency Tables, Latent Semantic Indexing, TV-Trees, Other Retrieval Techniques

Video Databases : Organizing Content of a Single Video, Querying Content of Video Libraries, Video Segmentation, video Standards

Audio Databases : A General Model of Audio Data, Capturing Audio Content through Discrete Transformation, Indexing Audio Data

Unit – III

Multimedia Databases : Design and Architecture of a Multimedia Database, Organizing Multimedia Data Based on The Principle of Uniformity, Media Abstractions, Query Languages for Retrieving Multimedia Data, Indexing SMDs with Enhanced Inverted Indices, Query Relaxation/Expansion

Unit – IV

Creating Distributed Multimedia Presentations : Objects in Multimedia Presentations, Specifying Multimedia Documents with Temporal Constraints, Efficient Solution of Temporal Presentation Constraints, Spatial Constraints.

Unit – V

Spatial Concepts and Data Models: Models of spatial information, Design extending the ER model with spatial concepts, Extending the ER model pictograms, Object oriented data model with UML.

Spatial Query Languages: Extending the SQL for spatial data, Examples of queries that emphasize spatial data, Object relational schema examples queries.

Text Books

1. Principles of Multimedia Database Systems, V.S. Subrahmanian, Elsevier(Morgan Kaufman).
2. Spatial Databases, Shashi Shekhar, Sanjiv Chawla, Pearson Education.

REFERENCE BOOKS:

1. Multimedia Databases: An object relational approach, Lynne Dunckley, Pearson Education.
2. Multimedia Database Systems, Prabhakaram, Springer.

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Professional Elective –II (R20CSE4142) Information Retrieval Systems

Objectives :

- To learn the different models for information storage and retrieval To learn about the various retrieval utilities.
- To understand indexing and querying in information retrieval systems.
- To expose the students to the notions of structured and semi structured data. To learn about web search.

UNIT-I

Introduction:

Retrieval Strategies : Vector space model, Probabilistic retrieval strategies simple term weights, Nonbinary independence model Language Models.

UNIT-II

Retrieval Utilities : Relevance feedback, Clustering, N-grams, Regression analysis, Thesauri.

UNIT-III

Retrieval Utilities : Semantic networks, Parsing Cross-language Information Retrieval: Introduction, Crossing the language barrier.

UNIT-IV

Efficiency: Inverted index, Query processing, Signature files, Duplicate document detection.

UNIT-V

Integrating Structured Data and Text: A Historical progression, Information retrieval as a relational application, Semi-structured search using a relational schema.

Distributed information Retrieval: A Theoretical model of distributed retrieval Web search.

TEXTBOOK:

1. David A. Grossman, Ophir Frieder, Information Retrieval – Algorithm and Heuristics, Springer, 2nd Edition (Distributed by Universities Press)

REFERENCES BOOKS :

- 1) Gerald J. Kowalski, Mark T Maybury. Information Storage and Retrieval Systems, Springer, 2000
- 2) Soumen Chakrabarti, Mining the Web: Discovering Knowledge from Hypertext Data, Morgan - Kaufmann Publications, 2002
- 3) Christopher D. Manning, Prabhakar Raghavan, Hinrich Schotze, an Introduction to Information Retrieval, Cambridge University Press, Cambridge, England, 2009.

Outcomes:

- Possess the ability to store and retrieve textual documents using appropriate models.
- Possess the ability to use the various retrieval utilities for improving search
- Possess an understanding of indexing and compressing documents to improve space and time efficiency.
- Possess the skill to formulate SQL like queries for unstructured data Understand issues in web search.

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Professional Elective-II
(R20CSE4153) Software Process & Project Management

Objectives:

1. Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Compare and differentiate organization structures and project structures.
3. Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

UNIT I : Software Process Maturity : Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

Process Reference Models : Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP.

UNIT II : Software Project Management Renaissance : Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

Life-Cycle Phases and Process artifacts : Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.

UNIT III: Workflows and Checkpoints of process : Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments.

Process Planning : Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT IV: Project Organizations : Line-of- business organizations, project organizations, evolution of organizations, process automation.

Project Control and process instrumentation : The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, and metrics automation.

UNIT V: CCPDS-R Case Study and Future Software Project Management Practices : Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOKS:

4. Managing the Software Process, *Watts S. Humphrey*, Pearson Education.
5. Software Project Management, *Walker Royce*, Pearson Education.

REFERENCE BOOKS:

1. Effective Project Management: Traditional, Agile, Extreme, Robert Wysocki, Sixth edition, Wiley India, rp2011.
2. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
3. Process Improvement essentials, James R. Persse, O'Reilly, 2006
4. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
6. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
7. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
8. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
9. The Art of Project Management, Scott Berkun, SPD, O'Reilly, 2011.
10. Applied Software Project Management, Andrew Stellman & Jennifer Greene, SPD, O'Reilly, rp2011.
11. Agile Project Management, Jim Highsmith, Pearson education, 2004.

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Professional Elective –II
(R20CSE4143) Cloud Computing

Objectives

- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.

UNIT – I

Systems Modeling, Clustering and Virtualization: Distributed System Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.

UNIT – II

Foundations: Introduction to Cloud Computing, Migrating into a Cloud, Enriching the ‘Integration as a Service’ Paradigm for the Cloud Era, The Enterprise Cloud Computing Paradigm.

UNIT – III

Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS / SAAS): Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service, Secure Distributed Data Storage in Cloud Computing.

Aneka, Comet Cloud, T-Systems’, Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments.

UNIT – IV

Monitoring, Management and Applications: An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWS cloud, Building Content Delivery networks using Clouds, Resource Cloud Mashups.

UNIT – V

Governance and Case Studies: Organizational Readiness and Change management in the Cloud age, Data Security in the Cloud, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services.

TEXT BOOKS

- 1) Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
- 2) Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, Elsevier, 2012.

REFERENCE BOOKS

- 1) Cloud Computing : A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill, rp2011.
- 2) Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
- 3) Cloud Computing: Implementation, Management and Security, John W. Rittinghouse, James F.Ransome, CRC Press, rp2012.
- 4) Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O’Reilly, SPD, rp2011.
- 5) Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather,Subra Kumaraswamy, Shahed Latif, O’Reilly, SPD, rp2011.

Outcomes

Ability to understand the virtualization and cloud computing concepts.

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Professional Elective-II (R20MAC3100) MOOCs - I					

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(R20CSE41L1) Cryptography and Network Security Lab

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.
8. Write a Java program to implement RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

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(R20CSM31L1) Artificial Intelligence Lab

Course Objectives

- To provide skills for designing and analyzing AI based algorithms.
- To enable students to work on various AI tools.
- To provide skills to work towards solution of real life problems

List of Experiments

1. Installation and working on various AI tools viz. Python, R tool, GATE, NLTK, MATLAB, etc.
2. Data preprocessing and annotation and creation of datasets.
3. Learn existing datasets and Treebanks
4. Implementation of searching techniques in AI.
5. Implementation of Knowledge representation schemes.
6. Natural language processing tool development.
7. Application of Machine learning algorithms.
8. Application of Classification and clustering problem.
9. Working on parallel algorithms.
10. Scientific distributions used in python for Data Science -Numpy, scify, pandas, scikitlearn, statmodels, nltk.

Course Outcomes

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

1. Elicit, analyze and specify software requirements.
2. Simulate given problem scenario and analyze its performance.
3. Develop programming solutions for given problem scenario.

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(R20CSE31L1) Software Engineering Lab**Course Objectives:**

- To understand the software engineering methodologies involved in the phases for project development.
- To gain knowledge about open source tools used for implementing software engineering methods.
- To exercise developing product-startups implementing software engineering methods.
- Open source Tools: StarUML / UMLGraph / Topcased

Prepare the following documents and develop the software project startup, prototype model, using software engineering methodology for at least two real time scenarios or for the sample experiments.

- Problem Analysis and Project Planning -Thorough study of the problem – Identify Project scope, Objectives and Infrastructure.
- Software Requirement Analysis – Describe the individual Phases/modules of the project and Identify deliverables. Identify functional and non-functional requirements.
- Data Modeling – Use work products – data dictionary.
- Software Designing – Develop use case diagrams and activity diagrams, build and test class diagrams, sequence diagrams and add interface to class diagrams.
- Prototype model – Develop the prototype of the product.
- The SRS and prototype model should be submitted for end semester examination.

List of Sample Experiments:

Course management system (CMS)

A course management system (CMS) is a collection of software tools providing an online environment for course interactions. A CMS typically includes a variety of online tools and environments, such as:

1. An area for faculty posting of class materials such as course syllabus and handouts
2. An area for student posting of papers and other assignments
3. A grade book where faculty can record grades and each student can view his or her grades
4. An integrated email tool allowing participants to send announcement email messages to the entire class or to a subset of the entire class
5. A chat tool allowing synchronous communication among class participants
6. A threaded discussion board allowing asynchronous communication among participants

In addition, a CMS is typically integrated with other databases in the university so that students enrolled in a particular course are automatically registered in the CMS as participants in that course.

The Course Management System (CMS) is a web application for department personnel, Academic Senate, and Registrar staff to view, enter, and manage course information formerly submitted via paper. Departments can use CMS to create new course proposals, submit changes for existing courses, and track the progress of proposals as they move through the stages of online approval.

Easy Leave

This project is aimed at developing a web based Leave Management Tool, which is of importance to either an organization or a college.

The Easy Leave is an Intranet based application that can be accessed throughout the organization or a specified group/Dept. This system can be used to automate the workflow of leave applications and their approvals. The periodic crediting of leave is also automated. There are features like notifications, cancellation of leave, automatic approval of leave, report generators etc in this Tool.

Functional components of the project:

There are registered people in the system. Some are approvers. An approver can also be a requestor. In an organization, the hierarchy could be Engineers/Managers/Business Managers/Managing Director etc. In a college, it could be Lecturer/Professor/Head of the Department/Dean/Principal etc.

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(R20CSE3104) Web Technologies**Objectives:**

- To introduce PHP language for server side scripting
- To introduce XML and processing of XML Data with Java
- To Introduce Server Side Programming with Java Servlets and JSP
- To Introduce Client side scripting with Javascript and AJAX

UNIT – I

Introduction to PHP : Declaring Variables, data types, arrays, string operators, expressions, control structures, functions, Reading data from web from controls like text boxes, radio buttons, ,lists etc., Handling File Uploads, Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

UNIT - II

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemas, Document Object Model, XHTML **Parsing XML Data** – DOM and SAX in java.

UNIT – III

Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

UNIT – IV

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, Implicit objects, Using Beans in JSP pages, Using Cookies and Session for Session tracking, connecting to database in JSP.

UNIT – V

Client side Scripting : Introduction to Javascript: Javascript Language – declaring variables, scope of variables, functions, evnt handlers (onclick, onsubmit etc.), Document Object Model, Form Validation. Simple AJAX application.

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd Edition, Wiley Dreamtech.
2. Java Server Pages – Hans Bergsten, SPD O'Reilly
3. Java Script, D. Flanagan, O'Reilly, SPD
4. Beginning Web Programming- Jon Duckett WROX.
5. Programming world wide web, R.W. Sebesta, Fourth Edition, Pearson
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson

Outcomes:

- Gain knowledge of client side scripting, validation of forms and AJAX programming.
- Have understanding of server side scripting with PHP language.
- Have understanding of what is XML and how to parse and use XML Data with Java To introduce Server side programming with Java Servlets and JSP.

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(R20CSM3204) DevOps

Course Objectives

1. To enable learners realize various aspects of DevOps Ecosystem.
2. To enable students appreciate the agile led development environment.
3. To give the students a perspective to grasp the need for Minimum viable product led development using Sprints.
4. To enable students acquire fundamental knowledge of CI/CD and CAMS
5. Student should be able to apply devops engineering practices and principles to solve real world use cases

Course Outcomes: At the end of this course student should be able to :

- Explain traditional software development methodologies like waterfall.
- Apply the Agile Methodology and comparing various other software development models with agile.
- Explain implementing Continuous Integration and Continuous Delivery.
- Explain CAMS for DevOps (Culture, Automation, Measurement and Sharing).
- Create quick MVP prototypes for modules and functionalities.
- Automate the process of software building for real life use cases.

Unit I: TRADITIONAL SOFTWARE DEVELOPMENT The Advent of Software Engineering, Waterfall method, Developers vs IT Operations conflict

Unit II: RISE OF AGILE METHODOLOGIES Agile movement in 2000, Agile Vs Waterfall Method, Iterative Agile Software Development, Individual and team interactions over processes and tools, Working software over comprehensive documentation, Customer collaboration over contract negotiation, Responding to change over following a plan

Unit III : DEFINITION OF DEVOPS Introduction to DevOps, DevOps and Agile

PURPOSE OF DEVOPS Minimum Viable Product, Application Deployment, Continuous Integration, Continuous Delivery

CAMS (CULTURE, AUTOMATION, MEASUREMENT AND SHARING) CAMS – Culture, CAMS – Automation, CAMS – Measurement, CAMS – Sharing, Test-Driven Development, Configuration Management, Infrastructure Automation, Root Cause Analysis, Blamelessness, Organizational Learning.

UNIT IV Documentation And Reporting Using the Site Life Cycle, Advanced Site Configuration, Generating Unit Test Reports, Generating Code Coverage Reports.

UNIT V

Real World Applications Of Devops , Devops Practical Examples, Case Studies

Text Books

1. Dev Ops – Volume 1 , Pearson and Xebia Press
2. The DevOps Handbook - by John Willis, Patrick Debois, Jez Humble, Gene Kim
3. DevOps: A Software Architect's Perspective - by Len Bass, Ingo Weber, Liming Zhu

Reference Books

1. The DevOps Handbook - Book by Gene Kim, Jez Humble, Patrick Debois, and Willis Willis
2. What is DevOps? - by Mike Loukides

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(R20CSE3201) Machine Learning**Course Objectives:**

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.
- To be able to read current research papers and understands the issues raised by current research.

UNIT - I

Introduction - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

UNIT - II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm Computational learning theory – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning - Instance-Based Learning- Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT - IV

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

UNIT - V

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators, Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

TEXT BOOKS:

2. Machine Learning – Tom M. Mitchell, - MGH
3. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

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Professional Elective –III (R20CSM3201) Natural Language Processing

Course Outcomes

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
3. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Able to design, implement, and analyze NLP algorithms
5. Able to design different language modeling Techniques

Unit-1 Finding the Structure of Words

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

Unit-2 Syntax Analysis

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

Unit-3 Semantic Parsing

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

Unit-4 Predicate-Argument Structure : Predicate-Argument Structure, Meaning Representation Systems, Software

Unit-5 Discourse Processing

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

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Professional Elective –III (R20CSE3231) Software Testing Methodologies

Objectives:

To understand the software testing methodologies such as flow graphs and path testing, transaction flows testing, data flow testing domain testing and logic based testing.

UNIT I :

Introduction : Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs

Flow graphs and Path testing : Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT II :

Transaction Flow Testing : Transaction flows, transaction flow testing techniques.

Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT III:

Domain Testing: Domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT IV :

Paths, Path products and Regular expressions : Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing : Overview, decision tables, path expressions, kv charts, specifications.

UNIT V :

State, State Graphs and Transition testing : State graphs, good & bad state graphs, state testing, Testability tips.

Graph Matrices and Application : Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools (student should be given an exposure to a tool like JMeter or Win-runner).

TEXT BOOKS :

1. Software Testing techniques - Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

REFERENCES :

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd Edition, P.C. Jorgensen, Aurbach Publication (Dist by SPO)
3. Software Testing, n. Chauhan, Oxford University Press.
4. Introduction to Software Testing, P. Ammann & J. Offutt, Cambridge Univ. Press.
5. Effective methods of Software Testing, Perry, John Wiley 3rd Edition, 1999.
6. Software Testing Concepts and Tools, P. Nageswara Rao, dreamtech Press
7. Software Testing, M.G. Limye, TMH.
8. Software Testing, S. Desikan, G. Reamesh, Pearson
9. Foundations of Software Testing, D. Graham & Others, Cengage Learning.
10. Foundations of Software Testing, A.P. Madhur, Pearson.

Outcomes:

- Ability to apply the process of testing and various methodologies in testing for developed software.
- Ability to write test cases for given software to test it before delivery to the customer.

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B.Tech. - III Year – II Semester

L	T	P	C
3	0	0	3

Professional Elective –III (R20CSM3202) Data Visualization Techniques

OBJECTIVES:

- To understand how accurately represent voluminous complex data set in web and from other data sources
- To understand the methodologies used to visualize large data sets
- To understand the process involved in data visualization and security aspects involved in data visualization

UNIT-I INTRODUCTION

Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors – Purpose, visualization function and tone, visualization design options – Data representation, Data Presentation, Seven stages of data visualization, widgets, data visualization tools.

UNIT-II VISUALIZING DATA METHODS

Mapping - Time series - Connections and correlations - Scatterplot maps - Trees, Hierarchies and Recursion - Networks and Graphs, Info graphics

UNIT-III VISUALIZING DATA PROCESS

Acquiring data, - Where to Find Data, Tools for Acquiring Data from the Internet, Locating Files for Use with Processing, Loading Text Data, Dealing with Files and Folders, Listing Files in a Folder, Asynchronous Image Downloads, Advanced Web Techniques, Using a Database, Dealing with a Large Number of Files. Parsing data - Levels of Effort, Tools for Gathering Clues, Text Is Best, Text Markup Languages, Regular Expressions (regexps), Grammars and BNF Notation, Compressed Data, Vectors and Geometry, Binary Data Formats, Advanced Detective Work

UNIT-IV INTERACTIVE DATA VISUALIZATION

Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts – Geomapping – Exporting, Framework – T3, .js, tablo.

UNIT-V SECURITY DATA VISUALIZATION

Port scan visualization - Vulnerability assessment and exploitation - Firewall log visualization - Intrusion detection log visualization -Attacking and defending visualization systems - Creating security visualization system.

REFERENCES:

1. Scott Murray, “Interactive data visualization for the web”, O’Reilly Media, Inc., 2013.
2. Ben Fry, “Visualizing Data”, O’Reilly Media, Inc., 2007.
3. Greg Conti, “Security Data Visualization: Graphical Techniques for Network Analysis”, No Starch Press Inc, 2007

OUTCOMES:

Upon completion of the course, the students will be able to

1. Design and use various methodologies present in data visualization
2. Discuss the process involved and security issues present in data visualization

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Professional Elective –III
(R20CSE3233) Mobile Application Development

Mobile application development is the process by which application software is developed for low-power handheld devices, such as personal digital assistants, enterprise digital assistants or mobile phones. These applications can be pre-installed on phones during manufacture, downloaded by customers from various mobile software distribution platforms, or delivered as web applications using server-side or client-side processing (e.g. JavaScript) to provide an “application-like” experience within a Web browser. Application software developers also have to consider a lengthy array of screen sizes, hardware specifications and configurations because of intense competition in mobile software and changes within each of the platforms.

Objectives:

On completion of this course the students should be able to:

1. Design, implement and evaluate a User Interface for a mobile application using J2ME.
2. Create a small but realistic working mobile application for small computing devices.
3. Categorise the challenges posed by developing mobile applications and be able to propose and evaluate and select appropriate solutions.

UNIT- I

J2ME Overview : Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices

Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants

UNIT- II

J2ME Architecture and Development Environment: J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit

J2ME Best Practices and Patterns: The Reality of Working in a J2ME World, Best Practices

UNIT- III

Commands, Items, and Event Processing: J2ME User Interfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling

High-Level Display: Screens: Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class

Low-Level Display: Canvas: The Canvas, User Interactions, Graphics, Clipping Regions, Animation

UNIT- IV

Record Management System: Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener

JDBC Objects: The Concept of JDBC, JDBC Driver Types, JDBC Packages, Overview of the JDBC Process, Database Connection, statement Objects, Result set, Transaction Processing, Metadata, Data Types, Exceptions.

JDBC and Embedded SQL: Model Programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Metadata, Updating Tables, Deleting Data from a Table, Joining Tables, Calculating Data, Grouping and Ordering Data, Subqueries, VIEWS

UNIT- V

Generic Connection Framework: The Connection, Hypertext Transfer Protocol, Communication Management Using HTTP Commands, Session Management, Transmit as a Background Process

TEXT BOOKS:

1. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.
2. Programming for Mobile and Remote Computers, G.T.Thampi, dreamtech press.

REFERENCE BOOKS:

1. Enterprise J2ME: Developing Mobile Java Applications – Michael Juntao Yuan, Pearson Education, 2004
2. Beginning Java ME Platform, Ray Rischpater, Apress, 2009
3. Beginning J2ME: From Novice to Professional, Third Edition, Sing Li, Jonathan B. Knudsen, Apress, 2005
4. Kicking Butt with MIDP and MSA: Creating Great Mobile Applications, 1st edition, J. Knudsen, Pearson.

Outcomes:

- Ability to evaluate and select appropriate solutions to the mobile computing platform.
- Ability to develop the user interface.
- Ability design a simple mobile phone game.

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Professional Elective -III
(R20MAC3200) MOOCs - II

LIST OF OPEN ELECTIVES**Open Elective – I**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV3271	Disaster Management & Mitigation	3	0	0	3
2	R20CSE3272	Database Concepts				
3	R20ECE3273	Consumer Electronics				
4	R20EEE3274	Electrical Estimation & Costing				
5	R20INF3275	Information Technology Essentials				
6	R20MED3276	Introduction to Robotics				
7	R20HMS3277	Fundamentals of Entrepreneurship				
8	R20HMS3278	Day to Day Biology				

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L	T	P	C
3	0	0	3

(R20CIV3271) Disaster Management & Mitigation

The objective of this course is to provide an understanding of basic concepts of various disasters and its management. In addition, the course is expected to develop scientific temperament and mitigation techniques to manage disaster.

1. To understand basic concepts of disaster and hazards of India.
2. To study the various natural disasters.
3. To study the various manmade disasters.
4. To understand the disaster management principles.
5. To study the modern techniques used in disaster mitigation and management.

UNIT I - Introduction To Disaster - Meaning, Nature, Importance of Hazard, Risk, Vulnerability and Disaster Dimensions & Scope of Disaster Management - India's Key Hazards – Vulnerabilities - National disaster management framework - Disaster Management Cycle.

UNIT II - Natural Disaster - Natural Disasters- Meaning and nature of natural disaster; their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

UNIT III - Anthropogenic Disaster - Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation and industrial waste water pollution.

UNIT IV - Approaches in Disaster Management - Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief - Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect.

UNIT V - Disaster Mitigation - Meteorological observatory - Seismological observatory - Hydrology Laboratory and Industrial Safety inspectorate. Technology in Disaster Management Emergency Management Systems (EMS) in the Disaster Management Cycle Remote Sensing and Geographic Information Systems (GIS) in Disaster Management.

TEXT BOOK

1. Sharma.S.R, "Disaster management", A P H Publishers, 2011.

REFERENCES

6. VenuGopalRao.K, "Geoinformatics for Disaster Management", Manglam Publishers and Distributors, 2010.
7. Singh.R.B, "Natural Hazards and Disaster Management: Vulnerability and Mitigation", Rawat Publications, 2006.
8. Gupta.H.K, "Disaster Management", University Press, India, 2003.
9. Gupta.M.C, "Manuals on Natural Disaster management in India", National Centre for Disaster Management, IIPA, New Delhi, 2001.

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B.Tech. - III Year – II Semester**OPEN ELECTIVE- I**

L	T	P	C
3	0	0	3

(R20CSE3272) Database Concepts

To study the concepts of Relational Database design and query languages

1. To provide a general introduction to relational model
2. To learn about ER diagrams
3. To learn about Query processing and Transaction Processing

UNIT I: Introduction to Database Management - Introduction to Database Management systems – History - Characteristics – Users- three-level architecture- Entity-- relationship data model.

UNIT II: The Relational Data Model and Relational Algebra - Data structures – Mapping E-R Model to Relational model – data manipulation – integrity – advantages – rules for fully relational systems – relational algebra – relational algebra queries.

UNIT III: Structured Query Language and Normalization - SQL – Data definition – manipulation – views SQL in procedural programming – data integrity and constraints – triggers – data control – database security. Normalization – Undesirable properties – single-valued normalization – desirable properties of decompositions – multivalued dependencies

UNIT IV: Storage Indexing and Transactions Management - Different types of memories – secondary storage – buffer management – file structures – heap files – sorted files – index and types – indexed sequential file – B-tree – B+ tree. Transaction management – concepts – examples – schedules – serializability – concurrency control – deadlocks – lock and multiple granularity – nonlocking techniques.

UNIT V: Database Backup, Recovery and Security - Database system failure – backup – recovery and concept of log – log-based recovery techniques – types of recovery – log-based immediate update recovery technique. Database Security – violations – identifications and authentication – authorization / access control – security of statistical databases – audit policy – internet applications and encryption.

TEXT BOOK

1. Gupta.G.K, “Database Management Systems”, Tata McGraw Hill, 2011.

REFERENCES

1. Silberschatz, Korth.H and Sudarshan.S, “Database System Concepts”, 6th Edition, McGraw-Hill International, 2011.
2. Hector Garcia-Molina, Jeffrey D.Ullman, Jennifer Widom, “Database System The Complete Book, 1st Edition, Pearson 2002.
3. RamezElmasri and ShamkantB.Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson, 2008.

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L	T	P	C
3	0	0	3

(R20ECE3273) Consumer Electronics**Course Objectives:**

- Students are able to understand consumer electronics fundamentals, microprocessors and microcontrollers, energy management and intelligent building perspective. Audio systems, Display systems, video systems and recording systems
- Student is able to demonstrate smart Home, Home Virtual Assistants, Home security systems and types of sensors RFID Home , kitchen electronics and smart alarms, smart toilet, smart floor and smart locks
- Students are able to discuss cordless telephones, Fax machines PDA's TABLETs Smart phones and Smart watches. Video conferencing systems, Internet enabled systems, Wi-Fi, Li-Fi, GPS and Tracking systems

UNIT I: Consumer Electronics Fundamentals - History of Electronic Devices- Vacuum Tubes, Transistors, Integrated Circuits- Moore Law, Semiconductor Devices, Diodes, Rectifiers, Transistors, Logic Gates, Combinational Circuits, ADC, DAC and Microprocessors, Microprocessor Vs Microcontrollers, Microcontrollers in consumer electronics, Energy management, Intelligent Building Perspective.

UNIT II: Entertainment Electronics - Audio systems: Construction and working principle of : Microphone, Loud speaker, AM and FM receiver, stereo, 2.1 home theatre, 5.1 home theatre . Display systems: CRT, LCD, LED and Graphics displays Video Players : DVD and Blue RAY. Recording Systems: Digital Cameras and Camcorders.

UNIT III: Smart Home - Technology involved in Smart home, Home Virtual Assistants- Alexa and Google Home. Home Security Systems - Intruder Detection, Automated blinds, Motion Sensors, Thermal Sensors and Image Sensors, PIR, IR and Water Level Sensors.

UNIT IV: Home Appliances - Home Enablement Systems: RFID Home, Lighting control, Automatic Cleaning Robots, Washing Machines, Kitchen Electronics- Microwave, Dishwasher, Induction Stoves, Smart Refrigerators, Smart alarms, Smart toilet, Smart floor, Smart locks.

UNIT V: Communication Systems - Cordless Telephones, Fax Machines, PDAs- Tablets, Smart Phones and Smart Watches. Introduction to Smart OS- Android and iOS. Video Conferencing Systems- Web/IP Camera, Video security, Internet Enabled Systems, Wi-Fi, IoT, Li-Fi, GPS and Tracking Systems.

TEXT BOOKS:

1. Thomas L Floyd "Electronic Devices" 10th Edition Pearson Education Asia 2018.
2. Philp Hoff "Consumer Electronics for Engineers" - Cambridge University Press.1998.
3. Jordan Frith, " Smartphones as Locative Media ", Wiley. 2014.
4. Dennis C Brewer, " Home Automation", Que Publishing 2013.
5. Thomas M. Coughlin, "Digital Storage in Consumer Electronics", Elsevier and Newness 2012.

Course Outcomes:

- C325.1. summarize the consumer electronics fundamentals and explain about microprocessors and microcontrollers, energy management and intelligent building perspective (K2-Understand)
- C325.2. Demonstrate Audio systems, Display systems, video systems and recording systems (K3-Apply)
- C325.3. Describe the smart Home, Home Virtual Assistants, Home security systems and Different types of sensors (K2-Understand)
- C325.4. Outline the home enablement systems like RFID Home, kitchen electronics and smart alarms, smart toilet, smart floor and smart locks. (K4-Analyse)
- C325.5. Discuss cordless telephones, Fax machines PDA's TABLETs Smart phones and Smart watches.
- C325.6. Compare and explain Android and iOS and demonstrate Video conferencing systems, Internet enabled systems, Wi-Fi, Li-Fi, GPS and Tracking systems. (K5-Evaluate)

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B.Tech. - III Year – II Semester**OPEN ELECTIVE- I**

L	T	P	C
3	0	0	3

(R20EEE3274) Electrical Estimation & Costing

Unit I: Electrical Symbols and Diagrams: (i) Need of symbols; List of symbols for electrical equipment and accessories used in electrical works. Light, fan and power circuits, alarm and indicating circuit, contactor control circuits as per I.S.S. (ii) Type of diagrams - Wiring diagrams (multiple and single line representation) and schematic diagrams as per I.S.S. (* One Drawing Sheet for at least - 50 symbols).

Wiring materials and accessories: (1) Brief description, general specifications (as per I.S.S.) and approximate cost of different types of wires, cables, switches, distribution board, switch board, boxes, batten and its accessories, conduit and its accessories, lamp holders, socket outlets, plug ceiling roses. Fuse and energy meter used in domestic and power wiring installations.

Unit II: Light and Fan Circuits: Schematic and wiring diagrams (multiline and single line both) using junction boxes and looping systems for the following types of circuits:- (i) Light and fan controlled by necessary switches and regulators. (ii) Stair case wiring (iii) Corridor lighting (iv) One lamp controlled by three or more switches.

Unit III: Principles of Estimating and Costing: Purpose of estimating and costing, essentials of estimating and costing-market survey, price list and net prices, preparation of list of materials, calculation of material and labor cost, contingencies, overhead charges, profit and total cost. Estimation of Domestic Internal Wiring Circuits: (i) Description of various wiring systems and methods. (ii) Need of earthing and point to be earthed in internal wiring system as per IE rules. (iii) I.S. specifications, calculation of No. of points (light, fan, socket outlet), calculation of total load including domestic power, determination of no. of circuits, size of wires and cables, switches and main switch, distribution board and switch board, batten conduit and other wiring accessories.

Unit IV: Estimation of Power Wiring: I.S. specifications and I.E. rules, calculation of current for single and three phase motors. Determination of sizes of cables, conductors distribution board, main switches and starters for power circuits. Cost of equipment and accessories and schedule of materials. Estimation and cost of material and work for motors up to 20 H.P., pump sets and small workshops.

Unit V: Estimation of Overhead and Underground Distribution Lines: Main components of overhead lines-line supports, cross-arm, clamps, conductors and stay sets, lightening arrestors, danger plates, ant climbing devices, bird guards, jumpers etc., concreting of poles, earthing of transmission line, formation of lines, specification of materials for O.H. lines, I.S. specification and I.E. rules. Cost of material and work for overhead and underground lines upto 11 KV only.

Estimation of Small Sub-Station: Main equipment and auxiliaries installed on the substation. Estimation of materials required for a small distribution substation (indoor and outdoor type platform and pole mounted). Costing of material and work of above substations.

Text Books:

1. S.K Bhattacharya, "Electrical Engineering Drawing & Design Estimating".Wiley Eastern Ltd. New Delhi.
2. Surjeet Singh, "Electrical Eesign& Drawing" S.K.Kataria& Sons New Delhi.

Reference Books:

1. O. P. Soni," Electrical Engg. Design & Drawing" SatyaPrakashan Delhi.

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B.Tech. - III Year – II Semester

OPEN ELECTIVE- I

L	T	P	C
3	0	0	3

(R20INF3275) Information Technology Essentials

COURSE OBJECTIVES:

- To introduce the principles required for building web applications.
- To provide working knowledge of the technologies needed for web application development
- To know about scripting languages.
- To understand principles of database access and storage.
- To understand various applications related to Information Technology.

COURSE OUTCOMES: Student will be able to

- Design and deploy web-sites
- Design and deploy simple web-applications
- Create simple database applications
- Develop an information system
- Describe the basics of networking

UNIT I: Web Essentials - Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server – HTML basics – HTML tags and their use

UNIT II: Scripting Essentials - Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and HTML - Cookies – Sessions - Authentication – Introduction to JavaScript

UNIT III: Database Essentials - Database management - Database terms - MySQL - commands – Data types – Indexes – Functions – Accessing MySQL using PHP.

UNIT IV: Networking Essentials - Fundamental computer network concepts - Types of computer networks - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components

UNIT V: Application Essentials - Creation of simple interactive applications - Simple database applications - Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications

TEXT BOOKS:

1. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.
2. James F. Kurose, "Computer Networking: A Top-Down Approach", Sixth Edition, Pearson, 2012.

REFERENCES:

1. GottapuSasibhushanaRao, "Mobile Cellular Communication", Pearson, 2012.
2. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.
3. it-ebooks.org

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B.Tech. - III Year – II Semester

OPEN ELECTIVE- I

L	T	P	C
3	0	0	3

(R20MED3276) Introduction to Robotics

COURSE OBJECTIVE: To impart knowledge about the basics of robot components and applications.

COURSE OUTCOMES:

1. Basics of Robot anatomy
2. Working of end effectors and drive systems
3. Kinematics and transformation analysis of robot
4. Various types of robot sensors
5. Robot cell design and applications of robot

UNIT I: Robot Basics - Robot-Basic concepts, Need, Law, History, Anatomy, specification. Robot configurations-Cartesian, cylinder, polar and articulate. Robot wrist mechanism, Precision and accuracy of robot-simple problems.

UNIT II: Robot Elements - End effectors-Classification, Types of Mechanical actuation, Gripper force analysis, Gripper design, Robot drive system-Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation.

UNIT III: Robot Kinematics - Robot kinematics – Direct and inverse kinematics – 2 and 3 DOF of kinematics analysis-Robot trajectories – Control of robot manipulators – Point to point, Contouring motion- 2D and 3D Transformation-Scaling, Rotation, Translation, Homogeneous coordinates, multiple transformation-Simple problems.

UNIT IV: Robot Sensors - Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors

UNIT V: Robot Cell Design And Applications - Robot work cell design and control – Safety measures in Robot – Robot cell layouts – Multiple robots and machine interference – Robot cycle time analysis – Industrial applications of robots, Nanorobots, Robot programming-Basic program.

TEXT BOOKS:

1. Deb.S.R, “Robotics Technology and Flexible Automation”, Tata McGraw – Hill Publishing Company Limited, 2010.
2. Mikell. P. Groover, ‘Industrial Robotics Technology’, Programming and Applications, McGraw Hill Co, 2008.

REFERENCES:

1. Klafter.R.D, Chmielewski.T.A, and Noggin’s., “Robot Engineering : An Integrated Approach”, Prentice Hall of India Pvt. Ltd.,1994.
2. Fu.K.S, Gonzalez.R.C&Lee.C.S.G, “Robotics control, sensing, vision and intelligence”, McGraw Hill Book co, 1987
3. Craig.J.J, “Introduction to Robotics mechanics and control”, AddisonWesley, 1999.
4. Ray Asfahl.C, “Robots and Manufacturing Automation”, John Wiley & Sons Inc., 1985.
5. Kozyrey, Yu. “Industrial Robotics”, MIR Publishers Moscow, 1985.

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B.Tech. - III Year – II Semester**OPEN ELECTIVE- I****L T P C****3 0 0 3****(R20HMS3277) Fundamentals of Entrepreneurship****COURSE OBJECTIVES:** To create awareness on entrepreneurship among engineering students and stimulating self-motivation to start up enterprise**COURSE OUTCOMES:**

1. To provide awareness about entrepreneurship
2. To develop idea generation, creative and innovative skills
3. To self-motivate the students by making aware of different opportunities and successful growth stories
4. To learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
5. To understand entrepreneurial process by way of studying different case studies and find exceptions to the process model of entrepreneurship.
6. To run a small enterprise with small capital for a short period and experience the science and art of doing business.

UNIT I: Introduction to Entrepreneurship - Understanding the Meaning of Entrepreneur; Characteristics and Qualities of an Entrepreneur; Entrepreneurs Vs Intrapreneurs and Managers; Classification of Entrepreneurs; Factors Influencing Entrepreneurship; Entrepreneurial Environment; Entrepreneurial Growth; Problems and Challenges of Entrepreneurs; Entrepreneurial Scenario in India.

UNIT II: Micro, Small and Medium Enterprises (MSMEs) - MSMEs – Definition and Significance in Indian Economy; MSME Schemes, Challenges and Difficulties in availing MSME Schemes, Forms of Business; Women Entrepreneurship; Rural Entrepreneurship; Family Business and First Generation Entrepreneurs.

UNIT III: Idea Generation and Feasibility Analysis - Idea Generation; Creativity and Innovation; Identification of Business Opportunities; Market Entry Strategies; Marketing Feasibility; Financial Feasibilities; Political Feasibilities; Economic Feasibility; Social and Legal Feasibilities; Technical Feasibilities; Managerial Feasibility, Location and Other Utilities Feasibilities.

UNIT IV: Business Model and Plan in Respective Industry - Business model – Meaning, designing, analyzing and improvising; Business Plan – Meaning, Scope and Need; Financial, Marketing, Human Resource and Production/Service Plan; Business plan Formats; Project report preparation and presentation; Why some Business Plan fails?

UNIT V: Financing and How to Start up Business? - Financial opportunity identification; Banking sources; Non-banking Institutions and Agencies; Venture Capital – Meaning and Role in Entrepreneurship; Government Schemes for funding business; Pre launch, Launch and Post launch requirements; Procedure for getting License and Registration; Challenges and Difficulties in Starting an Enterprise.

TEXT BOOKS :

1. Jayshree Suresh, “Entrepreneurial Development”, Margham Publishers, Chennai, 2011.
2. Poornima M Charantimath, “Entrepreneurship development small business enterprises”, Pearson, 2013.

REFERENCES:

1. Raj Shankar, “Entrepreneurship: Theory And Practice”, Vijay Nicole imprints ltd in collaboration with Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2012
2. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, “Entrepreneurship”, 8th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2012
3. Martin Roger, “The Design of Business”, Harvard Business Publishing, 2009
4. Roy Rajiv, “Entrepreneurship”, Oxford University Press, 2011
5. Drucker.F, Peter, “Innovation and Entrepreneurship”, Harper business, 2006.

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B.Tech. - III Year – II Semester

OPEN ELECTIVE - I

L	T	P	C
3	0	0	3

(R20HMS3278) Day to Day Biology

COURSE OBJECTIVE: The purpose of this study is to know and understand the involvement of biology in day-to-day life. This would give insight into his or her own biological system, the diseases and disorders, antibiotics, and importance of environment in human life. This also provides application of biology in day to day life.

COURSE OBJECTIVES:

1. The student can understand the biology of human system and health.
2. This provides student with a scope for selection of healthy food and sustain environment.

UNIT I: Biology of Human Diseases and Disorders - Diabetes mellitus, communicable diseases, genetic disorders, vector borne diseases, antibiotics - mode of action.

UNIT II: Biology for Human - Blood pressure, immune system and immunity, cardiac infarction, in vitro fertilization, cord blood bank, stem cells.

UNIT III: Biology of Cosmetics and Detergents - Biology of complexion and texture, bioactive natural products in industrial use, bio surfactants, antioxidants.

UNIT IV: Biology and Nutrition - Dietary index, carbohydrates, proteins and fats, HDL and LDL, dairy products and application, herbal plants and home remedies.

UNIT V: Biology and Environment - Water pollution, air pollution, bioremediation, species biodiversity, global warming and greenhouse effect.

TEXT BOOKS:

1. Gareth J. Price, Biology: An Illustrated Guide to Science, Diagram Group, Infobase Publishing, 2006.
2. Pam Dodman, Real-Life Science Biology, Walch Publishing, 2008.

REFERENCES:

1. Biology: The Science of Life, Stephen Nowicki, <http://www.thegreatcourses.com/tgc/courses>.
2. Neil Schlager, Science of everyday things: Real-Life Biology, Gale Publishing 2002.

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B.Tech. - III Year – II Semester

L	T	P	C
0	0	3	1.5

(R20CSE32L1) Machine Learning Lab

Course objectives: This course will enable students to

1. Make use of Data sets in implementing the machine learning algorithms
2. Implement the machine learning concepts and algorithms in any suitable language of choice.

Description :

1. The programs can be implemented in either JAVA or Python.
2. For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python.
3. Data sets can be taken from standard repositories (<https://archive.ics.uci.edu/ml/datasets.html>) or constructed by the students.

Lab Experiments:

1. Implement and demonstrate the **FIND-S algorithm** for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the **Candidate-Elimination algorithm** to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based **ID3 algorithm**. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the **Back propagation algorithm** and test the same using appropriate data sets.
5. Write a program to implement the **naïve Bayesian classifier** for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the **naïve Bayesian Classifier** model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a **Bayesian network** considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply **EM algorithm** to cluster a set of data stored in a .CSV file. Use the same data set for clustering using **k-Means algorithm**. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement **k-Nearest Neighbour algorithm** to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric **Locally Weighted Regression algorithm** in order to fit data points. Select appropriate data set for your experiment and draw graphs.

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(R20CSM32L1) Web Technologies Lab**Objectives:**

To enable the student to program web applications using the following technologies HTML , Javascript ,AJAX ,PHP ,Tomcat Server, Servlets ,JSP

WEB TECHNOLOGIES LAB

1. Install the following on the local machine Apache Web Server (if not installed)
 - Tomcat Application Server locally
 - Install MySQL (if not installed)
 - Install PHP and configure it to work with Apache web server and
 - MySQL (if not already configured)
2. Write an HTML page including any required Javascript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.
3. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, words and lines in the text entered using an alert message. Words are separated with white space and lines are separated with new line character.
4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
5. Create an XML document that contains 10 users information. Write a Java program, which takes User Id as input and returns the user details by taking the user information from the XML document using
 - (a) DOM Parser and
 - (b) SAX parser
6. Implement the following web applications using
 - (a) PHP,
 - (b) Servlets and
 - (c) JSP:
 - i. A user validation web application, where the user submits the login name and password to the server. The name and password are checked against the data already available in Database and if data matches, a successful login page is returned. Otherwise a failure message is shown to the user.
 - ii. Modify the above program to use an xml file instead of database.
 - iii. Modify the above program to use AJAX to show the result on the same page below the submit button.
 - iv. A simple calculator web application that takes two numbers and an operator (+, -, /, * and %) and returns the result page with the operation performed on the operands.
 - v. Modify the above program such that it stores each query in a database and checks the database first for the result. If the query is already available in the DB, it returns the value that was previously computed (DB) or it computes the result and returns it after storing the new query and result in DB.

- vi. A web application takes a name as input and on submit it shows a hello page where is taken the request. It shows the start time at the right top corner of the page and provides a logout button. On clicking this button, it should show a logout page with Thank You message with the duration of usage (hint: Use session to store name and time).
- vii. A web application that takes name and age from an HTML page. If the age is less than 18, it should send a page with "Hello , you are not authorized to visit this site" message, where should be replaced with the entered name. Otherwise it should send "Welcome to this site" message.
- viii. A web application for implementation: The user is first served a login page which takes user's name and password. After submitting the details the server checks these values against the data from the database and takes the following decisions. If name and password matches, serves a welcome message with user's full name. If name matches and password doesn't match, then serves "password mismatch" page. If name is not found in the database, serves a registration page, where user's name is asked and on submitting the full name, it stores, the login name, password and full name in the database (hint: use session for storing the submitted login name and password)
- ix. A web application that lists all cookies stored in the browser on clicking "List Cookies" button. Add cookies if necessary

Outcomes:

Use LAMP Stack for web applications

Use Tomcat Server for Servlets and JSPs

Write simple applications with Technologies like HTML, Javascript,

AJAX, PHP, Servlets and JSPs Connect to Database and get results

Parse XML files using Java (DOM and SAX parsers)

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(R20HAS31L1) Advanced Communication Skills Lab**Introduction**

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Syllabus:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing* – planning for writing – improving one's writing.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters / projects/ reports/e- mails/assignments etc.

5. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

Minimum Requirement:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

Prescribed Lab Manual: A book titled **A Course Book of Advanced Communication Skills (ACS) Lab** published by Universities Press, Hyderabad.

Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from 'train2success.com'
 - Preparing for being Interviewed
 - Positive Thinking
 - Interviewing Skills
 - Telephone Skills
 - Time Management

Books Recommended:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
4. Business and Professional Communication: Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
5. The Basics of Communication: A Relational Perspective. Steve Duck & David T. McMahan. Sage South Asia Edition. Sage Publications. 2012.
6. English Vocabulary in Use series, Cambridge University Press 2008.
7. Management Shapers Series by Universities Press(India) Pvt Ltd., Himayatnagar, Hyderabad 2008.

8. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012.Cengage Learning.
9. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
10. Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
11. Job Hunting by Colm Downes, Cambridge University Press 2008.
12. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
13. English for Technical Communication for Engineering Students, Aysha Vishwamohan, TataMc Graw-Hil 2009.
14. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/Cambridge University Press.
15. International English for Call Centres by Barry Tomalin and Suhashini Thomas, MacmillanPublishers, 2009.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

Advanced Communication Skills Lab Practicals:

1. The practical examinations for the ACS Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be continuous evaluation during the year for 25sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner fromoutside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

Mini Project: As a part of Internal Evaluation

1. Seminar/ Professional Presentation
2. A Report on the same has to be prepared and presented.

*** Teachers may use their discretion to choose topics relevant and suitable to the needs of students.**

- * Not more than two students to work on each mini project.
- * Students may be assessed by their performance both in oral presentation and written report.

Outcomes

- Accomplishment of sound vocabulary and its proper use contextually.
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities

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(R20COI1101) Constitution of India

UNIT-I:

History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working),
Philosophy of the Indian Constitution: Preamble, Salient Features.

UNIT-II:

Contours of Constitutional Rights & Duties: Fundamental Rights Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT-III:

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions.

UNIT-IV:

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT-V:

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS/ REFERENCES:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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L	T	P	C
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(R20CSM4101) NEURAL NETWORKS AND DEEP LEARNING

Course Objectives:

- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts
- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

Course Outcomes:

- Ability to understand the concepts of Neural Networks
- Ability to select the Learning Networks in modeling real world systems
- Ability to use an efficient algorithm for Deep Models
- Ability to apply optimization strategies for large scale applications

UNIT-I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT - III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT - IV

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT - V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second- Order Methods, Optimization Strategies and Meta-Algorithms

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS:

1. Deep Learning: An MIT Press Book By Ian Goodfellow and Yoshua Bengio and Aaron Courville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.

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(R20MED4202) REINFORCEMENT LEARNING

Course Objectives: Knowledge on fundamentals of reinforcement learning and the methods used to create agents that can solve a variety of complex tasks.

Course Outcomes

1. Understand basics of RL.
2. Understand RL Framework and Markov Decision Process.
3. Analyzing RL through the use of Dynamic Programming and Monte Carlo.
4. Understand TD(0) algorithm, TD(λ) algorithm.

UNIT - I

Basics of probability and linear algebra, Definition of a stochastic multi-armed bandit, Definition of regret, Achieving sublinear regret, UCB algorithm, KL-UCB, Thompson Sampling.

UNIT - II

Markov Decision Problem, policy, and value function, Reward models (infinite discounted, total, finite horizon, and average), Episodic & continuing tasks, Bellman's optimality operator, and Value iteration & policy iteration

UNIT - III

The Reinforcement Learning problem, prediction and control problems, Model-based algorithm, Monte Carlo methods for prediction, and Online implementation of Monte Carlo policy evaluation

UNIT - IV

Bootstrapping; TD(0) algorithm; Convergence of Monte Carlo and batch TD(0) algorithms; Model-free control: Q-learning, Sarsa, Expected Sarsa.

UNIT - V

n-step returns; TD(λ) algorithm; Need for generalization in practice; Linear function approximation and geometric view; Linear TD(λ). Tile coding; Control with function approximation; Policy search; Policy gradient methods; Experience replay; Fitted Q Iteration; Case studies.

TEXT BOOKS:

1. "Reinforcement learning: An introduction," First Edition, Sutton, Richard S., and Andrew G. Barto, MIT press 2020.
2. "Statistical reinforcement learning: modern machine learning approaches," First Edition, Sugiyama, Masashi. CRC Press 2015.

REFERENCE BOOKS:

1. "Bandit algorithms," First Edition, Lattimore, T. and C. Szepesvári. Cambridge University Press. 2020.
2. "Reinforcement Learning Algorithms: Analysis and Applications," Boris Belousov, Hany Abdulsamad, Pascal Klink, Simone Parisi, and Jan Peters First Edition, Springer 2021.
3. Alexander Zai and Brandon Brown "Deep Reinforcement Learning in Action," First Edition, Manning Publications 2020.

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(R20CSE4102) QUANTUM COMPUTING (Professional Elective – IV)**Course Objectives:**

1. To introduce the fundamentals of quantum computing
2. The problem-solving approach using finite dimensional mathematics

Course Outcomes:

1. Understand basics of quantum computing
2. Understand physical implementation of Qubit
3. Understand Quantum algorithms and their implementation
4. Understand the Impact of Quantum Computing on Cryptography

UNIT - I

Introduction to Essential Linear Algebra: Some Basic Algebra, Matrix Math, Vectors and Vector Spaces, Set Theory. Complex Numbers: Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrices, Transcendental Numbers.

UNIT - II

Basic Physics for Quantum Computing: The Journey to Quantum, Quantum Physics Essentials, Basic Atomic Structure, Hilbert Spaces, Uncertainty, Quantum States, Entanglement.

Basic Quantum Theory: Further with Quantum Mechanics, Quantum Decoherence, Quantum Electrodynamics, Quantum Chromodynamics, Feynman Diagram Quantum Entanglement and QKD, Quantum Entanglement, Interpretation, QKE.

UNIT - III

Quantum Architecture: Further with Qubits, Quantum Gates, More with Gates, Quantum Circuits, The D-Wave Quantum Architecture. Quantum Hardware: Qubits, How Many Qubits Are Needed? Addressing Decoherence, Topological Quantum Computing, Quantum Essentials.

UNIT - IV

Quantum Algorithms: What Is an Algorithm? Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Bernstein-Vazirani Algorithm, Simon's Algorithm, Shor's Algorithm, Grover's Algorithm.

UNIT - V

Current Asymmetric Algorithms: RSA, Diffie-Hellman, Elliptic Curve.

The Impact of Quantum Computing on Cryptography: Asymmetric Cryptography, Specific Algorithms, Specific Applications.

TEXT BOOKS:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press
2. Dr. Chuck Easttom, Quantum Computing Fundamentals, Pearson

REFERENCE BOOKS:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. Basic Concepts. Vol. Basic Tools and Special Topics, World Scientific.
3. Pittenger A. O., An Introduction to Quantum Computing Algorithms.

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L	T	P	C
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(R20CSM4104) EXPERT SYSTEMS (Professional Elective – IV)

Course Objectives:

1. Understand the basic techniques of artificial intelligence.
2. Understand the Non-monotonic reasoning and statistical reasoning.

Course Outcomes:

1. Apply the basic techniques of artificial intelligence.
2. Discuss the architecture of an expert system and its tools.
3. Understand the importance of building an expert systems.
4. Understand various problems with an expert systems.

UNIT - I

Introduction to AI programming languages, Blind search strategies, Breadth-first – Depth-first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO* algorithm – game trees, Min- max algorithms, game playing – Alpha-beta pruning.

UNIT - II

Knowledge representation issues predicate logic – logic programming Semantic nets- frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules-based deduction systems.

UNIT - III

Introduction to Expert Systems, Architecture of expert systems, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.

UNIT - IV

Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, system-building aids, support facilities, stages in the development of expert systems.

UNIT - V

Building an Expert System: Expert system development, Selection of the tool, Acquiring Knowledge, Building process.

Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain experts, difficulties during development.

TEXT BOOKS:

1. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw-Hill, New Delhi.
2. Waterman D.A., “A Guide to Expert Systems”, Addison Wesley Longman.

REFERENCE BOOKS:

1. Stuart Russel and other Peter Norvig, “Artificial Intelligence – A Modern Approach”, Prentice-Hall.
2. Patrick Henry Winston, “Artificial Intelligence”, Addison Wesley.
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat, and Waterman: Building Expert Systems, Addison Wesley.
5. Weiss S.M. and Kulikowski C.A., “A Practical Guide to Designing Expert Systems”, Rowman & Allanheld, New Jersey.

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B.Tech. - IV Year – I Semester**L T P C****3 0 0 3****(R20CSM4105) CONVERSATIONAL AI (Professional Elective – IV)****Course Objectives**

- Comprehensive introduction to Conversational AI
- Idea of interacting with a computer using voice or text
- Focuses mainly on the application of machine learning and statistical data-driven approaches to the development of dialogue systems

Course outcomes

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

- Understand about the performance and usability of dialogue systems.
- To be aware of achievements in dialogue technology.
- Learn about the new generation of dialogue systems and conversational interfaces.
- To be aware of challenges in dialogue systems, visual dialogue; data efficient dialogue model learning.

Unit I- Introduction to conversational AI

Introduction to AI assistants and their platforms, Types of AI assistants. A snapshot of AI assistant platforms, Primary use cases for AI assistant technology, Self-service assistant, Agent assist, Classification and routing, Useful spreadsheet software.

Building your first conversational AI - Building a conversational AI for Fictitious Inc-What's the user's intent?- Combining intents and entities-Adding intents to the Fictitious Inc. assistant-Responding to the user- Simple question-and-answer responses- Contextualizing a response by using entities- An alternative way to provide contextual responses

Unit II

Designing effective processes: What processes will the assistant handle?- Designing for the most common user needs-Assembling a plan and a dream team-Managing the design process-Cross-cutting design aspects-Choosing the channel to implement first-How users receive information in voice and web-How the assistant receives information in voice and web.

Designing effective dialogue: Writing dialogue, Take a conversational tone-Acknowledge the user-Asking questions-What if the assistant doesn't understand? - Reprompting-Disambiguation-Escalation.

Unit III

Building a successful AI assistant: AI assistant use cases- Conversational AI success metrics-Containment-Time to resolution-Net promoter score-Coverage-Instrumenting your conversational AI-Command interpreter success metrics-Usage-Stickiness-Instrumenting your command interpreter-Event classifier success metrics-Time to resolution-Number of hand-offs-Other customer satisfaction metrics-Instrumenting your classifier.

Unit IV

Training your assistant: Training an AI assistant-Finding training data-Production logs-A mock user interface-Organizing training data into intents-Assessing whether you have the right training data-Training data variety-Training data volume-Training data veracity

How accurate is your assistant?: Testing an AI assistant for accuracy-Testing a single utterance-Testing multiple utterances- Selecting a test data set-Comparing testing methodologies- Blind testing.

Unit V

Testing your dialogue flows: Functionally testing a dialogue flow- Manually testing a conversation flow-Automating a conversation flow test-Testing the dialogue flowchart-testing the unexpected error paths- Nonfunctionally testing a dialogue flow-User experience testing-Load testing.

Deployment and management: Where to run your code, Test environment, , Production environment-Improving the first flow to fix containment problems.

Textbook

1. Andrew Freed, Conversational AI, Manning Publications, 2021.
2. Xiaoquan Kong, Guan Wang, Alan Nichol, Conversational AI with Rasa: Build, test, and deploy AI-powered, enterprise-grade virtual assistants and chatbots,Packet Publishing,2021.

Reference Books :

1. Michael McTear, Conversational AI Dialogue Systems, Conversational Agents, and Chatbots, Morgan & Claypool Publishers, 2020.

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(R20CSM4106) GAME THEORY (Professional Elective - IV)

Course Objectives: The course will explain in depth the standard equilibrium concepts (such as Nash equilibrium, Subgame-Perfect Nash Equilibrium, and others) in Game Theory.

Course Outcomes:

1. Understand the basic concepts of game theory and solutions
2. Understand different types of equilibrium interpretations
3. Understand and analyze knowledge and solution concepts
4. Analyze extensive games with perfect information

UNIT - I

Introduction- Game Theory, Games and Solutions Game Theory and the Theory of Competitive Equilibrium, Rational Behavior, The Steady State and Deductive Interpretations, Bounded Rationality Terminology and Notation. Nash Equilibrium- Strategic Games, Nash Equilibrium Examples Existence of a Nash Equilibrium, Strictly Competitive Games, Bayesian Games: Strategic Games with Imperfect Information.

UNIT - II

Mixed, Correlated, and Evolutionary Equilibrium - Mixed Strategy Nash Equilibrium, Interpretations of Mixed Strategy Nash Equilibrium, Correlated Equilibrium, Evolutionary Equilibrium, Rationalizability and Iterated Elimination of Dominated Actions -Rationalizability Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions.

UNIT - III

Knowledge and Equilibrium -A Model of Knowledge Common Knowledge, Can People Agree to Disagree? Knowledge and Solution Concepts, The Electronic Mail Game

UNIT - IV

Extensive Games with Perfect Information -Extensive Games with Perfect Information Subgame Perfect Equilibrium Two Extensions of the Definition of a Game The Interpretation of a Strategy, Two Notable Finite Horizon Games, Iterated Elimination of Weakly Dominated, Strategies Bargaining Games - Bargaining and Game Theory, A Bargaining Game of Alternating Offers Subgame Perfect Equilibrium Variations and Extensions.

UNIT - V

Repeated Games - The Basic Idea Infinitely Repeated Games vs.\ Finitely Repeated Games, Infinitely Repeated Games: Definitions Strategies as Machines Trigger Strategies: Nash Folk, Theorems Punishing for a Limited Length of Time: A Perfect Folk Theorem for the Limit of Means Criterion Punishing the Punisher: A Perfect Folk Theorem for the Overtaking Criterion, Rewarding Players Who Punish: A Perfect Folk Theorem for the Discounting Criterion The Structure of Subgame Perfect Equilibria Under the Discounting Criterion Finitely Repeated Game.

TEXT BOOKS:

1. A course in Game Theory, M. J. Osborne and A. Rubinstein, MIT Press
2. Game Theory, Roger Myerson, Harvard University Press
3. Game Theory, D. Fudenberg and J. Tirole, MIT Press

REFERENCE BOOKS:

1. Theory of Games and Economic Behavior, J. von Neumann and O. Morgenstern, New York:John Wiley and Sons.
2. Games and Decisions, R.D. Luce and H. Raiffa, New York: John Wiley and Sons.
3. Game Theory, G. Owen, 2nd Edition, New York: Academic Press.

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L	T	P	C
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(R20CSM4102) MOBILE COMPUTING (Professional Elective - IV)

Course Objectives: To make the student understand the concept of mobile computing paradigm, its novel applications and limitations, the typical mobile networking infrastructure through a popular GSM protocol, the issues and solutions of various layers of mobile networks.

Course Outcomes:

1. Understand the concept of mobile computing paradigm, its novel applications and limitations.
2. Analyze and develop new mobile applications
3. Understand the protocols and platforms related to mobile environment
4. Classify data delivery mechanisms

UNIT - I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

UNIT –II

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11) Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT - III

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT - IV

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols

UNIT - V

Mobile Ad hoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery. Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772

REFERENCE BOOK:

1. Asoke K Talukder, Hasan Ahmed, Roopa Yavagal Mobile Computing: Technology, Applications and Service Creation, McGraw Hill Education.

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B.Tech. - IV Year – I Semester

L	T	P	C
3	0	0	3

(R20CSM4107) SOCIAL NETWORK ANALYSIS (Professional Elective - V)

Course Objectives:

1. It introduces the concepts of social media
2. It provides the mechanisms for social network analysis
3. Includes the concepts that allow for better visualization and analysis of widely used services such as email, Wikis, Twitter, flickr, YouTube, etc.

Course Outcomes:

1. Ability to construct social network maps easily
2. Gain skills in tracking the content flow through the social media
3. Use NodeXL to perform social network analysis

UNIT - I:

Introduction: Social Media and Social Networks.

Social Media: New Technologies of Collaboration.

Social Network Analysis: Measuring, Mapping, and Modeling collections of Connections.

UNIT - II:

NodeXL, Layout, Visual Design, and Labeling, Calculating and Visualizing Network Metrics, Preparing Data and Filtering, Clustering and Grouping.

UNIT - III:

CASE STUDIES - I:

Email: The lifeblood of Modern Communication.

Thread Networks: Mapping Message Boards and Email Lists.

Twitter: Conversation, Entertainment and Information.

UNIT - IV:

CASE STUDIES - II: Visualizing and Interpreting Facebook Networks, WWW Hyperlink Networks

UNIT-V:

CASE STUDIES - III:

You Tube: Contrasting Patterns of Content Interaction, and Prominence. **Wiki Networks:** Connections of Creativity and Collaboration.

TEXT BOOKS:

1. Hansen, Derek, Ben Shneiderman, Marc Smith, Analyzing Social Media Networks with NodeXL: Insights from a Connected World, Morgan Kaufmann, 2011.
2. Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability, Sybex, 2009.

REFERENCE BOOK:

1. Marshall Sponder, Social Media Analytics: Effective Tools for Building, Interpreting and Using Metrics, 1st Edition, MGH, 2011.

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(R20CSM4201) FEDERATED MACHINE LEARNING (Professional Elective - V)**Course Objectives**

Understand the key concepts and issues behind Federated Learning
 Get familiar with key theoretical results of Federated Learning

Course Outcomes

Knowledge of the basic concepts, architecture, and applications of FL.
 Understanding of new research and application trends in FL.
 Analyze horizontal federated learning
 Understand the significance of Federated Learning for Vision, Language, and Recommendation

UNIT - I

Introduction: Motivation, Federated Learning as a Solution, The Definition of Federated Learning, Categories of Federated Learning, Current Development in Federated Learning, Research Issues in Federated Learning, Open-Source Projects, Standardization Efforts, The Federated AI Ecosystem
Background: Privacy-Preserving Machine Learning, PPML and Secure ML, Threat and Security Models, Privacy Threat Models, Adversary and Security Models, Privacy Preservation Techniques, Secure Multi-Party Computation, Homomorphic Encryption, Differential Privacy.

UNIT - II

Distributed Machine Learning: Introduction to DML, The Definition of DML, DML Platforms, Scalability- Motivated DML, Large-Scale Machine Learning, Scalability-Oriented DML Schemes, Privacy-Motivated DML, Privacy-Preserving Decision Trees, Privacy-Preserving Techniques, Privacy-Preserving DML Schemes, Privacy-Preserving Gradient Descent, Vanilla Federated Learning, Privacy-Preserving Methods.

UNIT - III

Horizontal Federated Learning: The Definition of HFL, Architecture of HFL, The Client- Server Architecture, The Peer-to-Peer Architecture, Global Model Evaluation, The Federated Averaging Algorithm, Federated Optimization, The FedAvg Algorithm, The Secured FedAvg Algorithm, Improvement of the FedAvg Algorithm, Communication Efficiency, Client Selection Vertical Federated Learning: The Definition of VFL, Architecture of VFL, Algorithms of VFL, Secure Federated Linear Regression, Secure Federated Tree-Boosting.

UNIT - IV

Federated Transfer Learning: Heterogeneous Federated Learning, Federated Transfer Learning, The FTL Framework, Additively Homomorphic Encryption, The FTL Training Process, The FTL Prediction Process, Security Analysis, Secret Sharing-Based FTL Incentive Mechanism Design for Federated Learning: Paying for Contributions, Profit- Sharing Games, Reverse Auctions, A Fairness-Aware Profit Sharing Framework, Modeling Contribution, Modeling Cost, Modeling Regret, Modeling Temporal Regret, The Policy Orchestrator, Computing Payoff Weightage.

UNIT - V

Federated Learning for Vision, Language, and Recommendation: Federated Learning for Computer Vision, Federated CV, Federated Learning for NLP, Federated NLP, Federated Learning for Recommendation Systems, Recommendation Model, Federated Recommendation System Federated Reinforcement Learning: Introduction to Reinforcement Learning, Policy, Reward, Value Function, Model of the Environment, RL Background Example, Reinforcement Learning Algorithms, Distributed Reinforcement Learning, Asynchronous Distributed Reinforcement Learning, Synchronous Distributed Reinforcement Learning, Federated Reinforcement Learning, Background and Categorization.

TEXT BOOK:

1. Federated Learning, Qiang Yang, Yang Liu, Yong Cheng, Yan Kang, Tianjian Chen, and Han Yu - Synthesis Lectures on Artificial Intelligence and Machine Learning 2019.

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(R20CSE4201) AUGMENTED REALITY AND VIRTUAL REALITY (Professional Elective – V)

Course objectives:

1. The objective of this course is to provide a foundation to the fast-growing field of AR and make the students aware of the various AR devices.
2. To give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

Course Outcomes:

1. Describe how AR systems work and list the applications of AR.
2. Understand and analyze the hardware requirement of AR.
3. Describe how VR systems work and list the applications of VR.
4. Understand the design and implementation of the hardware that enables VR systems to be built.

UNIT - I:

Introduction to Augmented Reality: What Is Augmented Reality - Defining augmented reality, history of augmented reality, The Relationship Between Augmented Reality and Other Technologies-Media, Technologies, Other Ideas Related to the Spectrum Between Real and Virtual Worlds, applications of augmented reality Augmented Reality Concepts- How Does Augmented Reality Work? Concepts Related to Augmented Reality, Ingredients of an Augmented Reality Experience.

UNIT - II:

AR Devices & Components: AR Components – Scene Generator, Tracking system, monitoring system, display, Game scene. AR Devices – Optical See- Through HMD, Virtual retinal systems, Monitor bases systems, Projection displays, Video see-through systems.

UNIT - III:

Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality

UNIT - IV:

Representing the Virtual World: Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR, Case Study: GHOST (General Haptics Open Software Toolkit) software development toolkit.

UNIT - V:

Visual Perception & Rendering: Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information, Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates.

TEXT BOOKS:

1. Allan Fowler-AR Game Development, 1st Edition, A press Publications, 2018, ISBN 978-1484236178
2. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India; First edition (12 October 2016), ISBN-10: 9332578494

REFERENCE BOOKS:

1. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016.
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)”. Morgan Kaufmann Publishers, San Francisco, CA, 2002.
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009.
4. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381.
5. Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0.
6. Gerard Jounghyun Kim, “Designing Virtual Systems: The Structured Approach”, 2005.

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B.Tech. - IV Year – I Semester

L	T	P	C
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(R20CSI4101) WEB SECURITY (Professional Elective – V)

Course Objectives:

- Give an Overview of information security
- Give an overview of Access control of relational databases

Course Outcomes: Students should be able to

- Understand the Web architecture and applications
- Understand client side and service side programming
- Understand how common mistakes can be bypassed and exploit the application
- Identify common application vulnerabilities

UNIT - I

The Web Security, The Web Security Problem, Risk Analysis and Best Practices.

Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT - II

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT - III

Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.

UNIT - IV

Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and Future Trends.

UNIT - V

Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.

TEXT BOOKS:

1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia

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L	T	P	C
3	0	0	3

(R20INF4101) AD-HOC & SENSOR NETWORKS (Professional Elective - V)**Course Objectives:**

1. To understand the concepts of sensor networks
2. To understand the MAC and transport protocols for ad hoc networks
3. To understand the security of sensor networks
4. To understand the applications of adhoc and sensor networks

Course Outcomes:

1. Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks
2. Ability to solve the issues in real-time application development based on ASN.
3. Ability to conduct further research in the domain of ASN

UNIT - I**Introduction to Ad Hoc Networks** - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.**Routing in MANETs** - Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms-**Proactive**: DSDV; **Reactive**: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-**Location Services**-DREAM, Quorum-based; **Forwarding Strategies**: Greedy Packet, Restricted Directional Flooding-DREAM, LAR.**UNIT - II****Data Transmission** - Broadcast Storm Problem, **Rebroadcasting Schemes**-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting**: **Tree-based**: AMRIS, MAODV; **Mesh-based**: ODMRP, CAMP; **Hybrid**: AMRoute, MCEDAR.**UNIT - III****Geocasting**: **Data-transmission Oriented-LBM**; **Route Creation Oriented-GeoTORA**, MGR. **TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc****UNIT - IV****Basics of Wireless, Sensors and Lower Layer Issues**: Applications, Classification of sensornetworks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.**UNIT - V****Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.****TEXT BOOKS:**

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

Open Elective –II

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV4181	Green Building Engineering	3	0	0	3
2	R20CSE4182	Cyber Security Fundamentals				
3	R20ECE4183	Principles of Modern Communication Systems				
4	R20EEE4184	Illumination Engineering				
5	R20INF4185	E-Commerce				
6	R20MED4186	Industrial Design & Ergonomics				
7	R20HMS4187	Creative Writing				
8	R20HMS4188	Design Thinking				

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L	T	P	C
3	0	0	3

(R20CIV4181) Green Building Engineering**Course Outcomes:** On successful completion of this course the student will be able to:

1. Describe the concepts of Green building
2. Adopt Renewable energy for buildings.
3. Implement Automation techniques in buildings.
4. Describe Actuator techniques for Automation
5. Choose appropriate materials for Green buildings

UNIT 1 Concept of Green Buildings : Green building initiatives, its origin, characteristics of a green building, green buildings in India, certification of green buildings. Criteria for rating – sustainability. Depleting natural resources of building materials; renewable and recyclable resources; energy efficient materials; green cement, biodegradable materials, smart materials, engineering evaluation of these materials. Case study.

UNIT 2 Sources of Energy Renewable and non-renewable sources of energy ; coal, petroleum, nuclear, wind, solar, hydro, geothermal sources; potential of these sources, hazards, pollution; global scenario with reference to demand and supply in India. Energy arises. Carbon Emission: Forecasting, control of carbon emission, air quality and its monitoring carbon foot print; environmental issues, minimizing carbon emission.

UNIT 3 - Intelligent Buildings Intelligent buildings-Building automation-Smart buildings- Building services in high rise buildings-Green buildings-Energy efficient buildings for various zones-Case studies of residence, office buildings and other buildings in each zones. Case Study.

UNIT 4 Actuator Techniques Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magneto structure Material – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials.

UNIT 5 Materials For "Green" Systems Green materials, including biomaterials, biopolymers, bioplastics, and composites Nanotech Materials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Paints, Roofs, Walls, and Cooling. Multifunctional Gas Sensors, Biomimetic Sensors, Optical Interference Sensors Thermo-, light-, and stimulus-responsive smart materials.

TEXT BOOKS

1. Sustainable Construction , Charles J. Kibert., Third Edition
2. Green Building A to Z, Jerry Yudelson.

REFERENCE BOOKS

1 Advanced Technology for Smart buildings, James Sinopoli

E BOOKS <https://www.springer.com/in/book/9789811010002><https://www.elsevier.com/books/smart-buildings/casini/978-0-08-100635-1>**MOOC** <https://www.mooc-list.com/tags/green-building>

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OPEN ELECTIVE - II

L	T	P	C
3	0	0	3

(R20CSE4182) Cyber Security Fundamentals

Course Objectives:

1. Understand the need for Cyber security and its related threats and attacks
2. Learn methods to become secure in the cyber world and securely communicate in the cyber world
3. Become knowledgeable about the best practices related to cyber security, regulations and laws associated with the same.

Course Outcomes:

The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context

UNIT I: Need for Cyber Security - Introduction to security- CIA triad-Case studies- security attacks- issues related to social networking - Guidelines

UNIT II: Methods to Secure yourself in the Cyber World - Why and What of Reversible and Irreversible Cryptographic mechanisms? Applications of Digital Signature - Good password practices

UNIT III: E-Commerce: Secure Transactions - What is E-commerce? – Online banking security- Online shopping fraud Guidelines and Recommendations

UNIT IV: EVERYDAY SECURITY - Connecting your laptop, mobile devices, PDAs to Internet- Managing your browser-Facebook Security-E-mail security – Safe guarding from Viruses: Antiviruses– Best practices and guidelines

UNIT V: CYBER SECURITY LAWS AND COMPETENT AUTHORITIES - Indian IT Act, 2008 - What is Cyber Forensics? – Functions of cybercrime cell – Responding to a cyber-attack

REFERENCES:

1. “Information Security Awareness Handbook, ISEA, Department of Electronics and Information Technology”, Government of India, 2010
2. deity.gov.in/sites/upload_files/dit/.../itact2000/it_amendment_act2008.pdf
3. www.schneier.com/blog/archives/2013/03/browser_securit.html
4. www.dhses.ny.gov/ocs/awareness-training-events/news/2010-03.cfm
5. <https://www.watsonhall.com/e-commerce-security/>

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OPEN ELECTIVE - II

L	T	P	C
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(R20ECE4183) Principles of Modern Communication Systems

Course Objectives:

This course aims at:

- Establishing a firm foundation for the understanding of telecommunication systems, and the relationship among various technical factors when such systems are designed and operated
- To provide the student with an understanding of the mobile Cellular communications and their evolution.
- To equip the students with various kinds of wireless networks and its operations.
- To provide students with solid foundation in orbital mechanics and launches for the satellite communication
- Radar fundamentals and analysis of the radar signals

UNIT I: The evolution of electronic communication: From smoke signals to smart phones - History of communications: Theoretical Foundations, Development & Applications - Frequencies for communication - Frequency regulations - Overview of communication transmitter and receiver.

UNIT II: Mobile Cellular Communications: Evolution to cellular networks – Cellular systems generations and standards: 1G, 2G, 3G, 4G - Cellular network components - Components of a mobile phone - setting up a call process - Making a call process - Receiving a call process - Spectrum allocation: Policies and strategies, Role of TRAI.

UNIT III: Wireless Communication: Introduction - Bluetooth - Infrared communication - IEEE Wireless LANs (Wi-Fi) - IEEE 802.16 (WiMAX) - Future mobile and wireless networks: Introduction to 5G- device to device communication- IoT.

UNIT IV: Satellite: History of Satellite communication, Basics of Satellites, Types of Satellites, Capacity Allocation - Launch Vehicles and Orbits: Introduction to launching vehicles, Important Orbits, working of rocket, Three Pioneers of Rocketry - Basics of Global Positioning System (GPS) - Applications of GPS.

UNIT V:RADAR& NAVIGATION: Introduction, Radar Block diagram and Operation, Radar Frequencies, Applications of Radar. Navigation Systems: Introduction & methods of navigation, Instrument Landing System, Microwave landing system- Modern Navigation systems.

REFERENCES:

1. S.Haykin, —Communication Systems, 4/e, John Wiley 2007
2. B.P.Lathi, —Modern Digital and Analog Communication Systems, 3/e, Oxford University Press,2007
3. Rappaport Theodore S - Wireless Communications: Principles and Practice, 2/E, Pearson
4. Education India, 2010 5. Vijay. K. Garg, —Wireless Communication and Networking, Morgan Kaufmann Publishers, 2007.
5. T.Pratt, C. Bostian and J.Allnutt; —Satellite Communications, John Wiley and Sons, Second Edition., 2003
6. M. I .Skolnik —Introduction to Radar Systems, Tata McGraw Hill 2006.
7. Myron Kyton and W.R.Fried —Avionics Navigation Systems, John Wiley & Sons 1997.

Course outcomes

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

- C415.1. Differentiate various elements, processes, and parameters in communication systems, and describe their functions, effects, and interrelationship (K2-Understand).
- C415.2. Interpret the mobile cellular concepts, standards and all generations of cellular systems. (K2-understand)
- C415.3. Describe the existing and emerging wireless standards and Compare various wireless networks and their specifications. (K5-Evaluate)
- C415.4. Demonstrate the history of Satellite communication, applications and orbit concepts, Placement of a Satellite in a Geo-Stationary orbit and GPS concept (K3- Apply)
- C415.5 Summarize the radar fundamentals and analysis of the radar signals. (K4- Analyze)
- C415.6 Explain the Navigation systems (K2-Understand).

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OPEN ELECTIVE - II

L	T	P	C
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(R20EEE4184) Illumination Engineering

COURSE OBJECTIVES:

- To provide an introduction to the fundamentals of illumination engineering and architectural lighting design.
- To impart lighting fundamentals, measurement, and technology and their application in the analysis and design of architectural lighting systems

COURSE OUTCOME: The students will be able to:

- i. Identify the criteria for the selection of lamps and lighting systems for an indoor or outdoor space
- ii. Perform calculations on photometric performance of light sources and luminaires for lighting design
- iii. Evaluate different types of lighting designs and applications

UNIT I: Introduction of Light : Types of illumination, Day lighting, Supplementary artificial lighting and total lighting, Quality of good lighting, Factors affecting the lighting-shadow, glare, reflection, Color rendering and stroboscopic effect, Methods of artificial lighting, Lighting systems-direct, indirect, semi direct, semi indirect, Lighting scheme, General and localized.

UNIT II: Measurement of Light: Definition of luminous flux, Luminous intensity, Lumen, Candle power, Illumination, M.H.C.P, M.S.C.P, M.H.S.C.P, Lamp efficiency, Brightness or luminance, Laws of illumination, Inverse square law and Lambert's Cosine law, Illumination at horizontal and vertical plane from point source, Concept of polar curve, Calculation of luminance and illumination in case of linear source, round source and flat source.

UNIT III: Design of Interior Lighting : Definitions of maintenance factor, Uniformity ratio, Direct ratio, Coefficients of utilization and factors affecting it, Illumination required for various work planes, Space to mounting height ratio, Types of fixtures and relative terms used for interior illumination such as DLOR and ULOR, Selection of lamp and luminance, Selection of utilization factor, reflection factor and maintenance factor Determination of Lamp Lumen output taking into account voltage and temperature variations, Calculation of wattage of each lamp and no of lamps needed, Layout of lamp luminaire, Calculation of space to mounting height ratio, Indian standard recommendation and standard practices for illumination levels in various areas, Special feature for entrance, staircase, Corridor lighting and industrial building.

UNIT IV: Design of Outdoor Lighting: Street Lighting : Types of street and their level of illumination required, Terms related to street and street lighting, Types of fixtures used and their suitable application, Various arrangements in street lighting, Requirements of good street lighting, Selection of lamp and luminaire, Calculation of their wattage, Number and arrangement, Calculation of space to mounting height ratio, Calculation of illumination level available on road.

UNIT V:Design of Outdoor Lighting: Flood Lighting: Terms related to flood lighting, Types of fixtures and their suitable applications, Selection of lamp and projector, Calculation of their wattage and number and their arrangement, Calculation of space to mounting height ratio, recommended method for aiming of lamp.

Special Features of Aesthetic Lighting: Monument and statue lighting, Sports lighting, Hospital lighting, Auditorium lighting.

Text Books:

1. D.C. Pritchard Lighting, Routledge, 2016
2. Jack L. Lindsey, Applied Illumination Engineering, PHI, 1991
3. John Matthews Introduction to the Design and Analysis of Building Electrical Systems, Springer, 1993
4. M.A. Cayless, Lamps and Lighting, Routledge, 1996

References:

1. IS CODE 3646
2. IS CODE 6665

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OPEN ELECTIVE - II

L	T	P	C
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(R20INF4185) E – COMMERCE

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

1. Understand the E – commerce strategies and value chains
2. Understand the E-commerce services
3. Understand E - commerce infrastructure, its applications and Supply Chain Management.
4. Know the availability of latest technology and applications of E-Payment Mechanism.
5. Apply E-Commerce in business-to-business application.

UNIT 1: Electronic Commerce: Overview, Definition, Advantages & Disadvantages of E-Commerce, Threats of E-Commerce, Managerial Prospective, Rules & Regulation for Controlling Commerce, Relationship Between E-Commerce & Networking, Different Types of Networking for E-Commerce, internet, Intranet, EDI Systems, Wireless Application Protocol: Definition, Hand Held Devices, Mobility & Commerce Model, Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement for E-Commerce, Business Model of E-Commerce; Model Based on Transaction Type, Model Based on Transaction Party- B2B, B2C, C2B, C2C, E-Governance.

UNIT 2: E-Strategy: Overview, Strategic Methods for developing E-Commerce. Four C's (Convergence, Collaborative, Computing, Content Management & Call Center). Convergence: Technological Advances in Convergence - Types, Convergence and its implications, Convergence & Electronic Commerce. Collaborative Computing: Collaborative Product Development, contract as per CAD, Simulations Collaboration, Security. Content Management: Definition of Content, Authoring Tools and Content Management, Content Management, Content - partnership, repositories, convergence, providers, Web Traffic.

UNIT 3: Traffic Management: Content Marketing Call Center: Definition, Need, Tasks Handled, Mode of Operation, Equipment, Strength & Weakness of Call Center, Customer Premises Equipment (CPE).

Supply Chain Management: E-logistics, Supply Chain Portal, Supply Chain Planning Tools (SCP Tools), Supply Chain Execution(SCE), SCEFramework, Internet's Effect on Supply Chain Power.

UNIT 4: E-Payment Mechanism: Payment through card system, E-Cheque, E-Cash, E-Payment, Threats& Protections.

E-Marketing: Home - Shopping, E-Marketing, Tele- Marketing

UNIT 5: Electronic Data Interchange (EDI): Meaning, Benefits, Concepts, Application, EDI Model, Protocols (UN EDI, FACT/ GTDI), ANSI-X12, Data Encryption (DES/RSA)

Risks of E-Commerce: Overview, Security for E-Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital Certificates, Digital Signatures.

Text Book:

1. Electronic Commerce - Technologies & Applications, Bhaskar Bharat, TMH

Reference Books:

1. E-commerce, MM Oka, EPH
2. Frontiers of Electronics Commerce, Kalakotia, Whinston, Pearson Education
3. Electronic Commerce, Loshinpete, Murphy P. A., Jaico Publishing Housing
4. E-Commerce, Murthy, Himalaya Publishing.

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OPEN ELECTIVE - II

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(R20MED4186) Industrial Design & Ergonomics

UNIT 1: Introduction: An approach to industrial design -elements of design structure for industrial design in engineering application in modern manufacturing systems. Ergonomics and Industrial Design: Introduction -general approach to the man- machine relationship- workstation design-working position.

UNIT 2: Control and Displays: Shapes and sizes of various controls and displays-multiple, displays and control situations - design of major controls in automobiles, machine tools etc Ergonomics and Production: ergonomics and product design -ergonomics in automated systems- expert systems for ergonomic design. Anthropometric data and its applications in ergonomic, design- limitations of anthropometric data- use of computerized database.

UNIT 3: Visual Effects of Line and Form: The mechanics of seeing- psychology of seeing general influences of line and form. Color: Color and light -color and objects- color and the eye -color consistency- color terms- reactions to color and color continuation -color on engineering equipment.

UNIT 4: Aesthetic Concepts: Concept of unity- concept of order with variety -concept of purpose style and environment- Aesthetic expressions. Style-components of style- house style, observation style in capital goods, case study.

UNIT 5: Industrial Design in Practice: General Design -specifying design equipment- rating the importance of industrial design -industrial design in the design process.

REFERENCE BOOKS:

1. Industrial Design for Engineers - Mayall W.H. - London Hiffie books Ltd.-1988.
2. Applied Ergonomics Hand Book - Brain Shakel (Edited) - Butterworth scientific. London
3. Introduction to Ergonomics - R. C. Bridger - McGraw Hill Publications -1995.
4. Human Factor Engineering - Sanders & McCormick - McGraw Hill Publications – 6th edition,2002.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

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B.Tech. - IV Year – I Semester

OPEN ELECTIVE - II

L	T	P	C
3	0	0	3

(R20HMS4187) Creative Writing

COURSE OBJECTIVE: This course introduces students to the practice of creative writing in the genres of poetry and fiction. In addition to honing their skills as creative writers, students will develop a critical vocabulary that will aid them in discussing poems and fiction produced by their peers. This course allows for experimentation with writing poetry, short fiction, and creative nonfiction in a writing workshop setting. Far from undertaking the task of making student a professional writer, this class has its goal to familiarize the learner with the dynamics of imaginative literature, the synergy of form and content, and with what makes a particular work effective.

COURSE OBJECTIVES:

1. Discuss with some confidence many of the rhetorical devices, from metaphor to enjambment associated with creative writing.
2. Appreciate the complexity of Poetry, Short Fiction, and Creative Nonfiction.
3. Understand the importance of Creative Writing as a means of self-expression.
4. Read and discuss with enhanced understanding Poetry, Short Fiction, and Creative Nonfiction
5. Show improvement in writing and analytical skills.

UNIT I: Introduction to Literary Forms - Elements of Poetry - Rhythm and Meter Poetic Forms – Ballad, Lyrics, Elegy, Odes, Haiku, Sonnets Literary Genres- Short Fiction, Drama, and Non-Fiction

UNIT II: Poetry Writing - Appreciation of the form and content of poem Techniques - figurative language - (structure - rhythm – imagery – tone – style point of view, voice - read and discuss numerous poems)

Ballad - The Ballad of the Landlord by Langston Hughes; Lyrics - Kubla Khan by Samuel Taylor Coleridge Elegy - Elegy Written in a Country's Churchyard by Thomas Gray Odes – Ode to a Nightingale by John Keats; Haiku - This Other World by Richard Wright Sonnet - On His Blindness by John Milton Students Creative Assignment – Students will write three poems.

UNIT III: Short Fiction / Novel - Elements of Fiction - Character – Plot- Setting – Theme - Style; Narrator - Point of view - Tone – Suspension of Disbelief. Genres - Adventure, Comic, Fantasy, Gothic, Romance, Historical, Horror, Supernatural, Thriller, Science Fiction - Gooseberries by Anton Chekhov Short Story - My Lost Dollar by Stephen Leacock Students Creative Assignment – Students will write one Short Story

UNIT IV: Drama - Elements of Drama - Character Plot, Theme, Dialogue, Convention, Genre, Audience, Stagecraft, Design, Conversions Drama – The King of the Dark Chamber by Rabindranath Tagore Students Creative Assignment- Students will write a review of the drama read in the class.

UNIT V: Non Fiction - Prose, Biography, Memoirs, and Personal Essays Walden or Life in the Woods by Henry David Thoreau Students Creative Assignment - Students will write one or two essays

REFERENCES

1. Candace H. Schaefer, Rick Diamond. 1998. The Creative Writing Guide: A Path to Poetry, Nonfiction, and Drama, Longman, New York, USA
2. Shelly Clark and Marjone Saisa, 2009. Road Trip: Conversations with Writers, The Backwaters Press, Nebraska, USA
3. Nikki Moustaki (ed.), 1998. Writing Fiction: The Practical Guide from New York's Acclaimed Creative Writing School, Publisher: Bloomsbury, ISBN: 0156005743.

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B.Tech. - IV Year – I Semester

OPEN ELECTIVE - II

L	T	P	C
3	0	0	3

(R20HMS4188) Design Thinking

Course Objectives:

- To create awareness of design among students of engineering
- To motivate students to think of design before implementing an engineering project
- To teach a systematic approach to identifying and defining a problem before brainstorming for a solution
- To instill a sense of significance towards applying creativity to product and service design

Course Outcomes: Upon completion of this course, the student shall be

1. Learn to identify design principles from an engineering perspective
2. Cultivate sensitivity towards design aspects in objects made by engineers and non-engineers, which are typically used in daily life
3. Understand and create visual design elements to communicate more effectively
4. Construct clear problem statements, understand the importance of validation, and design services creatively
5. Develop fundamental team skills: working in teams and managing teams, strategizing tasks, and streamlining activities pertaining to a project

Students' Responsibilities:

1. Students will form teams of 3–5 members each, while working collaboratively throughout the semester.
2. Students will present and report the tasks to the class and to the concerned faculty members and design experts, using their oral and written communication skills as well as creativity and team skills.
3. Students must proactively engage in observing the objects and processes which are part of their daily life and society from a design perspective and discuss with peers to learn collaboratively.

UNIT 1: Design Overview and Motivation History and Context of birth of Design; Design thinking: Introduction and Motivation; Various definitions and interpretations of design, Design Vocabulary; Design in Indian Context; Art and Design: Art in Design, Design beyond Art; Design in Creative Industries

UNIT 2: Design Sensitization for Engineers- Design Engineering vs. Engineering Design, Examples of Engineering Design and Design Engineering in various engineering domains, Examples of design failures leading to bad products and services, Real-world examples of bad design that caused engineering and technological disasters, Domain-specific Engineering Design examples

UNIT 3: Design Thinking Foundations The Design Double Diamond: Discover-Define-Develop-Deliver User-centric design approaches: Importance of user-centricity for design, Empathisation, Empathy Maps, Data collection from users and for users, Data Validation Responsible Innovation and Ethical Design: Ethics as foundation for design, Concern for environment and sustainability

UNIT 4: Communication Skills for Design, Culture and Art Communication Media to express an idea: Visuals, Text, Voice and Audio, Info graphics General guidelines for a good Presentation: Target audience, slideshow templates, appropriate visual elements, presentation styles, guidelines General guidelines for a good Report: Documentation classification, standards, styles, and templates Modes of communication: Reports and documents, Presentation, poster, graphic, blog or website. Understanding Art in Design: Need for creativity, Elements of Visual Design Aesthetics: Influences and impressions of Colors, Shapes, Layouts, Patterns, and Fonts as Design Elements

UNIT 5: Applied Creativity and Design for Services Methods to brainstorm solutions for user issues; Combining solutions to workable solution concepts; Identifying the user needs in a service-driven economy; Process Flows and Customer Experience considerations for designing and improving services; 5 Why's; Service Delivery Pathways. Doing Design Looking for a problem, Ideation and Rules of Ideation, Framing and stating the problem; Basic considerations of Prototyping/ Model Building, Basics of Testing and Validation, Incorporating feedback

TEXT BOOKS:

1. Daniel Ling, "Complete Design Thinking Guide for Successful Professionals", CreateSpace Independent Publishing, 2015 (ISBN: 978-1514202739)
2. Tim Brown, "Change by Design", Harper Business, 2012 (ISBN: 978-0062337382)
3. Jimmy Jain, "Design Thinking for Startups: A Handbook for Readers and Workbook for Practitioners", Notion Press, 2018 (ISBN: 978-1642495034)
4. Beverly Rudkin Ingle, "Design Thinking for Entrepreneurs and Small Businesses: Putting the Power of Design to Work", APress, 2013 (ISBN: 978-1430261810)

REFERENCES:

1. Donald A. Norman, "The Design of Everyday Things", MIT Press, 2013 (ISBN: 978-0262525671)
2. Bruno Munari, "Design As Art", Penguin UK, 2009 (ISBN: 978-0141035819)
3. Tom Kelly, Jonathan Littman, "The Art of Innovation", HarperCollins Business, 2002 (ISBN: 978-0007102938)
4. Thomas Lockwood, "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value", Allworth Press, 2009 (ISBN: 978-158115)

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B.Tech. - IV Year – I Semester

L	T	P	C
0	0	2	1

(R20CSM41L1) DEEP LEARNING LAB

Course Objectives:

1. To Build the Foundation of Deep Learning.
2. To Understand How to Build the Neural Network.
3. To enable students to develop successful machine learning concepts.

Course Outcomes:

1. Upon the Successful Completion of the Course, the Students would be able to:
2. Learn the Fundamental Principles of Deep Learning.
3. Identify the Deep Learning Algorithms for Various Types of Learning Tasks in various domains.
4. Implement Deep Learning Algorithms and Solve Real-world problems.

LIST OF EXPERIMENTS:

1. Setting up the Spyder IDE Environment and Executing a Python Program
2. Installing Keras, Tensorflow and Pytorch libraries and making use of them
3. Applying the Convolution Neural Network on computer vision problems
4. Image classification on MNIST dataset (CNN model with Fully connected layer)
5. Applying the Deep Learning Models in the field of Natural Language Processing
6. Train a sentiment analysis model on IMDB dataset, use RNN layers with LSTM/GRU notes
7. Applying the Autoencoder algorithms for encoding the real-world data
8. Applying Generative Adversial Networks for image generation and unsupervised tasks.

TEXT BOOKS:

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.
2. The Elements of Statistical Learning by T. Hastie, R. Tibshirani, and J. Friedman, Springer.
3. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.

REFERENCES:

1. Bishop, C.M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.H., and Van Loan, C.F., Matrix Computations, JHU Press, 2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw Hill Education, 2004.

EXTENSIVE READING:

1. <http://www.deeplearning.net>
2. <https://www.deeplearningbook.org/>
3. <https://developers.google.com/machine-learning/crash-course/ml-intro>
4. www.cs.toronto.edu/~fritz/absps/imagenet.pdf
5. <http://neuralnetworksanddeeplearning.com/>

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY**(An Autonomous Institution under UGC, New Delhi)****B.Tech. - IV Year – I Semester****L T P C****0 0 2 1****(R20CSM41P1) Technical Seminar****SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY****(An Autonomous Institution under UGC, New Delhi)****B.Tech. - IV Year – I Semester****L T P C****0 0 6 3****(R20CSM41P2) Comprehensive Viva-voce****SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY****(An Autonomous Institution under UGC, New Delhi)****B.Tech. - IV Year – I Semester****L T P C****0 0 0 2****(R20CSM41P3) Industrial Oriented Mini Project/ Summer Internship**

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L	T	P	C
3	0	0	3

(R20HMS4201) ORGANIZATIONAL BEHAVIOUR

Course Objectives: The objective of the course is to provide the students with the conceptual framework and the theories underlying Organizational Behaviour.

UNIT - I:

Introduction to OB - Definition, Nature and Scope – Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour. Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization – Social perception – Attribution Theories – Locus of control – Attribution Errors – Impression Management.

UNIT- II:

Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality - Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT - III:

Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making. Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra- individual conflict - strategies to cope with stress and conflict.

UNIT - IV:

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teams in modern work place.

UNIT - V:

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life- Socio technical Design and High-performance work practices - Behavioural performance management: reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders.

REFERENCE BOOKS:

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. Newstrom W. John & Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e, TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective, Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, NewDelhi, 2009.
7. Pareek Udai: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
8. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
9. Hitt: Organizational Behaviour, Wiley, 2008.

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B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20AID4202) SPEECH AND VIDEO PROCESSING (Professional Elective - VI)**Course Objectives:** Knowledge on speech and video processing techniques**Course Outcomes:**

1. Describe the mechanisms of human speech production systems and methods for speech feature extraction.
2. Understand basic algorithms of speech analysis and speech recognition.
3. Explain basic techniques in digital video processing, including imaging characteristics and sensors.
4. Apply motion estimation and object tracking algorithms on video sequence.

UNIT - I:

Speech processing concepts: The speech production mechanism, Discrete time speech signals, Pole-Zero modeling of speech, relevant properties of the fast Fourier transform for speech recognition, convolution, linear and nonlinear filter banks, spectral estimation of speech using DFT. Linear Prediction analysis of speech.

UNIT - II:

Speech recognition: Real and Complex Cepstrum, application of cepstral analysis to speech signal, feature extraction for speech, static and dynamic feature for speech recognition, robustness issues, discrimination in the feature space, feature selection, MFCC, LPCC, Distance measures, vector quantization models. Gaussian Mixture model, HMM.

UNIT - III:

Basics of Video Processing: Video formation, perception and representation: Principle of color video, video cameras, video display, pinhole model, CAHV model, Camera motion, Shape model, motion model, Scene model, two-dimensional motion models. Three-Dimensional Rigid Motion, Approximation of projective mapping.

UNIT - IV:

Motion estimation Techniques: Optical flow, motion representation, motion estimation criteria, optimization methods, pixel-based motion estimation, Block matching algorithm, gradient Based, Intensity matching, feature matching, frequency domain motion estimation, Depth from motion. Motion analysis applications: Video Summarization, video surveillance.

UNIT - V:

object tracking and segmentation: 2D and 3D video tracking, blob tracking, kernel based counter tracking, feature matching, filtering Mosaicing, video segmentation, mean shift based, active shape model, video shot boundary detection. Interframe compression, Motion compensation

TEXT BOOKS:

1. Fundamentals of Speech recognition – L. Rabiner and B. Juang, Prentice Hall signal processing series.
2. Digital Video processing, A Murat Tekalp, Prentice Hall.
3. Discrete-time speech signal processing: principles and practice, Thomas F. Quatieri, Coth.
4. Video Processing and Communications, Yao Wang, J. Osternann and Qin Zhang, Pearson Education.

REFERENCE BOOKS:

1. “Speech and Audio Signal Processing”, B. Gold and N. Morgan, Wiley.
2. “Digital image sequence processing, Compression, and analysis”, Todd R. Reed, CRC Press
3. “Handbook of Image and Video processing”, Al Bovik, Academic press, second Edition

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L	T	P	C
3	0	0	3

(R20MED4202) ROBOTIC PROCESS AUTOMATION (Professional Elective - VI)**Course Objectives:** Aim of the course is to make learners familiar with the concepts of Robotic Process Automation.**Course Outcomes:**

1. Describe RPA, where it can be applied and how it's implemented.
2. Identify and understand Web Control Room and Client Introduction.
3. Understand how to handle various devices and the workload.
4. Understand Bot creators, Web recorders and task editors.

UNIT - I

Introduction to Robotic Process Automation & Bot Creation Introduction to RPA and Use cases – Automation Anywhere Enterprise Platform – Advanced features and capabilities – Ways to create Bots.

UNIT - II

Web Control Room and Client Introduction - Features Panel - Dashboard (Home, Bots, Devices, Audit, Workload, Insights) - Features Panel – Activity (View Tasks in Progress and Scheduled Tasks) - Bots (View Bots Uploaded and Credentials).

UNIT - III

Devices (View Development and Runtime Clients and Device Pools) - Workload (Queues and SLA Calculator) - Audit Log (View Activities Logged which are associated with Web CR) - Administration (Configure Settings, Users, Roles, License and Migration) - Demo of Exposed API's – Conclusion – Client introduction and Conclusion.

UNIT - IV

Bot Creator Introduction – Recorders – Smart Recorders – Web Recorders – Screen Recorders - Task Editor – Variables - Command Library – Loop Command – Excel Command – Database Command - String Operation Command - XML Command.

UNIT - V

Terminal Emulator Command - PDF Integration Command - FTP Command - PGP Command - Object Cloning Command - Error Handling Command - Manage Windows Control Command - Workflow Designer - Report Designer.

TEXT BOOKS:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool – UiPath Kindle Edition.

REFERENCES:

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

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B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20CSD4202) RANDOMIZED ALGORITHMS (Professional Elective - VI)

Course Objective: To introduce the power of randomization in the design and analysis of algorithms.

Course Outcomes:

1. Appreciate the fundamentals of randomized algorithm design.
2. Understand the fundamentals of Markov chains and the Monte Carlo method.
3. Apply high probability analysis to selected randomized algorithms.
4. Understand the Comparison of Fingerprinting Techniques and Pattern Matching

UNIT - I

Introduction, A Min – Cut algorithm, Las Vegas and Monte Carlo, Binary Planar Partitions, A Probabilistic Recurrence. Game – Theoretic Techniques: Game Tree Evaluation, The Minimax Principle

UNIT - II

Moments and Deviations: Occupancy Problems, The Markov and Chebyshev Inequalities, Randomized Selection. Markov Chains and Random Walks: A 2-SAT example, Markov Chains, Random Walks on Graphs, Graph Connectivity

UNIT - III

Algebraic Techniques: Fingerprinting and Freivald's Technique, Verifying Polynomial Identities, Perfect Matching in Graphs, Verifying Equality of Strings, A Comparison of Fingerprinting Techniques, Pattern Matching

UNIT - IV

Data Structures: The Fundamental Data-structuring Problem, Random Treaps, Skip Lists, Hashtables, Hashing with $O(1)$ Search Time. Graph Algorithms: All Pairs Shortest Paths, The Min- Cut Problem, Minimum Spanning Trees

UNIT - V

Geometric Algorithms: Randomized Incremental Construction, Convex Hulls in the Plane, Duality, Half-Space Intersections, Dalaunay Triangulations, Trapezoidal Decompositions. Parallel and Distributed Algorithms: The PRAM Model, Sorting on a PRAM, Maximal Independent Sets, Perfect Matchings

TEXT BOOKS:

1. Randomized Algorithms: Rajeev Motwani, Prabhakar Raghavan.
2. Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and Data Analysis by Eli Upfal and Michael Mitzenmacher.

REFERENCE BOOK:

1. Rajeev Motwani, Prabhakar Raghavan, Randomized Algorithms, Cambridge University Press.

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B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20CSM4202) COGNITIVE COMPUTING (Professional Elective - VI)

Prerequisites: Probability theory

Course Objectives:

1. To provide an understanding of the central challenges in realizing aspects of human cognition.
2. To provide a basic exposition to the goals and methods of human cognition.
3. To develop algorithms that use AI and machine learning along with human interaction and feedback to help humans make choices/decisions.
4. To support human reasoning by evaluating data in context and presenting relevant findings along with the evidence that justifies the answers.

Course Outcomes:

1. Understand what cognitive computing is, and how it differs from traditional approaches.
2. Plan and use the primary tools associated with cognitive computing.
3. Plan and execute a project that leverages cognitive computing.
4. Understand and develop the business implications of cognitive computing.

UNIT – I : Introduction to Cognitive Science: Understanding Cognition, IBM's Watson, Design for Human Cognition, Augmented Intelligence, Cognition Modeling Paradigms: Declarative/ logic-based computational cognitive modeling, connectionist models of cognition, Bayesian models of cognition, a dynamical systems approach to cognition.

UNIT – II : Cognitive Models of memory and language, computational models of episodic and semantic memory, modeling psycholinguistics.

UNIT – III : Cognitive Modeling: modeling the interaction of language, memory and learning, Modeling select aspects of cognition classical models of rationality, symbolic reasoning and decision making.

UNIT – IV: Formal models of inductive generalization, causality, categorization and similarity, the role of analogy in problem solving, Cognitive Development Child concept acquisition. Cognition and Artificial cognitive architectures such as ACT-R, SOAR, OpenCog, CopyCat, Memory Networks.

UNIT – V : DeepQA Architecture, Unstructured Information Management Architecture (UIMA), Structured Knowledge, Business Implications, Building Cognitive Applications, Application of Cognitive Computing and Systems.

TEXT BOOKS:

1. The Cambridge Handbook of Computational Psychology by Ron Sun (ed.), Cambridge University Press.
2. Formal Approaches in Categorization by Emmanuel M. Pothos, Andy J. Wills, Cambridge University Press.

REFERENCE BOOKS:

1. Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles Cognitive Computing and Big Data Analytics, Wiley
2. Vijay V Raghavan, Venkat N. Gudivada, Venu Govindaraju, Cognitive Computing: Theory and Applications: Volume 35 (Handbook of Statistics), North Holland.

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B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20CSM4204) SEMANTIC WEB (Professional Elective - VI)

Course Objectives:

1. To learn Web Intelligence.
2. To learn Knowledge Representation for the Semantic Web.
3. To learn Ontology Engineering.
4. To learn Semantic Web Applications, Services and Technology.

Course Outcomes:

1. Understand the characteristics of Semantic Web.
2. Apply SOAP and UDDI to web services.
3. Handle multiple web services using Orchestration.
4. Create documents using XML.
5. Construct and use Ontologies.

UNIT - I

Introduction: Introduction to Semantic Web, the Business Case for the Semantic Web, XML and Its Impact on the Enterprise.

UNIT - II

Web Services: Uses, Basics of Web Services, SOAP, UDDI, Orchestrating Web Services, Securing Web Services, Grid Enabled and Semantic Web of Web Services.

UNIT - III

Resource Description Framework: Features, Capturing Knowledge with RDF.

XML Technologies: XPath, The Style Sheet Family: XSL, XSLT, and XSL FO, XQuery, XLink, XPointer, XInclude, XMLBase, XHTML, XForms, SVG.

UNIT - IV

Taxonomies and Ontologies: Overview of Taxonomies, Defining the Ontology Spectrum, Topic Maps, Overview of Ontologies, Syntax, Structure, Semantics, and Pragmatics, Expressing Ontologies Logically, Knowledge Representation.

UNIT - V

Semantic Web Application: Semantic Web Services, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base. Semantic Search Technology: Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods, Latent Semantic Index Search, TAP, Swoogle.

TEXT BOOK:

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley Interscience.

REFERENCE BOOKS:

1. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, Wiley Publishing, Inc.
2. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies,R.Studer, P.Warren, John Wiley & Sons.
3. Semantic Web and Semantic Web Services - Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
4. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
5. Programming the Semantic Web, T.Segaran, C.Evans,J.Taylor, O'Reilly,SPD.

Open Elective –III

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV4291	Remote Sensing Concepts	3	0	0	3
2	R20CSE4292	Fundamentals of Soft Computing				
3	R20ECE4293	Audio & Video Engineering				
4	R20EEE4294	Non Conventional Energy Resources				
5	R20INF4295	Information Security Fundamentals				
6	R20MED4296	Total Engineering Quality Management				
7	R20HMS4297	Human Values & Professional Ethics for Engineers				
8	R20HMS4298	Science Fiction				

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L	T	P	C
3	0	0	3

(R20CIV4291) Remote Sensing Concepts

COURSE OBJECTIVES: To introduce the concepts of remote sensing processes and its components. To expose the various remote sensing platforms and sensors and to introduce the elements of data interpretation

COURSEOUTCOMES:

1. At the end of the course the student will be able to understand
2. The characteristics of electromagnetic radiation and its interaction with earth features
3. The types and configuration of various satellites and sensors
4. The elements of data interpretation

UNIT I: Remote Sensing and Electromagnetic Spectrum- Definition – components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods - Electromagnetic Spectrum – wave theory, particle theory, Stefan – Boltzmann Law and Wien's Law – visible and non-visible spectrum – Radiation sources: active & passive; Radiation Quantities

UNIT II: EMR Interaction with Atmosphere- Standard atmospheric profile – main atmospheric regions and its characteristics – interaction of radiation with atmosphere - Scattering (Rayleigh, Mie, non-selective scattering) absorption and refraction – Atmospheric effects on visible, infrared, thermal and microwave spectrum – Atmospheric windows.

UNIT III: EMR Interaction with Earth- Energy balance equation – Specular and diffuse reflectors – Spectral reflectance & emittance – Spectro radiometer / Spectrophotometer – Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water body – Factors affecting spectral reflectance of vegetation, soil and water body.

UNIT IV: Platforms and Sensors- Ground based platforms – Airborne platforms – Space borne platforms – Classification of satellites – Sun synchronous and Geosynchronous satellites – Resolution concepts – Scanners - Along and across track scanners – Orbital and sensor characteristics of different satellites – Airborne and Space borne TIR sensors – Calibration – S/N ratio – Passive/Active microwave sensing – Airborne and satellite borne RADAR – SAR – LIDAR, UAV – High Resolution Sensors

UNIT V: Data Products and Visual Interpretation- Photographic (film and paper) and digital products – quick look products - High Resolution data products data - ordering – interpretation – basic characteristics of image elements – interpretation keys (selective and elimination) – visual interpretation of natural resources.

TEXT BOOKS:

1. Richards, Remote sensing digital Image Analysis-An Introduction Springer - Verlag 1993.
2. Lillesand, T.M. and Kiefer R.W. Remote Sensing and Image interpretation, John Wiley and Sons, Inc, New York, 2002.

REFERENCES:

1. Janza, F.Z., Blue H.M. and Johnson,J.E. Manual of Remote Sensing. Vol.I, American Society of Photogrametry, Virginia, USA, 2002.
2. Verbyla, David, Satellite Remote Sensing of Natural Resources. CRC Press, 1995
3. Paul Curran P.J. Principles of Remote Sensing. Longman, RLBS, 2003.

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L	T	P	C
3	0	0	3

(R20CSE4292) Fundamentals of Soft Computing

COURSE OBJECTIVES: The main objective of the Soft Computing Techniques to Improve Data Analysis Solutions is to strengthen the dialogue between the statistics and soft computing research communities in order to cross-pollinate both fields and generate mutual improvement activities.

UNIT I: Introduction: What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing. Neural Networks: What is Neural Network, Learning rules and various activation functions, Single layer Perceptrons, Back Propagation networks, Architecture of Back propagation(BP) Networks, Backpropagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications.

UNIT II:Fuzzy Systems: Fuzzy Set theory, Fuzzy versus Crisp set, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Logic, Fuzzy Rule based systems, Predicate logic, Fuzzy Decision Making, Fuzzy Control Systems, Fuzzy Classification.

UNIT III: Genetic Algorithm: History of Genetic Algorithms (GA), Working Principle, Various Encoding methods, Fitness function, GA Operators- Reproduction, Crossover, Mutation, Convergence of GA, Bit wise operation in GA, Multi-level Optimization.

UNIT 4: Hybrid Systems: Sequential Hybrid Systems, Auxiliary Hybrid Systems, Embedded Hybrid Systems, Neuro-Fuzzy Hybrid Systems, Neuro-Genetic Hybrid Systems, Fuzzy-Genetic Hybrid Systems.

UNIT V: GA based Backpropagation Networks:

GA based Weight Determination, K - factor determination in Columns.

Fuzzy Backpropagation Networks: LR type Fuzzy numbers, Fuzzy Neuron, Fuzzy BP Architecture, Learning in Fuzzy BP, Application of Fuzzy BP Networks

TEXT BOOKS:

1. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S.Rajasekaran, G. A. Vijayalakshami, PHI.
2. Genetic Algorithms: Search and Optimization, E. Goldberg.
3. Neuro-Fuzzy Systems, Chin Teng Lin, C. S. George Lee, PHI.
4. Build_Neural_Network_With_MS_Excel_sample by Joe choong.

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L	T	P	C
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(R20ECE4293) Audio and Video Engineering**Course Objectives:**

- Student are able understand different amplifiers, graphic equalizer and Dolby NR recording systems TV fundamentals like concept of aspect ratio ,image continuity etc Color theory
- Student are able to discuss composite video signal ad CCIR B standard for color signal Transmission and reception, monochrome TV transmitter and receivers, Color TV transmitter and compare TV camera tubes, Color picture tube
- Student are able Illustrate of color TV receivers(PAL-D) and Differentiate between NTSC PAL and SCAM systems cable Television, MATV, CATV, CCTV, Cable TV network and DTH

UNIT I: Hi Fi Audio Amplifier - Introduction to Amplifiers: Mono, Stereo, Public Address; Difference between stereo amplifier and Mono amplifier; Block diagram of Hi Fi amplifier and explanation; Graphic equalizer concept, circuit diagram and operation. (5 Point Circuit diagram); Dolby NR recording system; Types of speaker woofer, Midrange and Tweeter; Cross over network circuit and its function.

UNIT II: TV Fundamentals - Concept of Aspect ratio, image continuity, interlace scanning, scanning periods, horizontal and vertical, vertical resolution, horizontal resolution; Vestigial sideband transmission, bandwidth for Colour signal, picture tube, brightness, contrast, viewing distance luminance, hue, saturation, compatibility; Colour theory, primary colors and secondary colors, additive Colour mixing subtractive Colour mixing; Composite Video Signal, Pedestal height, Blanking pulse, Colour burst, Horizontal sync pulse details, Vertical sync pulse details, Equalizing pulses, CCIR B standards for Colour signal transmission and reception.

UNIT III: TV Transmitters and Receiver - Audio and Video signal transmission; Positive and Negative modulation; Merits and Demerits of Negative modulation; Introduction to television camera tube (a) Vidicon; (b) Plumbicon; (c) Solid State camera based on CCD; Color Picture tube (a) PIL, (b) Delta gun picture tube; Block diagram of monochrome TV transmitter; Block diagram of Colour TV transmitter; Block diagram of monochrome TV Receiver.

UNIT IV: Colour TV - Block Diagram and operation of color TV receiver (PAL D type); Explain – YagiUda Antenna; Explain block diagram of PAL-D decoder with circuit diagram of chroma signal amplifier, Burst pulse blanking, Colour killer control, Basic Circuit for Separation of U and V signals. AGC Amplifier.Colour signal matrixing, RGB drive amplifiers; EHT generation: circuit explanation for line output stage using transistor or IC in Colour TV; Comparisons between NTSC, PAL and SCAM Systems.

UNIT V: Cable Television - Working principle and specification of following components : Dish antenna, LNBC, Multiplexer, Attenuators Connectors (two ways and three ways), Amplifier and cable; MATV,CATV and CCTV;Design concept for cable TV network; Block diagram of dB meter with working principle; Direct to Home System (DTH) Introduction and Block Diagram.

References :

1. Television & Radio Engineering (A.M. Dhake) Tata McGraw Hill.
2. Television Engg and Video System (R.G. Gupta) Tata McGraw Hill.
3. Audio Video Systems (R.G. Gupta) Tata McGraw Hill.
4. Modern TV Praticce (R.R. Gulati) New Age International.
5. Basic Radio and Television (S. Sharma) Tata McGraw Hill.
6. Colour Television Principles and Praticce (R.R. Gulati) New Age International.
7. Basic Television and Video System (Bernard Grob) Tata McGraw Hill.
8. Mono Chrome and Colour Television (R.R. Gulati) New Age International.
9. Modern CD Player Servicing Manual (ManoharLotia) BPB Publication.

Course Outcomes:

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

- C423.1. Explain and differ ate the different amplifiers, graphic equalizer and Dolby NR recording systems (K3-apply)
- C423.2. Describe the TV fundamentals like concept of aspect ratio, image continuity etc Color theory (K2-Understand)
- C423.3. Discuss about composite video signal ad CCIR B standard for color signal Transmission and reception (K2-Understand)
- C423.4. Discuss monochrome TV transmitter and receivers, Color TV transmitter and compare TV camera tubes, Color picture tube (K5-Evaluate)
- C423.5. Diagram Illustrate of color TV receivers (PAL-D) and Differentiate between NTSC PAL and SCAM systems (K4-Analyse)
- C423.6. Explain about cable Television, MATV, CATV, CCTV, Cable TV network and DTH (K2-Understand)

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(R20EEE4294) Non Conventional Energy Resources

This course helps the students to understand the importance, availability, conversion technologies of renewable energy resources and its applications

1. To emphasize the current energy status and role of non-conventional and renewable energy sources.
2. To familiarize various aspects of Solar energy and utilization
3. To familiarize various aspects of Wind energy and utilization
4. To familiarize various aspects of Biomass energy and utilization
5. To emphasize the significance of Green Energy Technologies.

UNIT I: SOLAR ENERGY - Solar radiation its measurements and prediction - Solar thermal collectors - Flat plate collectors, Concentrating collectors – Applications - Heating, Cooling, Desalination, Drying, Cooking, etc - Principle of photovoltaic conversion of solar energy - Types of solar cells and fabrication - Photovoltaic applications - Battery charging, Domestic lighting, Street lighting and water pumping.

UNIT II: WIND ENERGY - Wind energy - Energy chains - Application - Historical background, Merits and limitations - Nature of wind - Planetary and local day / night winds - Wind energy quantum - Power in wind- Turbine efficiency - Torque Thrust calculations Velocity at different heights - Site selection - Components of Wind Energy Conversion System (WECS).

UNIT III: BIOMASS ENERGY - Energy from Biomass - Biomass as Renewable Energy Source - Types of Bio mass Fuels - Solid, Liquid and Gas - Biomass Conversion Techniques- Wet Process, Dry Process-Photosynthesis - Biogas Generation - Factors affecting Biodigestion - Classification of bio gas plant - Continuous, Batch and Fixed Dome types - Advantages and Disadvantages.

UNIT IV: TIDAL, OTEC, HYDEL AND GEOTHERMAL ENERGY - Tidal energy: Tide – Spring tide, Neap tide – Tidal range – Tidal Power – Types of tidal power plant – Single and dual basin schemes – Requirements in tidal power plant - Ocean Thermal Energy Conversion (OTEC): Principle - Open and closed OTEC Cycles - Hydel Energy: Micro hydro - Geothermal Energy: Geothermal energy sources - Power plant and environmental issues.

UNIT V: NEW ENERGY SOURCES - Hydrogen as a renewable energy source - Sources of Hydrogen - Fuel for Vehicles - Hydrogen Production - Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production - Storage of Hydrogen - Gaseous, Cryogenic and Metal hydride - Fuel Cell – Principle of working, construction and applications.

TEXT BOOKS

1. Rai.G.D, “Non- conventional resources of energy”, Khanna publishers, Fourth edition, 2010.
2. Khan. B.H, “Non-Conventional Energy Resources”, The McGraw Hills, Second edition, 2009.

REFERENCES

1. Rao.S&Parulekar, “Energy Technology”, Khanna publishers, Fourth edition, 2005.
2. Pai.B.R and Ram Prasad.M.S, “Power Generation through Renewable Sources of Energy”, Tata McGraw Hill, New Delhi, 1991.
3. Bansal.N.K, Kleeman and Meliss, “Renewable energy sources and conversion Techniques”,

Tata McGraw hill, 1990.

4. Godfrey Boyl “Renewable Energy: Power Sustainable Future”, Oxford University Press, Second edition, 2006.
5. Ryan O’Hayre, Suk-Won Cha and Whitney colella, “Fuel Cell Fundamentals”, Second edition, 2009.
6. John W Twidell and Anthony D Weir, “Renewable Energy Resources”, Taylor and Francis, 2006.
7. Freris.L.L, “Wind Energy Conversion systems”, Prentice Hall, UK, 1990.

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(R20INF4295) Information Security Fundamentals

COURSE OBJECTIVES:

1. To provide impeccable knowledge on various technical aspects of Information Security & Computer Security principles
2. To provide foundation for understanding the key issues associated with protecting Computer Systems & Information Assets.
3. To provide competency in designing consistent & reasonable Information security system with appropriate Scanning & Enumeration mechanisms, determining the level of protection and Response to security incidents.

UNIT I: Introduction to Information Security - Introduction to Information Security, Need for Security - Threats to security & Attacks, Computer System Security and Access Controls - System access and data access.

UNIT II: Communication Security - Introduction to cryptography, cryptosystems, Encryption & Decryption Techniques - classical encryption techniques, communication channel used in cryptographic system, various types of ciphers, Cryptanalysis, Hash function and Data integrity, Security of Hashing function.

UNIT III: Network - Introduction to Network Security, Email Security, IP Security, Web Security, Kerberos, X.509 techniques.

UNIT IV: Scanning & Enumeration Technology - Malicious software, Firewalls, Honey pots, Intrusion Detection system, Intrusion Prevention system

UNIT V: Ethics In Information Security - Implementing Information Security, Legal Ethical & Professional issues in Information Security.

TEXT BOOKS:

1. Matt Bishop, "Computer Security: Art and Science", Addison-Wesley Professional, First Edition, 2003. ISBN: 0201440997.
2. William Stallings, "Cryptography and Network Security", Pearson Education, Fourth Edition, 2006. ISBN: 8177587749

REFERENCES:

1. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security" Cengage Learning, Fourth Edition, 2010, ISBN: 1111138214
2. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network security: private communication in a public world", Second Edition, ISBN: 0130460192.
3. Dieter Gollmann, "Computer Security", Third Edition, ISBN: 0470741155.

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(R20MED4296) Total Engineering Quality Management

COURSE OBJECTIVE: To understand the Engineering and Management aspects of Planning, Designing, Controlling and Improving Quality in Manufactured products.

COURSE OUTCOMES:

1. To understand the fundamentals of quality
2. To understand the role of TQM tools and techniques in elimination of wastages and reduction of defects
3. To develop quality as a passion and habit

UNIT I: Quality Gurus And TQM Kitemarks - Evolution of TQM – Quality Guru's – Edward Deming – Joseph Juran – Philip Crosby – Genichi Taguchi – Walter Shewart – Criteria for Deming's Prize
UNIT II - PRODUCT DESIGN AND ANALYSIS (9 hours) Basic Design Concepts and TQM – Design Assurance – Design Validation – Failure Mode Effect Analysis – Fault Tree Analysis – Design for Robustness – Value Analysis

UNIT-III: Process Improvement and Modern Production Management Tools - Six Sigma Approach – Total Productive Maintenance – Just-In-Time – Lean Manufacturing Paradigms

UNIT IV: Quality Improvement Tools and Continuous Improvement - Q-7 Tools – New Q-7 Tools – Quality Function Deployment – Kaizen – 5S – PokaYoke

UNIT V: Quality Management Systems - Quality Management Systems – Introduction to ISO9000 – TS16949:2002 and EMS14001 certifications.

TEXT BOOKS

1. Total Engineering Quality Management, Sunil Sharma, 1st Edition, MacMillan India Limited.
2. Total Quality Management, Poornima M. Charantimath, 2nd Edition, Pearson Education.

REFERENCES

1. "Quality and Performance Excellence", James R Evans, Edition, 7th Edition, Cengage Learning.
2. "Quality Management", Howard S Gitlow, Alan J Oppenheim, Rosa Oppenheim, David M Levine, 3rd Edition, Tata McGraw Hill Limited.
3. "Fundamentals of Quality Control & Improvement", Amitava Mitra, 3rd Edition, Wiley Publications, 2012.

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(R20HMS4297) Human Values & Professional Ethics for Engineers

Course Objectives:

1. To know the different moral and ethical issues through various prominent theories.
2. To educate the code of ethics as well as the industrial standards and how they can be used for ensuring safety and reducing the risk.
3. To vocalize the Rights and Responsibilities of individuals.
4. To enable the students to imbibe and internalize the Values and Ethical Behavior in the personal and Professional lives.

Course Outcome: The students will understand the importance of Values and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT – I Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT – II Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT – III Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers – The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT – IV Work Place Rights & Responsibilities, Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research – The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.

UNIT – V Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCES

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e ,Cengage learning, 2015.
2. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

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(R20HMS4298) Science Fiction

COURSE OBJECTIVES: To help learners understand the link between Science and Technology and Humanities, especially Fiction form in Literature, with a view to instilling in them a sensitivity to the current issues of the world and probable issues that will crop up in the future world and imbibe in them a fine sensibility to appreciate and handle with balance the borderline problems of interdisciplinary nature with integrity and responsibility.

COURSE OUTCOMES:

1. To enable the learners to appreciate the literary form of Science Fiction
2. To give them a firsthand linguistic experience of the various types of Science Fiction novels
3. To equip the learners with the discretion to distinguish between a successful/effective science fiction novel and the one not so
4. To enhance the learners' communication skills and to develop their potential for creative writing
5. To spark off the dormant researcher in the learner so that he/she will use it for the betterment of the world

UNIT I: Science Fiction – an Introduction - 1. What is science fiction? Characteristics. 2. Classification 3. Types 4. A Historical Overview

UNIT II: Novels of other Worlds - 1. Utopian Science Fiction Novels Huxley, Aldous. Island.1932; Harper Perennial Classics, 2002. 2. Dystopian Science Fiction Novels Huxley, Aldous. Brave New World.Chatto and Windus, 1962.

UNIT III: Novels of other Beings - 1. Robots and Science Fiction Asimov, Isaac.I Robot.Granada, 1950. 2. Aliens and Science Fiction Card, Orson Scott. Ender's Game. Starscape, 2002.

UNIT IV: Novels of Time Travel -1. Travel into future a. H. G. Well's Time Machine. 2. Travel into past a. Asimov, Isaac and Robert Silverberg. Child of Time.Tor, 1993.

UNIT V : Novels on Women's Issues - 1. Man Controlling Women a. Shelley, Mary. Frankenstein.1818; Barnes and Noble, 2009. 2. Varied Identities of Women b. RUSS, JOANNA. THE FEMALE MAN. BEACON PRESS, 2000

REFERENCES

1. Seed, David. "Science Fiction: A Very Short Introduction". OUP, 2011.
2. Roberts, Adam. "Science Fiction". 2 revised. Routledge, 2005.
3. Moylan, Tom and RaffaellaBaccolini. "Dark Horizons: Science Fiction and the Dystopian Imagination". Routledge, 2003.
4. Little, Judith.A. "Feminist philosophy and science fiction: utopias and dystopias", Prometheus Press, 2007.
5. Atwood, Margaret. "In Other Worlds".Anchor, 2012.
6. Reid, Robin.A. "Women in Science Fiction and Fantasy".Greenwood Press, 2009. 7. Schneider, Susan. "Science Fiction and Philosophy: From Time Travel to Superintelligence", Wiley Blackwell, 2009.
7. Drout, Michael D.C. From "Here to Infinity: An Exploration of Science Fiction Literature",. 7 CDs. Published in 2006 by Recorded Books.
8. Melzer, Patricia. "Alien Constructions: Science Fiction and Feminist Thought", University of Texas Press, 2006.

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(R20CSM42P1) PROJECT WORK