ACADEMIC REGULATIONS

COURSE STRUCTURE AND

DETAILED SYLLABUS

COMPUTER SCIENCE AND ENGINEERING

M.TECH 2 YEAR PG COURSE

(Applicable for the batches admitted from 2020-2021)

REGULATION: R20

(I & II Year Syllabus)

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
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J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

(Permanently Affiliated to JNTUH, Approved By AICTE, New Delhi and Accredited By NBA, NAAC)

Academic Regulations of M.Tech (Regular/Full Time) Programmes, 2020-21 (R20) (CBCS)

(Effective for the students admitted into I year from the Academic Year 2020-21 and onwards)

1.0 Post-Graduate Degree Programmes in Engineering & Technology (PGP in E & T)

J. B. Institute of Engineering and Technology (JNTUH) offers **Two** Years (**Four** Semesters) full-time Master of Technology (M. Tech.) Degree programmes, under Choice Based Credit System (CBCS) in the following branches of Engineering and Technology with different specializations as mentioned below:

Computer Science & Engineering	Computer Science & Engineering
Electronics & Communication Engineering	VLSI System Design
Electrical & Electronics Engineering	Electrical Power Systems
Mechanical Engineering	CAD / CAM
Civil Engineering	Structural Engineering

2.0 Eligibility for Admissions

2.1 Admission to the PGPs shall be made subject to eligibility, qualification and specializations prescribed by the University from time to time, for each specialization under each M.Tech programme.

2.2 Admission to the post graduate programme shall be made on the basis of either the merit rank or Percentile obtained by the qualified student in the relevant qualifying GATE Examination/ the merit rank obtained by the qualified student in an entrance test conducted by Telangana State Government (PGCET) for M.Tech. programmes.

2.3 The medium of instructions for all PG Programmes will be **ENGLISH** only.

3.0 M.Tech. Programme (PGP in E & T) Structure

3.1 The M.Tech Programmes in E & T of JBIET are of Semester pattern, with **Four** Semesters consisting of **Two** academic years, each academic year having **Two** Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 22 weeks duration (inclusive of Examinations), with a minimum of 90 instructional days per Semester.

3.3 **UGC/AICTE** specified definitions/descriptions are adopted appropriately for various terms and abbreviations used in these PG academic regulations, as listed below:

3.3.1 Semester Scheme

Each Semester shall have 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) are taken as 'references' for the present set of Regulations. The terms 'SUBJECT' and 'COURSE' imply the same meaning here and refer to 'Theory Subject', or Lab Course', or 'Design/Drawing Subject', or 'Seminar', or 'Comprehensive Viva', or 'Project', or 'Technical Paper Writing' as the case may be.

3.3.2 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
- One credit for two hours/ week/semester for laboratory/ practical (P) courses or tutorials (T)
- Other student activities like study tour, guest lecture, conference/workshop participations, technical paper presentations, and identified mandatory courses, if any, will not carry credits.

3.3.3 Subject Course Classification

All subjects / courses offered for the Post-Graduate Programme in E & T (M.Tech Degree Programme) are broadly classified as follows. The institute has followed in general the guidelines issued by AICTE/UGC.

S.No.	Broad Course Classification	Course Group/ Category	Course Description
1	Core Courses (CoC)	PC- Professional Core	Includes subjects related to .the parent discipline/department/ branch of Engineering.
		Project Work	M.Tech Project or PG Project or Major Project
		Seminar, Technical Paper Writing	Seminar/Colloquium based on core contents related to parent discipline/department/branch of Engineering.
		Comprehensive Viva-Voce	Viva-voce covering all the PG subjects studied during the course work and related aspects
2	Elective Courses	PE - Program Electives	Includes elective subjects related to the parent discipline/department/branch of Engineering.

	(E1E)	OE - Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline/department/ branch of Engineering.
Total number of Credits = 68			

4.0 Course Registration

4.1 A 'Faculty Advisor or Counselor' shall be assigned to each specialization, who will advise on the Post Graduate Programme (PGP), its Course Structure and Curriculum, Choice/Option for Subjects/ Courses, based on his competence, progress, pre-requisites and interest.

4.2 The Department invites 'Registration Forms' from students. Registration requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

4.3 A Student can apply for Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from his Faculty Advisor, which should be submitted to the Department

4.4 If the Student submits ambiguous choices or multiple options or erroneous entries during Registration for the Subject(s) / Course(s) under a given/ specified Course Group/ Category as listed in the Course Structure, only the first mentioned Subject/ Course in that Category will be taken into consideration.

4.5 Subject/ Course Options exercised through Registration are final and CANNOT be changed, nor can they be inter-changed; further, alternate choices also will not be considered. However, if the Subject/ Course that has already been listed for Registration by the Department in a Semester could not be offered due to unforeseen or unexpected reasons, then the Student will be allowed to have alternate choice either for a new Subject, if it is offered, or for another existing Subject (subject to availability of seats). Such alternate arrangements will be made by the Head of Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

4.6 Open electives: The students have to choose one open elective (OE-I) from the list of open electives given in II year I semester.

4.7 Program electives: The students have to choose 5 Program electives (PE-I to V) from the list of program electives given. (2 PEs in I Semester, 2 PEs in II Semester and 1 in III Semester)

5.0 Attendance Requirements

The programmes are offered on the basis of a unit system with each subject being considered a unit.

5.1 A student is 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) for that semester..

5.2 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned on medical grounds.

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

5.4 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester.

5.5 A student fulfills the attendance requirement in the present semester, shall not be eligible for readmission into the same class.

5.6 A prescribed fee per subject shall be payable for condoning shortage of attendance.

6.0 Academic Requirements

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no. 5. The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks per subject / course (theory / practical), on the basis of Internal Evaluation and Semester End Examination.

6.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course, if he secures not less than 40% of marks (28 out of 70 marks) in the End Semester Examination, and a minimum of 50% of marks in the sum total of CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

6.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to a subject/ course, if he secures not less than 50% of the total marks. The student is deemed to have failed, if he (i) does not attend the comprehensive viva-voce as per the schedule given, or (ii) does not present the seminar as required, or (iii) does not present the Technical Paper Writing as required. In such a case, he may reappear for comprehensive viva-voce in supplementary examinations and for seminar/ technical paper writing, in the subsequent semesters, as and when scheduled.

6.3 A student shall register for all subjects for total of 68 credits as specified and listed in the course structure for the chosen specialization, put in required the attendance and fulfill the academic requirements for securing 68 credits obtaining a minimum of 'B' Grade or above in each subject, and all 68 credits securing Semester Grade Point Average **(SGPA) 6.0** (in each semester) and final Cumulative Grade Point Average **(CGPA)** (i.e., CGPA at the end of PGP**) 6.0**, to complete the PGP successfully.

6.4 Marks and Letter Grades obtained in all those subjects covering the above specified 68 credits alone shall be considered for the calculation of final CGPA, which will be indicated in the Grade Card /Marks Memo of second year second semester.

6.5 If a student registers for extra subject(s) (in the parent department or other departments/ branches of Engineering) other than those listed subjects totalling to 68 credits as specified in the course structure, the performance in extra subject(s) (although evaluated and graded using the same procedure as that of the required 68 credits) will not be taken into account while calculating the SGPA and CGPA. For such extra subject(s) registered, a certificate will be issued with a letter grade indicated as a performance measure, subject to completion of the attendance and academic requirements as stated in items 5 and 6.1 - 6.3.

6.6 A student eligible to appear for the Semester End Examination in any subject, but absent from it or failed (failing to secure 'B' Grade or above), may reappear for that subject at the supplementary examination as and when conducted. In such cases, his Internal Marks assessed earlier for that subject will be carried over, and added to the marks secured in the supplementary examination, for the purpose of evaluating his performance in that subject.

6. 7 A Student who fails to earn 68 credits as per the specified course structure, and as indicated above, within **four** academic years from the date of commencement of his first year first semester, shall forfeit his seat in M.Tech. programme and his admission **shall stand cancelled.**

7.0 Evaluation - Distribution and Weightage of Marks

7.1 The performance of a student in every subject/course (including practicals) will be evaluated for 100 marks each, with 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for SEE (Semester End-Examination).

7.2 For theory courses, during the semester there are 2 mid-term examinations (internal exams of 25 marks each) and 2 assignments carrying 5 marks each.

7.3 Each mid-term examination will be of 1 hour 20 minutes consisting of Part-A (short answer questions) for 10 marks and Part-B (long answer) for 15 marks. Part-A consists of 5 two marks questions and Part- B consists of 4 questions carrying 5 marks each and student should answer 3 questions.

7.4 First mid-term examination is conducted for first 2 units of syllabus and second mid-term examination is conducted for remaining 3 units of syllabus.

7.5 The Continuous Internal Evaluation for theory course shall be made as average of marks obtained in CIE – I and CIE –II as detailed in the table below.

CIE – I	Marks	CIE - II	Marks
MID – I	25	MID - II	25
Assignment – I	5	Assignment - II	5
Total	30	Total	30

7.6 If a student is absent for any test/assignment, he is awarded zero marks for that test/assignment. However a candidate may be permitted on genuine grounds provided he/she has taken permission before the mid-term examination from the Head of the Department. Moreover, he/she has to apply for makeup examinations within a week after completion of mid-term examinations. A subcommittee will be constituted with the following composition to look into such cases.

Subcommittee-composition:

S.No	Faculty Member	Designation
1	Concern Head of the Department	Chairman
2	Senior faculty nominate by Principal	Member
3	One Senior faculty member of the concern department	Member
4	One faculty member of the other department	Member
5	Additional Controller of Examinations	Convener

7.7 The details of the Question Paper pattern for Semester End Examination (Theory) are given below:

The Semester End Examination will be conducted for 70 marks. It consists of two parts. i).Part A for 20 marks, ii). Part B for 50 marks.

- Part A is compulsory and consists of 5 questions, one from each unit and carrying 4 marks each.
- Part-B consists of five questions 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.

7.8 For practical subjects, 70 marks shall be awarded for performance in the Semester End Examinations and 30 marks shall be awarded as Internal Marks. Out of the 30 marks for internal evaluation, day-to-day work in the laboratory is evaluated for 20 marks and internal practical examination is evaluated for 10 marks conducted by the laboratory teacher concerned.

7.9 The semester end examination is conducted with an external examiner and the laboratory teacher. The external examiner is selected and appointed by the Principal from the list submitted by Head of the Department.

7.10 There shall be a Seminar presentation during II Year I semester. For Seminar student under the supervision of a faculty member shall collect literature on a topic and critically review the literature and submit a report to the Department. Upon acceptance of the report by the Department committee candidate shall make an oral presentation before the Department Commitee. The Department Committee comprising of Head of The Department, supervisor, and two other senior faculty members of the Department shall evaluate for 50 marks. There is no external Evaluation for the Seminar.

7.11 There shall be a mini project preferably suggested by the industry of their specialization. The mini project shall be carried out during the summer vacation between I Year II Semester and II year I Semester is evaluated for 50 marks in the II Year I Semester by the Head, Supervisor/ mentor and a senior faculty of the department. A candidate has to secure a minimum of 50% of marks (*25 out of 50*) to be declared successful. If he fails to obtain the minimum marks, he has to reappear for the same during the supplementary examinations as and when conducted, subject to item 3.2.

7.12 There shall be a dissertation/major project work of one-year duration which contributes strong weightage in the curriculum in the II year. It is expected to undertake industrially relevant problem to develop an optimal solution through extensive research work. The students and faculty can design the research project in consultation with industry preferably in the region. The planning of laboratory work/modelling/computational work with execution schedule is suggested at the beginning of the programme to ensure expected outcome. This will lead to creation of patents from the result of the programme.

7.13 Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

7.14 A Project Review Committee (PRC) shall be constituted with the Head of the Department as Chairperson, Project Coordinator and one senior faculty member of the Departments offering the M. Tech. programme.

7.15 Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement in all the subjects, both theory and practicals.

7.16 After satisfying 7.15, a candidate has to present in Project Work Review I, in consultation with his Project Supervisor, the title, objective and plan of action of his project work to then Project Work Review Committee (PRC) for approval within four weeks from the commencement of Second Year First Semester. Only after obtaining the approval of the PRC can the student initiate the Project work.

7.17 If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the PRC. However, the PRC shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

7.18 A candidate is permitted to submit Project Thesis only after successful completion of all theory and practical courses with the approval of PRC not earlier than 40 weeks from the date of approval of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Head of the Department and make an oral presentation before the PRC.

7.19 The major project work shall be carried out in two stages: Project Stage – I during II Year I Semester, Project Stage – II during II Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in II Year I semester and second report includes project work carried out in II Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.

7.20 For Project Stage – I, the Project Review Committee shall evaluate the project work for 50 marks and project supervisor shall evaluate for 50 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 50% marks in the sum total of the CIE and SEE taken together.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.21 For Project Stage – II, the external examiner shall evaluate the project work for 50 marks and the project supervisor shall evaluate it for 50 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 50% marks in the sum total of the CIE and SEE taken together. For conducting viva-voce of project stage – II, Principal selects an external examiner from the panel of experts in the relevant branch submitted by the HOD.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.22 After approval from the PRC, the soft copy of the thesis should be submiitted to the Department for ANTI-PLAGIARISM for the quality check and the plagiarism report should be included in the final thesis. If the copied information is less than 30%, then only thesis will be accepted for submission.

7.23 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College, after submission of a research paper related to the project work in a UGC approved journal. A copy of the submitted research paper shall be attached to thesis.

7.24 The Project Viva-Voce External examination marks must be submitted to the Exam Branch on the same day of the examination.

8.0 Re-Admission/Re-Registration

8.1 Re-Admission for Discontinued Student

A student, who has discontinued the M.Tech. degree programme due to any reason whatsoever, may be considered for '**readmission**' into the same degree programme (with the same specialization) with the academic regulations of the batch into which he gets readmitted, with prior permission from the authorities concerned, subject to item 6.6.

9.0 Examinations and Assessment - The Grading System

9.1 Grades will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practicals, or Seminar, or Technical Paper Writing or Project, etc., based on the % of marks obtained in CIE + SEE (Continuous Internal Evaluation + Semester End Examination,

both taken together) as specified in Item 7 above, and a corresponding Letter Grade shall be given.

9.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a subject/Course (Class Intervals)	**Letter Grade (UGC Guidelines)**	**Grade Points**
90% and above (≥90% , ≤ 100%)	O (Outstanding)	10
Below 90% but not less than 80% (≥80% , <90%)	A^+ (Excellent)	9
Below 80% but not less than 70% (≥ 70% , <80%)	A (Very Good)	8
Below 70% but not less than 60% (≥60% , <70%)	B^+ (Good)	7
Below 60% but not less than 50% (≥50% , <60%)	B (above Average)	6
Below 50% (< 50%)	F (FAIL)	0
Absent	**Ab**	**0**

9.3 A student obtaining F Grade in any Subject is deemed to have 'failed' and is required to reappear as 'Supplementary Candidate' for the Semester End Examination (SEE), as and when conducted. In such cases, his Internal Marks (CIE Marks) in those subjects will remain as obtained earlier.

9.4 If a student has not appeared for the examinations, 'Ab' Grade will be allocated to him for any subject and shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' for the Semester End Examination (SEE), as and when conducted.

9.5 A Letter Grade does not imply any specific marks percentage; it is only the range of percentage of marks.

9.6 In general, a student shall not be permitted to repeat any Subject/ Course (s) only for the sake of 'Grade Improvement' or 'SGPA/ CGPA Improvement'.

9.7 A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him 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

9.8 The student passes the Subject/ Course only when he **gets GP ≥ 6 (B Grade or above).**

9.9 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (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 :

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

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 Gi represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

9.10 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over 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 Second Semester onwards, at the end of each Semester, as per the formula mentioned below:

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

(i.e., up to and inclusive of S semesters, S ≥ 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' for from the 1^{st} Semester onwards upto and inclusive of the Semester S (obviously M > N), 'j' is the Subject indicator index (taking into account all Subjects from 1 to S Semesters), C is the no. of Credits allotted to the j^{th} Subject, and G 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 however, 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*8 = 32
Course 2	4	O	10	4*10 = 40
Course 3	4	B	6	4*6 = 24
Course 4	3	B	6	3*6 = 18
Course 5	3	A+	9	3*9 = 27
Course 6	3	B	6	3*6 = 18
	21			159

Illustration of calculation of CGPA

Semester	Credits	SGPA	Credits * SGPA
Semester I	24	7	24*7 = 168
Semester II	24	6	24*6 = 144
Semester III	24	6.5	24*6.5 = 156
Semester IV	24	6	24*6 = 144
	96		612

CGPA = 612/96 = 6.37

10.0 Award of Degree and Class

10.1 If a student who registers for all the specified Subjects/ Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes the examinations prescribed in the entire PG Programme (PGP), and secures the required number of **68** Credits (with CGPA 6.0), shall be declared to have 'QUALIFIED' for the award of the M.Tech. Degree in the chosen Branch of Engineering and Technology with the specialization that he was admitted into.

10.2 Award of Class

After a student has earned the requirements prescribed for the completion of the programme and is eligible for the award of M.Tech. Degree, he shall be placed in one of the following three classes based on the CGPA:

Class Awarded	CGPA
First Class with Distinction	≥ 7.75
First Class	$6.75 \leq$ CGPA < 7.75
Second Class	$6.00 \leq$ CGPA < 6.75

A student with final CGPA (at the end of the **PGP) < 6.00** shall not be eligible for the Award of Degree.

11 Withholding of Results

If the student has not paid the dues, if any, to the Institution or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester.

12.0. Transitory Regulations

12.1 A student who has been detained in any semester of I Year of Previous Regulations due to lack of attendance, shall be permitted to join the same semester of I Year of R20 Regulations and he is required to complete the study of M.Tech programme within the stipulated period of

four academic years from the date of first admission in I Year I semester. The R20 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester.

12.3 For student readmitted to R20 Regulations, the maximum credits that a student acquires for the award of the degree, shall be the sum of the total number of credits secured in previous regulations of his/her study including R20 Regulations.

12.4 If a student readmitted to R20 Regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R20 regulations will be substituted by another subject to be suggested by the Concerned Board Of Studies (BOS).

13 General

13.1 The academic regulation should be read as a whole for the purpose of any interpretation.

13.5 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Institution is final.

13.6 The Institution may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institution.

MALPRACTICE RULES
DISCIPLINARY ACTION FOR CONDUCT IN EXAMINATION

	Nature of Malpractices/Improper conduct	**Punishment**
	if the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
1.(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
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 practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester 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 end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or 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 end semester 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 Examination Result Processing Committee (ERPC) for further action to award suitable punishment.	

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.TECH (CSE) COURSE STRUCTURE - R20

SEMESTER-I						
Sl. No.	**Code**	**Course Title**	**L**	**T**	**P**	**C**
1.	JM71A	Machine Learning	3	0	0	3
2.	JM71B	Cryptography & Network Security	3	0	0	3
3.	JM71C JM71D JM71E	1. Cloud Computing 2. Advanced Data Structures 3. Internet of Things	3	0	0	3
4.	JM71F JM71G JM71H	1. Software Architectures 2. Information Retrieval Systems 3. Distributed Systems	3	0	0	3
5.	JM71I	Machine Learning Lab	0	0	4	2
6.	JM71J	Cryptography & Network Security Lab	0	0	4	2
7.	JM91A	Soft Skills	2	0	0	0
TOTAL CREDITS			**14**	**0**	**8**	**16**

SEMESTER-II						
Sl. No.	**Code**	**Course Title**	**L**	**T**	**P**	**C**
1.	JM72A	Advanced Algorithms	3	0	0	3
2.	JM72B	Network Programming	3	0	0	3
3.	JM72C JM72D JM72E	1. Digital Forensics 2. Data Analytics 3. Parallel Computing	3	0	0	3
4.	JM72F JM72G JM72H	1. Human Computer Interaction 2. Computer Vision 3. Distributed Databases	3	0	0	3
5.	JM92A	Research Methodology and IPR	2	0	0	2
6.	JM72I	Advanced Algorithms Lab	0	0	4	2
7.	JM72J	Network Programming Lab	0	0	4	2
8.	JM92B	Personality Development and Professional Values	2	0	0	0
TOTAL CREDITS			**16**	**0**	**8**	**18**

SEMESTER-III						
Sl. No.	**Code**	**Course Title**	**L**	**T**	**P**	**C**
1.	JM73A JM73B JM73C	1. Blockchain Technology 2. High Performance Computing 3. Ad hoc and Sensor Networks	3	0	0	3
2.		Open Elective	3	0	0	3
3.	JM73D	Mini Project	0	0	0	2
4.	JM73E	Technical Seminar	0	0	0	1
3.	JM73F	Phase-I Dissertation	0	0	18	9
TOTAL CREDITS			**6**	**0**	**18**	**18**

SEMESTER-IV						
Sl.No.	**Code**	**Course Title**	**L**	**T**	**P**	**C**
1.	JM74A	Phase-II Dissertation	0	0	32	16
TOTAL CREDITS			**0**	**0**	**32**	**16**
GRAND TOTAL CREDITS 68 Credits						

PEC: Program Elective Course

OEC: Open Elective Course

OPEN ELECTIVES

S.No.	Code	Name of the Subject
1	JM1OA	Industrial Safety
2	JM20A	Renewable Energy Technologies and Battery Storage
3	JM20B	Power Plant Engineering
4	JM3OA	Disaster Management
5	JM3OB	Precast & Prefabricated Construction
6	JM6OA	Clean Room Technology and Maintenance.
7	JM60B	Principles of Computer Communications and Networks.
8	JM7OA	Python Programming
9	JM7OB	E-Commerce

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UGC Autonomous

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year I-Sem	**3**	**0**	**0**	**3**

MACHINE LEARNING
(Program Specific Elective-I)

Prerequisites

1. Data Structures
2. Knowledge on statistical methods

Course objectives:
Students will :

1. Explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. Understand computational learning theory.
3. Study the pattern comparison techniques.

Course outcomes:
Students will be able to:

1. Understand the concepts of computational intelligence like machine learning
2. Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
3. Understand the Neural Networks and its usage in machine learning application.

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.

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.

UNIT - II

Artificial Neural Networks Introduction, Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptions, Multilayer Networks and the Back propagation Algorithm.

Discussion on the Back Propagation Algorithm, An illustrative Example: Face Recognition

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, Gibs Algorithm, Naïve Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief Networks, EM Algorithm.

Computational Learning Theory – Introduction, Probably 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 Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

UNIT - IV

Pattern Comparison Techniques, Temporal patterns, Dynamic Time Warping Methods, Clustering, Codebook Generation, Vector Quantization

Pattern Classification: Introduction to HMMS, Training and Testing of Discrete Hidden Markov Models and Continuous Hidden Markov Models, Viterbi Algorithm, Different Case Studies in Speech recognition and Image Processing

UNIT - V

Analytical Learning – Introduction, Learning with Perfect Domain Theories : PROLOG-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operations.

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis.

Text Books

1. Machine Learning – Tom M.Mitchell,-MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.

Reference Books

1. Machine Learning : An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech	**L**	**T**	**P**	**C**
I Year I Semester	**3**	**0**	**0**	**3**

CRYPTOGRAPHY & NETWORK SECURITY

Prerequisites

1. A Course on "Computer Networks

Course objectives:

Students will :

1. Impart knowledge on network security issues, services, goals and mechanisms.
2. Analyze the security of communication systems, networks and protocols.

Course outcomes:

Students will be able to:

1. Demonstrate the knowledge of cryptography and network security concepts and applications.
2. Ability to apply security principles in system design.
3. Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

UNIT - I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT - II

Conventional Encryption: Principles, Conventional encryption algorithms (DES, AES, RC4, Blowfish), cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

UNIT - III

Number Theory: Modular Arithmetic, Euclid's Algorithm, Fermat's and Euler's Theorem, Chinese Remainder Theorem, Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

UNIT - IV

Email privacy: Pretty Good Privacy (PGP) and S/MIME.

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT - V

Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Intruders, Viruses and related threats, Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

Text Books:

1. "Cryptography and Network Security" by William Stallings 3rd Edition, Pearson Education.
2. "Applied Cryptography" by Bruce Schneier 2nd Edition,Wiley Publisher.

References:

1. Cryptography and Network Security by Behrouz A.Forouzan, 2nd edition, Tata McGraw-Hill Education.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

	L	T	P	C
M.Tech.				
I Year I-Sem	**3**	**0**	**0**	**3**

CLOUD COMPUTING
(Program Specific Elective-I)

Course Objectives:

Student will:

1. 1. Learn about the cloud environment, services and Hadoop
2. Classify cloud platforms and virtualization concepts
3. Identify cloud computing applications and enterprise cloud computing paradigms
4. Demonistrate cloud application development using python Explain security concepts in the cloud

Course Outcomes:

Student will able to:

1. Understand about the cloud environment, services and Hadoop
2. Differentiate cloud platforms and virtualization concepts
3. Describe cloud computing applications and enterprise cloud computing paradigms
4. Implement cloud application development using python
5. Apply security concepts in the cloud

UNIT-I

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Mapreduce.

UNIT –II

Cloud Platforms for Industry, Healthcare and education, Cloud Platforms in the Industry, cloud applications. Virtualization, cloud virtualization technology, deep dive: cloud virtualization, Migrating in to cloud computing, Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems,

UNIT-III

Cloud computing Applications: Industry, Health, Education, Scientific Applications, Business and Consumer Applications, Understanding Scientific Applications for Cloud Environments, Impact of Cloud computing on the role of corporate IT.

Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

UNIT-IV

Python Basics, Python for cloud, cloud application development in python, Cloud Application Development in Python.

Programming Google App Engine with Python: A first real cloud Application, Managing Data in the cloud, Google app engine Services for Login Authentication, Optimizing UI and Logic, Making the UI Pretty: Templates and CSS, Getting Interactive. Map Reduce Programming Model and Implementations.

UNIT-V

Cloud management, Organizational Readiness and change management in the cloud age , Cloud Security ,Data security in the cloud, Legal Issues in the Cloud , Achieving Production Readiness for the cloud Services

TEXT BOOKS:

1. Cloud Computing: Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.
3. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014,

University Press.
4. Cloud computing: Dr Kumar Saurab Wiley India 2011.

REFERENCES:

1. Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT)
2. Essentials of cloud computing : K Chandrasekharan CRC Press.
3. Cloud Computing: John W. Rittinghouse, James Ransome, CRC Press.
4. Virtualization Security: Dave shackleford 2013. SYBEX a wiley Brand.
5. Cloud computing and Software Services: Ahson , Ilyas.2011.
6. Cloud Computing Bible: Sosinsky 2012. Wiley India .
7. Cloud Computing: Dan C. Marinescu-2013, Morgan Kaufmann.
8. Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, Elsevier, 2012.
9 . Fundamentals of Python Kenneth A.Lambert | B.L.Juneja

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year I-Sem	**3**	**0**	**0**	**3**

ADVANCED DATA STRUCTURES

Prerequisites

1. A course on " Data Structures"

Course objectives:

Students will :

6. Introduces the heap data structures such as leftist trees, binomial heaps, fibonacci and min-max heaps
7. Introduces a variety of data structures such as disjoint sets, hash tables, search structures and digital search structures

Course outcomes:

Students will be able to:

1. Select the data structures that efficiently model the information in a problem
2. Understand how the choice of data structures impact the performance of programs
3. Design programs using a variety of data structures, including hash tables, search structures and digital search structures

UNIT - I

Heap Structures- Introduction, Min-Max Heaps, Leftist trees, Binomial Heaps, Fibonacci heaps.

UNIT - II

Hashing and Collisions

Introduction, Hash Tables, Hash Functions, different Hash Functions:- Division Method, Multiplication Method, Mid-Square Method, Folding Method, Collisions

UNIT - III

Search Structures- OBST, AVL trees, Red-Black trees, Splay trees,

Multiway Search Trees - B-trees., 2-3 trees

UNIT - IV

Digital Search Structures - Digital Search trees, Binary tries and Patricia, Multiway Tries, Suffix trees, Standard Tries, Compressed Tries

UNIT - V

Pattern matching : Introduction, Brute force, the Boyer –Moore algorithm, Knuth-Morris-Pratt algorithm, Naïve String , Harspool, Rabin Karp

Textbooks

1. Fundamentals of data structures in C++ Sahni, Horowitz, Mehatha, Universities Press.
2. Introduction to Algorithms, TH Cormen, PHI

References

1. Design methods and analysis of Algorithms, SK Basu, PHI.
2. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis
4. Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year I-Sem	**3**	**0**	**0**	**3**

INTERNET OF THINGS
(Program Specific Elective-I)

Prerequisites: NIL

Course objectives:
Students will :

1. Know the terminology, technology and its applications
2. Introduce the raspberry PI platform, that is widely used in IoT applications
3. Implementation of web based services on IoT devices

Course outcomes:
Students will be able to:

1. Understand the new computing technologies
2. Able to apply the latest computing technologies like cloud computing technology and Big Data
3. Ability to introduce the concept of M2M (machine to machine) with necessary protocols
4. Get the skill to program using python scripting language which is used in many IoT devices

UNIT - I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain

Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT - II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT - III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI- Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

Text Books

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year I-Sem	**3**	**0**	**0**	**3**

SOFTWARE ARCHITECTURES
(Program Specific Elective-II)

Pre Requisite

1. A course On "Software Engineering"

Course objectives:
Students will :

1. Understand the concept of software architecture
2. Understand the design, documentation of software Architecture and Reconstruct.
3. Understand importance of Architecture Evaluation and Methods.
4. Understand reusability of Architecture

Course outcomes:
Students will be able to:

1. Design, document and Reconstruct Software Architecture
2. Gain knowledge on Software Architecture
3. Evaluate Architecture
4. Reuse the Architecture

UNIT - I
Envisioning Architecture
The Architecture Business Cycle, What is Software Architecture, Architectural patterns,
reference models, reference architectures, architectural structures and views.

A-7E – A case study in utilizing architectural structures

UNIT - II

Creating an Architecture

Understanding Quality Attributes, Achieving qualities, Architectural styles and patterns

Air Traffic Control – a case study in designing for high availability

UNIT - III

Designing the Architecture, Documenting software architectures, Reconstructing Software Architecture

Flight Simulation – a case study in Architecture for Integrability

UNIT - IV

Analyzing Architectures

Architecture Evaluation, Architecture design decision making, ATAM, CBAM.

The Nightingale System - a case study in Applying the ATAM
The NASA ECS Project – a case study in Applying the CBAM

UNIT - V

Moving from one system to many

Software Product Lines, Building systems from off the shelf components, Software architecture in future.

Celsius Tech – a case study in product line development

Text Books:

1. Software Architecture in Practice, , Len Bass, Pau Clements & Rick Kazman, second edition Pearson Education,2003.

Reference Books:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year I-Sem	**3**	**0**	**0**	**3**

INFORMATION RETRIEVAL SYSTEMS
(Program Specific Elective-II)

Prerequisites:

1. Data Structures

Course objectives:
Students will :

1. Learn the important concepts and algorithms in IRS
2. Understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course outcomes:
Students will be able to:

1. Apply IR principles to locate relevant information large collections of data
2. Design different document clustering algorithms
3. Implement retrieval systems for web search tasks.
4. Design an Information Retrieval System for web search tasks.

UNIT - I

Introduction:

Motivation, Basic Concepts, Past-Present and Future, the Retrieval Process

Modelling :

Introduction, A Taxonomy of Information retrieval Models, Retrieval: Ad hoc and Filtering, A Formal Characteristics of IR Models, Classic

Information Retrieval, Alternative Set Theory Models, Alternative Probabilistic Models, Structured Text Retrieval Models, Model for Browsing

UNIT - II
Retrieval Evaluation

Introduction, retrieval Performance Evaluation, Reference Collections

Query languages

Introduction, Keyword-Based Querying, Pattern Matching, Structural Queries, Query Protocols

Query Operations

Introduction, User Relevance Feedback, Automatic Local Analysis, Automatic global Analysis

Text Operations

Introduction, Document Preprocessing, Document Clustering, Text Compression, Comparing text Compression Techniques

UNIT - III
Indexing and Searching

Introduction, Inverted Files, Other Indices for Text, Boolean queries, Sequential Searching, pattern Matching, Structural Queries, Compression

Searching the Web

Introduction, Challenges, Characterizing the Web, Search Engines, Browsing, Metasearches, Finding the Needle in the Haystack, Searching using Hyperlinks

UNIT - IV
User Interfaces and Visualization

Introduction, human-Computer Interaction, The Information Access Process, Starting Points, Query Specification, Context, User Relevance Judgments, Interface Support for the Search Process

UNIT - V

Multimedia IR: Models and Languages

Introduction, Data Modeling, Query Languages

Multimedia IR: Indexing and |Searching

Introduction, Background-Spatial Access Methods,A Generic Multimedia Indexing Approach, One Dimentional Time Series, wo dimential Color Images, Automatic Feature Extraction.

Text Books

1. Modern Information Retrival By Yates and Neto Pearson Education.

Reference

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
3. Information Storage & Retieval By Robert Korfhage – John Wiley & Sons.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year I-Sem	**3**	**0**	**0**	**3**

DISTRIBUTED SYSTEMS
(Program Specific Elective-II)

Prerequisites

1. A course on " Operating Systems"
2. A course on "Network Security and Cryptography"

Course objectives:

Students will :

1. Attain the knowledge on Distributed systems.
2. Know Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory

Course outcomes:

Students will be able to:

1. Understand Transactions and Concurrency control. 2. Understand Security issues.
2. Understand Distributed shared memory.
3. Design distributed systems for basic level applications.

UNIT - I

Characterization of Distributed Systems-Introduction,Examples of Distributed systems,Resource sharing and web,challenges,System models-Introduction,Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication, Distributed objects and Remote Invocation-Introduction,Communication between distributed objects,RPC,Events and notifications, Case study-Java RMI.

UNIT - - II

Operating System Support- Introduction, OS layer,Protection,Processes and Threads, Communication and Invocation, Operating system architecture,Distributed File Systems-Introduction,File Service architecture,case study- SUN network file systems.

Name Services-Introduction, Name Services and the Domain Name System,Case study of the Global Name Service,Case study of the X.500 Directory Service.

UNIT - III

Peer to Peer Systems–Introduction,Napster and its legacy,Peer to Peer middleware,Routing overlays,Overlay case studies-Pastry,Tapestry,Application case studies-Squirrel,OceanStore.

Time and Global States-Introduction,Clocks,events and Process states,Synchronizing physical clocks,logical time and logical clocks,global states,distributed debugging. Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT - IV

Transactions and Concurrency control-Introduction,Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.Distributed Transactions-Introduction,Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery,Replication-Introduction,System model and group communication, Fault tolerant services, Transactions with replicated data.

UNIT - V

Security-Introduction, Overview of Security techniques, Cryptographic algorithms, Digital signatures, Case studies-Kerberos,TLS,802.11 WiFi.

Distributed shared memory, Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study,Other consistency models, CORBA case study-Introduction,CORBA RMI,CORBA Services.

Text Books

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems,S.Ghosh,Chapman&Hall/CRC,Taylor&Francis Group,2010.

Reference Books

1. Distributed Computing,S.Mahajan and S.Shah,Oxford University Press.
2. Distributed Operating Systems Concepts and Design,Pradeep K.Sinha,PHI.
3. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, TMH.
4. Reliable Distributed Systems,K.P.Birman,Springer.
5. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, PearsonEducation.
6. Distributed Operating Systems and Algorithm Analysis,R.Chow,T.Johnson,Pearson.
7. Distributed Operating Systems,A.S.Tanenbaum,Pearson education.
8. Distributed Computing,Principles,Algorithms and Systems,Ajay D.Kshemakalyani and Mukesh Singhal,Cambridge,rp 2010.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

	L	T	P	C
M.Tech.				
I Year I-Sem	**0**	**0**	**4**	**2**

MACHINE LEARNING LAB

Prerequisites

Course objectives:

Student will:

1. Familiarize with ANACONDA framework and JUPYTER IDE.
2. Learn Python Packages like numpy, pands and Matplotlib for data preprocessing and visualization
3. Practice inductive learning algorithms using python.Understand the applications of neural networks and back propagation algorithm.
4. Apply machine learning concepts for Text mining.

Course objectives:

Student will be able to:

1. Effectively use ANACONDA framework and JUPYTER IDE.
2. Use Python Packages like numpy, pands and Matplotlib for data preprocessing and visualization
3. Implement inductive learning algorithms using python.
4. Implement the applications of neural networks and back propagation algorithm.
5. Use machine learning concepts for Text mining.List of Programs

Experiment 1: Familiarizing with Ananconda and Jupyter, for importing modules and dependencies for ML
Experiment 2: Familiarization with numpy, Panda and Matplotlib by Loading Dataset in Python.
Experiment 3: Familiarization with Pytorchin Python.
Experiment 4: Find S algorithm in Python
Experiment 5: Candidate Elimination Algorithm in Python

Experiment 6: ID3 Algorithm for Decision Tree in Python
Experiment 7: C4.3 Algorithm for Decision Tree in Python.
Experiment 8: Demonstration of Logistic Regression using Python.
Experiment 9: Demonstration of Classification using Python.
Experiment 10: Demonstration of Clustering using Python.
Experiment 11: Implementation of Bayesian Network in Python.
Experiment 12: Implementation of SVM using Python.
Experiment 13: Implementation of XOR function using NN and Python.
Experiment 14: Implementation of Backpropagation using Python.
Experiment 15: Implementation of Auto encoder in python.
Experiment 16: Sentiment Analysis using “Bag of Words” in Python
Experiment 17: Recommender System in Python.

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
UGC Autonomous

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year I-Sem	**0**	**0**	**4**	**2**

CRYPTOGRAPHY & NETWORK SECURITY LAB

Course objectives:

Student will:

1. Familiarize with client sever concepts
2. Learn encryption techniques, Jcrypt toll, wireshrk toll
3. Understand SQL injection, DOS injection attacks

Course objectives:

Student will be able to:

1. Implement client sever concepts
2. Apply encryption techniques using Jcrypt tool, wireshrk tool
3. Demonstrate sniffing using wireshrk tool
4. Apply Ethical hacking
5. Impalement phishing techniques

1. Write a client-server program where client sends a text message to server and server sends the text message to client by changing the case(uppercase and lowercase) of each character in the message.
2. Write a client-server program to implement following classical encrytion techniques:
   - ceaser cipher
   - transposition cipher
   - row substitution cipher
   - hill cipher
3. Install JCrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric
crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security and
Management

Tools:

1. Perform an experiment to demonstrate how to sniff for router traffic by using the tool wireshark
2. Using nmap
    a) Find open ports on a system
    b) Find the machines which are active
    c) Find the version of remote os on other systems
    d) Find the version of s/w installed on other system

Ethical Hacking:

1. Setup a honey pot and monitor the honey pot on network
2. Write a script or code to demonstrate SQL injection attacks
3. Create a social networking website login page using phishing techniques
4. Write a code to demonstrate DoS attacks
5. Install rootkits and study variety of options

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	L	T-P-D	C
M.Tech. CSE			
I Year - I Semester	**2**	**0-0-0**	**0**

SOFT SKILLS
(Mandatory Course – I)

Course Objectives:

This course will enable students to:

1. Study the Positivity, Motivation and developing positive thinking and attitude.
2. Summarize the listening skills and essential formal writing skills.
3. Explain the Time Management and Personality Development.
4. Describe the Decision-Making and Problem-Solving Skills.
5. Study the Psychometric Analysis and Mock Interview Sessions.

UNIT-I:

Soft Skills: An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development. Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue. Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.

UNIT-II:

Interpersonal Communication: Interpersonal relations; communication models, process, and barriers; team communication; developing interpersonal relationships through effective communication; listening skills; essential formal writing skills; corporate communication styles – assertion, persuasion, negotiation. Public Speaking: Skills, Methods, Strategies and Essential tips for effective public speaking. Group Discussion: Importance, Planning, Elements, Skills assessed; Effectively disagreeing, Initiating, Summarizing and Attaining the Objective. Non-Verbal Communication: Importance and Elements; Body Language. Team work and Leadership Skills: Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills.

UNIT-III:

Interview Skills: Interviewer and Interviewee – in-depth perspectives. Before, During and After the Interview. Tips for Success. Presentation Skills: Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness. Etiquette and Manners – Social and Business.Time Management – Concept, Essentials, Tips.Personality Development – Meaning, Nature, Features, Stages,

Models; Learning Skills; Adaptability Skills.

UNIT-IV:

Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills. Conflict Management: Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resolution. Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and 8 Impact of Stress; Measurement and Management of Stress, Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertivness Skills.Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

UNIT-V:

Employability Skills: Resume buildings – Facing the Personal Interview (HR and Technical)- Psychometric Analysis- Mock Interview Sessions.

REFERENCES:

1. Managing Soft Skills for Personality Development –edited by B.N.Ghosh, McGraw Hill India, 2012.
2. English and Soft Skills – S.P.Dhanavel, Orient BlackswanIndia, 2010.
3.

Course outcomes:

The students will be able to:

1. Describe the Positivity, Motivation and developing positive thinking and attitude.
2. Explain the listening skills and essential formal writing skills.
3. Discuss the Time Management and Personality Development.
4. Illustrate the Decision-Making and Problem-Solving Skills.
5. Describe the Psychometric Analysis and Mock Interview Sessions.

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	L	T	P	C
M.Tech.				
I Year II-Sem	**3**	**0**	**0**	**3**

ADVANCED ALGORITHMS

Prerequisites

1. A course on "Computer Programming & Data Structures"
2. A course on "Advanced Data Structures & Algorithms"

Course objectives:
Students will :

1. Introduces the recurrence relations for analyzing the algorithms 2. Introduces the graphs and their traversals.
2. Describes major algorithmic techniques (divide-and-conquer, greedy, dynamic programming, Brute Force , Transform and Conquer approaches) and mention problems for which each technique is appropriate;
3. Describes how to evaluate and compare different algorithms using worst-case, average-case and best-case analysis.
4. Introduces string matching algorithms 6. Introduces linear programming.

Course outcomes:

Students will be able to:
1. Analyze the performance of algorithms
2. Choose appropriate data structures and algorithm design methods for a specified application
3. Understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT - I

Classification of algorithms, Algorithm Specifications,

Mathematical analysis of Recursive Algorithms: – Introduction to recurrence equations, formulation of recurrence equations, Techniques

for solving recurrence equations, Solving recurrence equations, Solving Recurrence Equations using polynomial reduction, Divide and conquer recurrences

UNIT - II

Graphs :– Graph representations, Graph traversals

Brute Force Approaches:- Computational Geometry Problems-Closest pair problem, Convex Hull Problem, Exhaustive Searching- Magic Squares problem, Container Loading problem, Knapsack Problem, Assignment Problem

UNIT - III

Divide and Conquer approach:- Multiplication of long integers, Strassen's matrix multiplication, Fourier Transform

Greedy algorithms:- Coin change problem, Scheduling problems, knapsack problem, optimal storage on tapes, optimal tree problems, optimal graph problems

UNIT - IV

Transform and Conquer approach :- Matrix operations- Gaussian Elimination method, LU decomposition, Crout's method of decomposition

Dynamic Programming:- Computing binomial coefficients, Multistage graph problem, Transitive Closure and Warshall algorithm, Floyd warshall all pairs shortest path problem, TSP, Flow shop scheduling algorithm

UNIT - V

String algorithms:- Basic string algorithms, Longest Common Subsequences, Naive String Matching algorithm, Rabin Karp, KMP, Harspool algorithm

Linear Programming, Graphical method for solving LPP, Simplex method, Minimization problems, Principle of Duality, Max Flow problem

Text Books

1. Design and Analysis of Algorithms, S.Sridhar, OXFORD University Press

References

1. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein,PHI Pvt. Ltd./ Pearson Education.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
3. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education

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M.Tech.	**L**	**T**	**P**	**C**
I Year II-Sem	**3**	**0**	**0**	**3**

NETWORK PROGRAMMING

Course Objectives:
Student will:

1. Understand the major components in the LINUX system Structure and describe the architecture of the UNIX operating system.
2. Describe use of UNIX utilities and Shell scripting language such as bash.
3. Identifying advanced C systems programming and debugging techniques in a Unix/Linux environment.
4. Apply how to organize and manipulate files and directories in Linux Operating system.
5. Analyze how to use UNIX utilities to create simple tools for the information processing for inter process communication consisting of pipes, FIFOs, Semaphores and message Queues

Course Outcomes:
Student will able to:

1. Work confidently in LINUX environment.
2. Write shell script to automate different tasks as LINUX administration
3. Use different LINUX utilities to organize and manipulate files and directories in LINUX operating system.
4. Schedule the process for inter process communication techniques using various system calls.
5. Manage remote system by connecting to them using socket programming system calls for TCP, and UDP connections.

UNIT – I

Linux Utilities- File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking utilities, Filters, Text processing utilities and Backup utilities.

Bourne again shell(bash) - Introduction, pipes and redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples.

Review of C programming concepts-arrays, strings (library functions), pointers, function pointers, structures, unions, libraries in C.

UNIT - II

Files- File Concept, File types File System Structure, Inodes, File Attributes, file I/O in C using system calls, kernel support for files, file status information-stat family, file and record locking-lockf and fcntl functions, file permissions- chmod, fchmod, file ownership-chown, lchown , fchown, links-soft links and hard links – symlink, link, unlink.

File and Directory management – Directory contents, Scanning Directories- Directory file APIs.

Process- Process concept, Kernel support for process, process attributes, process control – process creation, replacing a process image, waiting for a process, process termination, zombie process orphan process.

UNIT - III

Signals- Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions.

Interprocess Communication - Introduction to IPC mechanisms, Pipes-creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions, Introduction to message queues, semaphores and shared memory.

Message Queues- Kernel support for messages, UNIX system V APIs for messages, client/server example.

Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores.

UNIT – IV

Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, client/server example.

Network IPC - Introduction to Unix Sockets, IPC over a network, Client-Server model, Address formats(Unix domain and Internet domain), Socket system calls for Connection

Oriented - Communication, Socket system calls for Connectionless-Communication, Example-Client/Server Programs- Single Server-Client connection, Multiple simultaneous clients, Socket options – setsockopt, getsockopt, fcntl.

UNIT-V

Network Programming in Java-Network basics, TCP sockets, UDP sockets (datagram sockets), Server programs that can handle one connection at a time and multiple connections (using multithreaded server), Remote Method Invocation (Java RMI)-Basic RMI Process, Implementation details-Client-Server Application.

TEXT BOOKS:

1. Unix System Programming using C++, T.Chan, PHI.(Units II,III,IV)
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.(Unit I)
3. An Introduction to Network Programming with Java, Jan Graba, Springer, rp 2010.(Unit V)
4. Unix Network Programming ,W.R. Stevens, PHI.(Units II,III,IV)
5. Java Network Programming,3rd edition, E.R. Harold, SPD, O'Reilly.(Unit V)

REFERENCE BOOKS:

1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. UNIX for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.
4. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
5. Unix Network Programming The Sockets Networking API, Vol.-I,W.R.Stevens, Bill Fenner, A.M.Rudoff, Pearson Education.
6. Unix Internals, U.Vahalia, Pearson Education.
7. Unix shell Programming, S.G.Kochan and P.Wood, 3rd edition, Pearson Education.
8. C Programming Language, Kernighan and Ritchie, PHI

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year II-Sem	**3**	**0**	**0**	**3**

DIGITAL FORENSICS
(Program Specific Elective-III)

Course objectives:

Students will :

1. Know the history and evaluation of digital forensics
2. Describe various types of cyber crime
3. Understand benefits of forensics
4. Implement forensics readiness plan

Course outcomes:

Students will be able to:

Upon completion graduates with a BS degree in Computer Forensics & Digital Investigations should be able to:

1. Interpret and appropriately apply the laws and procedures associated with identifying, acquiring, examining and presenting digital evidence.
2. Create a method for gathering, assessing and applying new and existing legislation and industry trends specific to the practice of digital forensics

UNIT - I

Computer Forensics Fundamentals: What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic

Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Back-up and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.

UNIT - II

Evidence Collection and Data Seizure: Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene — Computer Evidence Processing Steps — Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration —Practical Implementation.

UNIT - III

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions

Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case

UNIT - IV

Current Computer Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the

client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT - V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

Text Books

1. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

Reference Books

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.
3. Computer Evidence Collection & Presentation by Christopher L.T. Brown, Firewall Media.
4. Homeland Security, Techniques & Technologies by Jesus Mena, Firewall Media.
5. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M. Slade, TMH 2005
6. Windows Forensics by Chad Steel, Wiley India Edition.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year II-Sem	**3**	**0**	**0**	**3**

DATA ANALYTICS
(Program Specific Elective-III)

Course objectives:

Students will :

1. Explore the fundamental concepts of data analytics.
2. Learn the principles and methods of statistical analysis
3. Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
4. Understand the various search methods and visualization techniques.

Course outcomes:

Students will be able to:

After completion of this course students will be able to

1. Understand the impact of data analytics for business decisions and strategy
2. Carry out data analysis/statistical analysis
3. Carry out standard data visualization and formal inference procedures
4. Design Data Architecture
5. Understand various Data Sources

UNIT - I

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT - II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT - III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc.

Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT - V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

Text books:

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

Reference books:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand RajaramanMilliway Labs Jeffrey D Ullman Stanford Univ.

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M.Tech.	**L**	**T**	**P**	**C**
I Year II-Sem	**3**	**0**	**0**	**3**

PARALLEL COMPUTING
(Program Specific Elective – III)

Prerequisites

1. Computer Organization & Architecture
2. Operating Systems
3. Programming for problem solving

Course objectives:
Students will :

1. Introduce the foundations of parallel Computing
2. Learn various parallel computing architectures and programming models
3. Gain knowledge of writing efficient parallel programs

Course outcomes:
Students will be able to:

1. Understand the concepts of parallel architectures
2. Select the data structures that efficiently model the information in a problem.
3. Develop an efficient parallel algorithm to solve it.
4. Implement an efficient and correct code to solve it, analyse its performance

UNIT - I

Parallel Computing: Introduction, Motivation and scope - Parallel Programming Platforms – Basic Communication Operations

UNIT - II

Principles of Parallel Algorithm Design - Analytical Modelling of Parallel Programs

UNIT - III

Programming using Message Passing Paradigm(MPI) – Programming Shared Address Space Platforms(PThreads)

UNIT - IV

Dense Matric Algorithms (Matrix-Vector Multiplication , Matrix-Matrix Multiplication) – Sorting Algorithms (Issues, Bubble Sort, Quick Sort, Bucket Sort, Enumeration Sort, Radix Sort)

UNIT - V

Graph Algorithms (Minimum Spanning Tree: Prim's Algorithm - Single-Source Shortest Paths: Dijkstra's Algorithm) Search Algorithms (DFS, BFS)

Text Book:

1. Introduction to Parallel Computing, Second Edition, Ananth Grama, George Karypis,
Vipin Kumar, Anshul Gupta, Addison-Wesley, 2003, ISBN: 0201648652

References:

1. Parallel Computing – Theory and Practice, Second Edition, Michaek J. Quinn, Tata McGraw-Hill Edition.
2. Parallel Computers – Architectures and Programming, V. Rajaraman, C. Siva Ram Murthy,PHI.

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M.Tech.	**L**	**T**	**P**	**C**
I Year II-Sem	**3**	**0**	**0**	**3**

HUMAN COMPUTER INTERACTION
(Program Specific Elective-IV)

Course objectives:
Students will :

1. Understand the design principles of developing a Human Computer Interface (HCI).
2. Learn tools and devices required for designing a good interface

Course outcomes:
Students will be able to:

1. Acquire knowledge on principles and components of HCI.
2. Analyze product usability evaluations and testing methods
3. Design an effective user interface for software application using the building tools and techniques

UNIT - I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design

The graphical user interface: Popularity of graphics, direct manipulation, graphical system, Characteristics, Web user –interface popularity, characteristics- Principles of user interface.

UNIT - II

Design process: Human interaction with computers, important of human characteristics in design, human considerations in design, Human interaction speeds, understanding business junctions.

UNIT - III

Screen Designing : Interface design goals, Screen meaning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presenting information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT - IV

Windows: Window characteristics, components of a window, presentation styles, types, management, organizing window functions, operations

Selection of device based and screen based controls.

UNIT - V

Write clear text and messages, create meaningful Graphics, Icons, Images, Choose proper colors

Interaction Devices:

Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

Text Books:

1. Wilbent. O. Galitz ,"The Essential Guide To User Interface Design", Second Edition, Wiley India Edition
2. Ben Sheiderman, "Designing The User Interface", Third Edition, Addison-Wesley

Reference:

1. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd.,
2002.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year II-Sem	**3**	**0**	**0**	**3**

COMPUTER VISION
(Program Elective - IV)

Course objectives:
Students will :

1. Review image processing techniques for computer vision
2. Understand shape and region analysis
3. Understand Hough Transform and its applications to detect lines, circles, ellipses
4. Understand three-dimensional image analysis techniques
5. Understand motion analysis
6. Study some applications of computer vision algorithms

Course outcomes:
Students will be able to:
Upon Completion of the course, the students will be able to

1. Implement fundamental image processing techniques required for computer vision
2. Perform shape analysis
3. Implement boundary tracking techniques
4. Apply chain codes and other region descriptors
5. Apply Hough Transform for line, circle, and ellipse detections
6. Apply 3D vision techniques
7. Implement motion related techniques
8. Develop applications using computer vision techniques

UNIT - I

IMAGE PROCESSING FOUNDATIONS

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture

UNIT - II

SHAPES AND REGIONS

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance

functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures –

active contours – shape models and shape recognition – centroidal profiles – handling occlusion –boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region
descriptors – moments

UNIT - III

HOUGH TRANSFORM

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform – spatial matched filtering – GHT for ellipse detection – object location– GHT for feature collation

UNIT - IV

3D VISION AND MOTION

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – splinebased motion – optical flow – layered motion

UNIT - V

APPLICATIONS

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians

TEXTBOOK:

1. E. R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press, 2012.

REFERENCES:

1. R. Szeliski, "Computer Vision: Algorithms and Applications", Springer 2011.
2. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012.
3. Mark Nixon and Alberto S. Aquado, "Feature Extraction & Image Processing for Computer Vision", Third Edition, Academic Press, 2012.
4. D. L. Baggio et al., "Mastering OpenCV with Practical Computer Vision Projects", Packt Publishing, 2012.
5. Jan Erik Solem, "Programming Computer Vision with Python: Tools and algorithms for analyzing images", O'Reilly Media, 2012.

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UGC Autonomous

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech	**L**	**T**	**P**	**C**
I Year II-Sem	**3**	**0**	**0**	**3**

DISTRIBUTED DATABASES
(Program Specific Elective-IV)

Prerequisites

1. A course on "Database Management Systems"

Course objectives:

Students will :

To acquire knowledge on parallel and distributed databases and its applications.

1. Study the usage and applications of Object Oriented databases.
2. Learn the modeling and design of databases
3. Acquire knowledge on parallel and distributed databases and its applications.
4. Equip students with principles and knowledge of parallel and object oriented databases.
5. Know topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.

Course outcomes:

Students will be able to:

6. Understand theoretical and practical aspects of distributed database systems.
7. Study and identify various issues related to the development of distributed database system.
8. Understand the design aspects of object oriented database system and related development.
9. Abilty to write global queries for distributed databases.

UNIT - I

Features of Distributed versus Centralized Databases, Principles of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases, Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Distributed Database Design

UNIT - II

Translation of Global Queries to Fragment Queries, Equivalence transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.

Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries

UNIT - III

The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions

Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

UNIT - IV

Reliability, Basic Concepts, Nonblocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection

UNIT - V

Architectural Issues, Alternative Client/Server Architectures, Cache Consistency, Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution, Transaction Management, Transaction Management in Object DBMSs, Transactions as Objects

Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues Transaction Management Transaction and Computation Model, Multidatabase Concurrency Control, Multidatabase Recovery, Object Orientation and Interoperability, Object Management Architecture CORBA and Database interoperability, Distributed Component Object Model, COM/OLE and Database Interoperability, PUSH-Based Technologies

Text books:

1. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Pelagatti,TMH.
2. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez , Pearson Education, 2nd Edition.

Reference books:

1. Distributed Database Systems,Chanda Ray,Pearson.
2. Distributed Database Management Systems,S.K.Rahimi and Frank.S.Haug, Wiley.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech	**L**	**T**	**P**	**C**
I Year II-Sem	**3**	**0**	**0**	**3**

RESEARCH METHODOLOGIES & IPR

Course objectives:
Students will :

1. To understand the basic concept of research problem formulation.
2. To be exposed to effective research report writing and research design.
3. To investigate the various methods of data collection and analysis.
4. To understand the various fields of Industrial Property and PCT.
5. To be exposed to administration of IP and new developments in IPR.

Course outcomes:
Students will be able to:

1. Understand the basic concept of research problem formulation.
2. Develop an effective research proposal and research report.
3. Identify appropriate method for data collection and analysis for effective research.
4. Apply for Patent Filing and other fields of IP.
5. Make use of new developments in IPR.

UNIT - I

Introduction

Meaning and Objectives of Research, Types of Research, Research Approaches, Research Methods Vs Methodology, Research Process, Criteria of Good Research.

Research Problem

Meaning of Research Problem, Steps involved in Selecting a Research Problem, Scope and Objectives of Research Problem, Sources of Research Problem, Characteristics of a Good Research Problem, Steps involved in Defining a Research Problem.

UNIT - II

Effective technical writing

Importance of Literature Review, Steps involved in conducting a Literature Review, Research Report, Characteristics of a Good Report, Layout of a Research Report, Writing a Journal Paper, Writing a Research Proposal, Format of Research Proposal, Plagiarism and Research Ethics.

Research Design

Need for Research Design, Features of a Good Design, Important Concept Relating to Research Design, Categories of Research Design.

UNIT - III

Data Collection

Methods of Primary Data Collection – Observation Method, Interview Method, Collection of Data through Questionnaire and Schedule, Collection of Secondary Data, Selection of Appropriate Method for Data Collection.

Data Processing and Analysis

Processing Operations, Problems in Processing, Types of Analysis, Multivariate Analysis, Correlation Analysis, Regression Analysis..

UNIT - IV

Test Procedures:

Fields of Intellectual Protection

Patents - Conditions of Patentability, Drafting and Filing a Patent Application, Examination of a Patent Application; Copyright - Copyright Protection, Subject Matter of Copyright Protection, Ownership of Copyright, Limitations on Copyright Protection; Trademarks - Definitions, Criteria of Protectability, Protection of Trademark Rights; Industrial Designs; Geographical Indications.

International cooperation on intellectual property

World Intellectual Property Organization (WIPO) - Patenting under PCT; Patent information and databases; Licensing and transfer of technology.

UNIT - V

Administration of Industrial Property

Administrative Structure in the Industrial Property Office, Patent Office, Trademark Office, Industrial Designs Office, Patent and Trademark Attorney.

New Developments in IPR

Technological and Legal Developments in IntellectualProperty, Traditional Knowledge, Case Studies.

Text Books

1. Stuart Melville and Wayne Goddard, “Research Methodology: An Introduction for Science & Engineering Students’’, Juta& Co. Ltd Publishers, Revised Second Edition, 2006.
2. Halbert, “Resisting Intellectual Property”, Routledge, Taylor & Francis Ltd, First Edition, 2007.
3. C. R. Kothari, “Research Methodology: Methods and Techniques”, New Age International Publications, Revised Second Edition, 2004.

References

1. Ranjit Kumar, “Research Methodology: A Step by Step Guide for beginners”, British Library Publishers, Fourth Edition, 2014.
2. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”,Wolters Kluwer Law & Business Publishers, 2016.
3. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand Publications, First Edition, 2008.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
I Year II-Sem	**0**	**0**	**4**	**2**

ADVANCED ALGORITHMS LAB

Course objectives:
Students will :
The student can able to attain knowledge in advance algorithms.

Course outcomes:
Students will be able to:
The student can able to analyze the performance of algorithms

1. Implement assignment problem using Brute Force method
2. Perform multiplication of long integers using divide and conquer method.
3. Implement solution for knapsack problem using Greedy method.
4. Implement Gaussian elimination method.
5. Implement LU decomposition
6. Implement Warshall algorithm
7. Implement Rabin Karp algorithm.
8. Implement KMP algorithm.
9. Implement Harspool algorithm
10. Implement max-flow problem.

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NETWORK PROGRAMMING LAB

M.Tech.	**L**	**T**	**P**	**C**
I Year II-Sem	**0**	**0**	**4**	**2**

Course Objectives:

Student will:

1. Familiarize with the Linux environment.
2. Describe the fundamentals of shell scripting/programming.
3. Apply the various linux system calls for writing c programs to implement inter-process communication.
4. Analyze use of UNIX utilities like pipes, FIFOs.
5. Analyze TCP and UDP programs.

Course Outcomes:
Student will able to:

1. Develop application programs using commands and system calls in unix.
2. Develop effective use of unix utilities, and scripting languages
3. Implement inter-process communication between processes.
4. Construct and manage simple tcp/ip network services on a linux system.
5. Implement UDP for client-server application.

Note: Use Bash for Shell scripts.

EXPERIMENT 1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

EXPERIMENT 2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

EXPERIMENT 3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

EXPERIMENT 4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

EXPERIMENT 5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

EXPERIMENT 6. Write a shell script to list all of the directory files in a directory.

EXPERIMENT 7. Write a shell script to find factorial of a given integer.

EXPERIMENT 8. Write an awk script to count the number of lines in a file that do not contain vowels.

EXPERIMENT 9. Write an awk script to find the number of characters, words and lines in a file.

EXPERIMENT 10. Write a c program that makes a copy of a file using standard I/O and system calls.

EXPERIMENT 11. Implement in C the following Unix commands using System calls

A . cat B. ls C. mv

EXPERIMENT 12. Write a program that takes one or more file/directory names as command line input and reports the following information on the file.

A. File type. B. Number of links.

C. Time of last access. D. Read, Write and Execute permissions.

EXPERIMENT 13. Write a C program to emulate the Unix ls –l command.

EXPERIMENT 14. Write a C program to list for every file in a directory, its inode number and file name.

EXPERIMENT 15. Write a C program that demonstrates redirection of standard output to a file.Ex: ls > f1.

EXPERIMENT 16. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.

EXPERIMENT 17. Write a C program to create a Zombie process.

EXPERIMENT 18. Write a C program that illustrates how an orphan is created.

EXPERIMENT 19. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex:- ls –l | sort

EXPERIMENT 20. Write C programs that illustrate communication between two unrelated processes using named pipe.

EXPERIMENT 21. Write a C program to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.

EXPERIMENT 22. Write a C program that receives the messages (from the above message queue as specified in (21)) and displays them.

EXPERIMENT 23. Write a C program to allow cooperating processes to lock a resource for exclusive use, using a)Semaphores b)flock or lockf system calls.

EXPERIMENT 24. Write a C program that illustrates suspending and resuming processes using signals.

EXPERIMENT 25. Write a C program that implements a producer-consumer system with two processes. (using Semaphores).

EXPERIMENT 26. Write client and server programs(using c) for interaction between server and client processes using Unix Domain sockets.

EXPERIMENT 27. Write client and server programs(using c) for interaction between server and client processes using Internet Domain sockets.

EXPERIMENT 28. Write a C program that illustrates two processes communicating using shared memory.

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M.Tech: SE	**L**	**T-P-D**	**C**
I Year - II Semester	**2**	**0-0-0**	**0**

PERSONALITY DEVELOPMENT AND PROFESSIONAL VALUE
(Mandatory Course – II)

Course Objectives:

This course will enable students to:

1. Study the sensitization towards gender equality, physically challenged, intellectually challenged.
2. Summarize the Leadership and qualities of a successful leader.
3. Explain the Modern Challenges of Adolescent Emotions and behaviour.
4. Describe the Personality Development Body language.
5. Study the Workplace Rights & Responsibilities.

UNIT-I:Concept of Human Values, Value Education Towards Personal Development

Aim of education and value education; Evolution of value-oriented education; Concept of Human values; types of values; Components of value education.

Personal Development: Self-analysis and introspection; sensitization towards gender equality, equitability, physically challenged, intellectually challenged. Respect to - age, experience, maturity, family members, neighbours, co-workers.

Character Formation Towards Positive Personality: Truthfulness, Constructively, Sacrifice, Sincerity, Self-Control, Altruism, Tolerance, Scientific Vision.

UNIT-II: Aspects of Personality Development -Body language- Problem-solving - Conflict and Stress Management - Decision-making skills - Leadership and qualities of a successful leader – Character building -Team-work s - Positive attitude – Advantages –Negative attitude- Disadvantages– Time management - Work ethics –Good manners and etiquette.

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: Workplace 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.

UNIT-V: Impact of Global Development on Ethics and Values

Conflict of cross-cultural influences, mass media, cross-border education, materialistic values, professional challenges, and compromise. Defining the difference between aggressive, submissive, and assertive behaviours.

Modern Challenges of Adolescent Emotions and behaviour; Sex and spirituality: Comparison and competition; positive and negative thoughts. Adolescent Emotions, arrogance, anger, sexual instability, selfishness, defiance.

TEXTBOOKS:

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition: Prentice Hall

REFERENCES:

1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi, Tata McGraw-Hill 1988.
2. Heller, Robert. Effective leadership. Essential Manager series. Dk Publishing, 2002
3. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003
4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill. 2001

Course outcomes:

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

1. Describe the sensitization towards gender equality, physically challenged, intellectually challenged.
2. Explain the Leadership and qualities of a successful leader.
3. Discuss the Modern Challenges of Adolescent Emotions and behaviour.

4. Illustrate the Personality Development Body language.
5. Identify the Workplace Rights & Responsibilities.

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M.Tech	**L**	**T**	**P**	**C**
I Year III-Sem	**3**	**0**	**0**	**3**

BLOCKCHAIN TECHNOLOGY
(Program Specific Elective-V)

Course objectives:

Students will :

1. Learn the fundamentals of BlockChain Technology
2. Understand the History of Money and working with Bitcoin
3. Understand usage of cryptography in Block Chain Technology
4. Create smart account and decentralized Systems

Course outcomes:

Students will be able to:

1. Understated the block chain Technology and limitations
2. Analyse the history of money and working with Bitcoin and Bitcoin wallets
3. Use cryptography in bitcoin transactions
4. Understand the Design philosophy of Block Chain Technology and Virtual Machine
5. Develop Decentralized applications and Building ethereumDapp

UNIT-I:

Introduction: History, what is blockchain, the structure of block chains, types of block chain, block chain applications, block chain lifecycle. Limitations and challenges of blockchain.

UNIT – II:

Crypto currencies: Cryptography, the science behind crypto currencies, Symmetric key cryptography, cryptography hash functions, MAC and HMAC, asymmetric key cryptography Diffie-Hellman key exchange, symmetric vs asymmetric key cryptography, game theory Nash

equilibrium, prisoners dilemma, byzantine Generals' problem, zero-sum games.

UNIT-III:
Bitcoin: History of Money, working with Bitcoins, the Bitcoin Blockchain, Bitcoin network, bitcoin scripts, Full nodes vs SPVs, Bitcoin wallets.

UNIT – IV:
Ethereum: Ethereum as Next-Gen Blockchain, Design Philosophy of Ethereum, Ethereum Blockchain, Ethereum Accounts, Trie Usage, RLP Encoding, Ethereum Transaction Message structure, Ethereum smart contracts, Ethereum Virtual Machine, Ethereum Eco System .

UNIT – V:
Block chain application development, Interacting with bitcoin blockchain, interacting programmatically with ethereum for sending transactions, creating smart account, executing smart contract functions, decentralised application structure. Building an ethereum Dapp

Text Books:

1. Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions by Bikramaditya Singhal, Gautam Dhameja , Priyansu Sekhar Panda.
2. Blockchain Technology Explained: The Ultimate Beginner's Guide About Blockchain Wallet,Mining, Bitcoin, Ethereum, Litecoin, Zcash, Monero, Ripple, Dash

Reference Books:

1. Blockchain Technology: Introduction to Blockchain Technology and its impact on Business Ecosystem
2. Blockchain: Bitcoin, Ethereum & Blockchain: Beginners Guide to Understanding the Technology Behind Bitcoin & Cryptocurrency
3. Blockchain: Discover the Technology behind Smart Contracts, Wallets, Mining and Cryptocurrency.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

	L	T	P	C
M.Tech.				
II Year I-Sem	**3**	**0**	**0**	**3**

HIGH PERFORMANCE COMPUTING
(Program Specific Elective-V)

Prerequisites

1. Computer Organization & Architecture
2. Operating System Programming

Course objectives:
Students will :

1. Improve the system performance
2. Learn various distributed and parallel computing architecture
3. Learn different computing technologies

Course outcomes:
Students will be able to:

1. Understanding the concepts in grid computing
2. Set up cluster and run parallel applications
3. Understand the cluster projects and cluster OS
4. Understand the concepts of pervasive computing & quantum computing.

UNIT - I

Grid Computing: Data & Computational Grids, Grid Architectures And Its Relations To Various Distributed Technologies. Autonomic Computing, Examples Of The Grid Computing Efforts (Ibm).

UNIT - II

Cluster Setup & Its Advantages, Performance Models & Simulations; Networking Protocols & I/O, Messaging Systems. Process Scheduling, Load Sharing And Balancing; Distributed Shared Memory, Parallel I/O.

UNIT - III

Example Cluster System – Beowlf; Cluster Operating Systems: Compas And Nanos

Pervasive Computing Concepts & Scenarios; Hardware & Software; Human – Machine Interface.

UNIT - IV

Device Connectivity; Java For Pervasive Devices; Application Examples.

UNIT - V

Classical Vs Quantum Logic Gates; One, Two & Three Qubit Quantum Gates; Fredkin & Toffoli Gates; Quantum Circuits; Quantum Algorithms.

Text Book:

1. "Selected Topics In Advanced Computing" Edited By Dr. P. Padmanabham And Dr. M.B. Srinivas, 2005 Pearson Education.

References:

1. J. Joseph & C. Fellenstien: 'Grid Computing ', Pearson Education
2. J. Burkhardt et.al: 'pervasive computing' Pearson Education
3. Marivesar:' Approaching quantum computing', pearson Education.
4. Raj kumar Buyya:'High performance cluster computing', pearson Education.
5. Neilsen & Chung L:'Quantum computing and Quantum Information', Cambridge University Press.
6. A networking approach to Grid Computing , Minoli , Wiley

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech.	**L**	**T**	**P**	**C**
II Year I-Sem	**3**	**0**	**0**	**3**

ADHOC AND SENSOR NETWORKS
(Program Specific Elective-V)

Prerequisites

1. Computer Networks
2. Distributed Systems
3. Mobile Computing

Course objectives:

Students will:

1. Understand the concepts of sensor networks
2. Understand the MAC and transport protocols for adhoc networks
3. Understand the security of sensor networks
4. Understand the applications of adhoc and sensor networks

Course outcomes:

Students will be able to:

1. Understand the state of the art research in emerging subject of ad hoc and wireless sensor networks (ASN)
2. Solve the issues in real-time application development based on ASN
3. Conduct further research in the ASN domain

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, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; *Position-based* routing algorithms-Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies: Greedy Packet, Restricted Directional

Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

UNIT - II

Data Transmission - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR and Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR.

UNIT - III

TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc Basics of Wireless, Sensors and Applications Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT - IV

Data Retrieval in Sensor Networks

Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

UNIT - V

Security - Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

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)

AY 2020 – 21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	M. Tech: II Year – I Sem			
Course Code: JM1OA	INDUSTRIAL SAFETY Open Elective	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Engineering Chemistry, Probability and Statistics.

Course Objectives:

This course will enable students to:

1. Study mechanical and electrical hazards and it's preventive methods in an industry.
2. Correlate primary and secondary functions with responsibilities of maintenance department.
3. Attain basic knowledge of chemical corrosion, it's types and reduction methods.
4. Adapt to a new technology of fault tracing and decision tree.
5. Recognize the importance of periodic and preventive maintenance.

Module 1:

Unit 1: Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure.

Unit 2: Describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and fire fighting, equipment and methods, overview of OHSAS 18000 and ISO 14000.

Module 2:

Unit 1: Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department.

Unit 2: Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment, failure rate analysis, reliability of systems

Module 3:

Unit 1: Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication,

Unit 2: Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods

Module 4:

Unit 1: Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools.

Unit 2: Hydraulic, pneumatic, automotive, thermal and electrical equipment's like i. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Module 5:

Unit 1: Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance.

Unit 2: Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Text Books:

1. Lindly R. Higgins, R. Keith mobley,"Maintenance Engineering Handbook", McGraw - Hill Professional, 6th edition, 2001.
2. Er. H. P. Garg, "Maintenance Engineering", S. Chand Publishing, 2010.

Reference Books:

1. Frank Duncan Graham, "Pumps hydraulics air Compressors", Theo Audel & CO publishers, 1965.
2. Hans F. Winterkom, Hsal - Yang Fang, "Foundation Engineering Handbook", Galgotia Booksource, 2010.

E- Resources:

1. https://www.google.co.in/books/edition/Industrial_Safety_and_Risk_Management/_Rr_BRvp30EC?hl=en&gbpv=1
2. https://www.google.co.in/books/edition/Industrial_Safety_Management/FDQ8DwAAQBAJ?hl=en&gbpv=1
3. https://nptel.ac.in/courses/110/105/110105094/
4. https://www.coursera.org/specializations/energy-industry
5. https://www.sciencedirect.com/bookseries/industrial-safety-series/vol/8/suppl/C

Course Outcomes:

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

1. Relate factories act with each equipment and fire prevention methods.
2. Calculate service life of an equipment with replacement economy.
3. Layout different lubrication methods to reduce wear and corrosion.
4. Infer decision tree for various Engineering equipments.
5. Construct a schedule for periodic and preventive maintenance for mechanical and electrical equipments.

AY 2020 – 21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	M. Tech: II Year – I Sem			
Course Code: JM20A	**RENEWABLE ENERGY TECHNOLOGIES AND BATTERY STORAGE SYSTEMS**	**L**	**T**	**P**	**D**
Credits: 3	Open Elective	**3**	**0**	**0**	**0**

Objectives:

1. To explain the concepts of Non-renewable and renewable energy systems.
2. To outline utilization of renewable energy sources for both domestic and industrial applications.
3. To analyze the environmental and cost economics of renewable energy sources in comparison with fossil fuels.
4. To enable the student to understand the need for energy storage.

Outcomes:

1. An understanding of renewable energy sources.
2. Knowledge of working principle of various energy systems.
3. A capability to carry out basic design of certain renewable energy systems.
4. Analyze the characteristics of energy from various sources and need for storage.

UNIT - I

Fundamentals of Energy: Energy consumption and standard of living, Oil crisis, Classification of energy resources, Consumption trend of primary energy resources, conventional energy sources and their distribution, Energy chain, common forms of energy, importance and salient features of nonconventional energy resources, environmental aspects of energy, Environment-economy-energy and sustainable development, Energy densities of various fuels, World energy status, Energy scenario in India.

UNIT - II

Solar energy: Solar energy basics, Sun-Earth relation spectrum, Terrestrial and extra-terrestrial radiation, spectral energy distribution of solar radiation, Depletion of solar radiation, measurement of solar radiation, solar radiation data, Solar time, Solar radiation geometry, Solar day length, Empirical equations for estimation of solar radiation on horizontal surfaces, Global, diffused and beam radiation, Solar radiation on inclined surface (Problems on energy availability on surfaces)

UNIT - III

Wind Energy: Wind origin, nature, types, Wind data and wind rose, wind speed variation, Wind siting Wind turbine classification and types of rotors, Wind turbine aerodynamics, power extraction from wind, Betz criteria, Axial thrust on the turbine, torque developed by the turbine, Dynamic matching, speed control strategies, Wind turbine operational characteristics, wind

energy conversion systems, environmental aspect, Wind energy potential and installation in India (Problems on energy Conversion)

UNIT - IV

Biomass Energy: Biomass resources and their classification**,** Biomass conversion technologies: Thermochemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion – operational parameters of biogas plants, Types of biogas Plants and biogas plant design – Alcohol production from biomass - Bio diesel production -

Urban waste to energy conversion - Biomass energy program in India (Problems on biogas plant design)

UNIT – V

Electrical Energy Storage Technologies: Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

TEXT BOOKS:

1. Renewable Energy Sources, Twidell, J.W. and Weir, A., EFN Spon Ltd., 1986.
2. Renewable Energy Engineering and Technology, Kishore VVN, Teri Press, New Delhi, 2012
3. “James M. Eyer, Joseph J. Iannucci and Garth P. Corey “, “Energy Storage Benefits and Market Analysis”, Sandia National Laboratories, 2004.

REFERENCE BOOKS:

1. Solar Energy - Principles of thermal collection and storage, S. P. Sukhatme
2. Solar Engineering of Thermal Processes, J. A. Duffie and W. A. Beckman
3. Principles of Solar Engineering, Kreith, F and Kreider, J. F., McGraw-Hill, 1978.
4. Power Plant Technology, J Wakil
5. Non-Conventional Energy Sources, G.D Rai
6. “Jim Eyer, Garth Corey”, Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories, Feb 2010.

AY 2020 – 21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	M. Tech: II Year – I Sem			
Course Code: JM20B	**POWER PLANT ENGINEERING** Open Elective	**L**	**T**	**P**	**D**
Credits: 3		**3**	**0**	**0**	**0**

Objectives:

- To provide the knowledge on principles of solar radiation & solar energy collection & storage and applications.
- To prepare graduates to express the Knowledge on wind energy, geo-thermal energy, and ocean energy plants.
- To understand the behaviour of different power plants.

Outcomes:

- Analyze different types of steam cycles and it's efficiencies in a steam power plant.
- Describe basic working principles of gas turbine and diesel engine power plants. Define the performance characteristics and components of such power plants.
- List the principal components and types of nuclear reactors.
- List types, principles of operations, components and applications of steam turbines, steam generators, condensers, feed water and circulating water systems.
- Estimate different efficiencies associated with power plant systems.

UNIT I: Thermal power plants: Basic thermodynamic cycles, Various components of steam power plant- Layout- Pulverized coal burners- Fluidized bed combustion - Coal Handling systems - Ash handling systems - Forced draft and induced draft fans- Boilers- Feed pumps- Super heater- Regenerator - Condenser- Dearearators - Cooling tower.

UNIT II: Hydroelectric power plants: Layout- Dams -Selection of water turbines – types - Pumped storage hydel plants

UNIT III: Nuclear power plants: Principles of nuclear energy- Fission reactions - Nuclear reactor-Nuclear power plants

UNIT IV: Gas and diesel power plants: Types, Open and closed cycle gas turbine, Work output & thermal efficiency, Methods to improve performance-reheating, Inter-coolings, Regeneration-Advantage and disadvantages - Diesel engine power plant, Component and layout.

UNIT V: Non-conventional power generation: Solar energy collectors, OTEC, Wind power plants, Tidal power plants and geothermal resources, Fuel cell, MHD power generation - Principle, Thermoelectric power generation, Thermionic power generation.

TEXT BOOKS

1. Arora and Domkundwar, "A Course in Power Plant Engineering" Dhanpat Rai and Co.Pvt. Ltd., New Delhi.
2. P.K. Nag, "Power Plant Engineering", Tata McGraw Hill, Second Edition, Fourth reprint 2003.

REFERENCE BOOKS:

1. Bernhardt G.A. Skrotzki and William A. Vopat, "Power Station Engineering and Economy", Tata McGraw Hill Publishing Company Ltd., New Delhi, 20th reprint 2002.
2. G.D. Rai, "An Introduction to Power Plant Technology", Khanna Publishers, Delhi- 110 005.
3. M.M. El-Wakil, "Power Plant Technology", Tata McGraw Hill, New Delhi, 1984.

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	M.Tech II Year – I Sem			
Course Code: JM3OA	**DISASTER MANAGEMENT (Open Elective)**	**L**	**T**	**P**	**D**
Credits:3		**3**	**0**	**0**	**0**

Pre-requisite: Environmental Science

Course Objectives:

This course will enable students to:

1. Provide basic conceptual understanding the difference between the hazard and a disaster.
2. Knowledge about the various disasters and their impacts.
3. Provide basic understanding about the hazard and vulnerability profile of India.
4. Have conceptual understanding about the disaster management phases.
5. Approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, Disasters, disaster prevention and risk reduction.

Module 1:

Unit 1:

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional)

Unit 2:

Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards

Module 2:

Unit 1: Disaster Management Mechanism: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief

Module 3:

Unit 1:

Capacity Building: Capacity Building: Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management - Legislative Support at the state and national levels

Module 4:

Unit 1: Coping with Disaster: Coping Strategies; alternative adjustment processes - Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits - Mass media and disaster management

Module 5:

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans

Text Books:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by Mrinalini Pandey Wiley 2014. 3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015

1.

Reference Books:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

Web Resources:

1. https://nptel.ac.in/courses/105/104/105104183/
2. https://nptel.ac.in/courses/124/107/124107010/

2.

3. Course Outcomes:

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

1. Acquired knowledge on various types of disasters and hazards
2. Distinguish between the hazard and a disaster can be analyzed
3. Acquired knowledge on the various approaches of Disaster Risk Reduction (DRR)
4. Ability to understand the relationship between vulnerability. disasters, disaster prevention and risk reduction
5. Develop ability to respond to different disasters

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	M.Tech II Year – I Sem			
Course Code: JM3OB	PRECAST & PREFABRICATED CONSTRUCTION (Open Elective)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: STRUCTURAL ENGINEERING –I (RCC)

Course Objectives:

This course will enable students to:

1. Study the Precast Footings, Beams, Columns, Slab, Shear walls, Partition Walls.
2. Explain the precast construction methodology.
3. Discuss about the principles, materials in Prefabrication.
4. Study the behaviour of structural components of Prefabrication.
5. Describe the Positioning of Building components.
4.

Module 1:

UNIT I: Introduction to Precast Technology: Definition-Advantages-Difference between Precast and Conventional Buildings-Precast slab-wall panels-Footings-Beams-Columns-Slab-Non- Structural Precast Elements- Paver blocks, fencing poles, Manhole covers, Hollow and Solid Blocks, Door and Window frames - Connections between precast elements-Standard dimensions and tolerances.

Module 2:

UNIT I: Precast construction methodology: Casting Methods-Curing-Stacking-lifting-transportation-Construction Considerations-Sequence of Work-Procedure-Post Installation-Constraints and Solutions-Comparison between Cast-in-situ and Precast Building Designs.

Module 3:

UNIT I: Modular Co-ordination: Introduction-Aim and Basics-Modular Reference System-Positioning of Building components (Structural Components, Non-Structural Components and Finishes)

Module 4:

UNIT I: Introduction to Prefabrication: Introduction-Need for prefabrication-Principles, materials-standardization-system-production-transportation-erection.

Module 5:

UNIT I: Prefabricated components: Behaviour of structural components-Large panel construction of roof and floor slabs-wall panels-columns.

UNIT II: Prefabrication construction methods: Panelized Wood Framing, Timber Framing, Concrete Systems,Steel Framing

Text Books:

1. Precast Concrete Structures- Elliott, Kim S, CRC Press, New York; 2011.
2. Pre Engineered Steel Buildings–K.S.Vivek & P.Vaishavi– Lambert Academic Publishing; 2017
3. "Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009.

5.

Reference Books:

1. "Manual of precast concrete construction", Vol. I, II and III, Koncz T., Bauverlag, GMBH, 1976.
2. CBRI, Building materials and components, India, 2017.

6.

Web Resources:

1. https://www.iiti.ac.in/public/storage/events/new_Short%20Term%20Course%20on%20Pre cast%20and%20Prefabricated%20Buildings.pdf

7.

Course Outcomes:

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

1. Apply the concept of prestressing and determine the losses of prestress.
2. Analyze the prestressed concrete beam and suggest the cable profile for beam.
3. Evaluate the prestressed concrete beam for flexure and shear.
4. Apply skills to satisfy the serviceability and strength provisions of the Indian Standards (IS: 1343-2012).
5. Examine the principles of design of composite sections and their advantages.

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	M.Tech-VLSISD II Year – I Sem			
Course Code: JM6OA	CLEAN ROOM TECHNOLOGY AND MAINTENANCE (Open Elective)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: No Pre-requisite

Course Objectives:

1. To introduce clean room classification and its standards.
2. To gain knowledge about design of clean rooms.
3. To illustrate the clean room testing and monitoring.
4. To analyze air quantities, pressure differences and clean room disciplines.
5. To describe the clean room operation and cleaning.

Module 1

Unit-1: Introduction

Introduction, Clean room Classification Standards, Unidirectional air flow Clean room.

Unit-2: Standards

Basis of Clean room standards, Federal Standards 209, ISO standard 14644-1:1999, Clean room classification (Pharmaceutical, clean rooms).

Module 2

Unit-1: Design of Clean rooms

Design of Turbulently Ventilated and Ancillary Clean rooms, Mini environments, isolators and RABS, Containment zone, Construction and clean build.

Unit-2: Design of Unidirectional Clean rooms

Design of Unidirectional Clean rooms, High Efficiency Air filtration, Particle removal mechanisms, Testing of high efficiency filters.

Module 3

Unit-1: Clean room Testing and Monitoring

Cleanroom Testing and Monitoring, Principles of clean room testing, Testing in relation to room type and occupation state, Monitoring of clean room.

Module 4

Unit-1: Measurement in Clean Room

Measurement of Air Quantities and Pressure Differences, Air movement control, Recovery test methods, Clean room containment leak testing.

Module 5

Unit-1: Clean Room Operation

Filter Installation leak testing, Operating a clean room, Materials, equipment and machinery, Clothing, masks and gloves, Cleaning a Clean room.

Text Books:

1. William White, Clean room Technology: Fundamentals of Design, Testing and Operation, 2nd Edition, Wiley, 2010.
2. Matts Ramstorp, Introduction to Contamination Control and Clean room Technology, Wiley, 2008.

Reference Books:

1. Wani-Kai Chen (editor), The VLSI Hand book, CRI/IEEE press, 2000.

E - Resources:

1. https://nptel.ac.in/content/storage2/courses/113106062/Lec30.pdf .
2. https://www.cmmonline.com/articles/infographic-basic-cleanroom-requirements-and-classifications.
3. https://www.terrauniversal.com/blog/6-really-cool-cleanroom-videos-will-awe/.

Course Outcomes:

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

1. specify clean room standards and ancillary clean rooms.
2. identify fabrication materials and surface finishes.
3. illustrate the clean room testing and monitoring.
4. analyze air quantities, pressure differences and clean room disciplines.
5. gain knowledge about operation of clean room.

8.

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	M.Tech-VLSISD II Year – I Sem			
Course Code: JM6OB	PRINCIPLES OF COMPUTER COMMUNICATION AND NETWORKS (Open Elective)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Analog and Digital Signals concepts, Computer Networks

Course Objectives:

1. To understand the Analog and Digital Communication concepts.
2. To understand the concept of computer communication.
3. To illustrate about the networking concept, layered protocols.
4. To understand various communications concepts.
5. To gain knowledge of various networking equipments.

Module 1

Unit-1: Analog and Digital Signal Representation

Representing data as analog signals, representing data as digital signals, frequency analysis of signals.

Unit-2: Communication Concepts

Data rate and bandwidth reduction, Digital Carrier Systems.

Module 2

Unit-1: Overview of Computer Communications

Introduction to Computer Communications and Networking, Introduction to Computer Network, Types of Computer Networks.

Unit-2: Overview of Computer Networking

Network Addressing, Routing, Reliability, Interoperability and Security, Network Standards, The Telephone System and Data Communications.

Module 3:

Unit-1: Protocols and Models

Computer Applications and Application protocols, Computer Communications and Networking models, Communication Service Methods and data transmission modes.

Unit-2: Multiplexing & OSI Model

Analog and Digital Communications, Speed and capacity of a Communication Channel, Multiplexing and switching, Network architecture and the OSI reference model.

Module 4

Unit-1: Physical layer Concepts

The Physical and Electrical Characteristics of wire, Copper media, Fiber optic media, Wireless Communications.

Unit-2: Data link layer Concepts

Introduction to data link Layer, the logical link control and medium access control sub-layers.

Module 5

Unit-1: Network Hardware Components

Introduction to Connectors, Transreceivers and media convertors, repeaters, network interference cards and PC cards, bridges, switches, Switches vs Routers.

Unit 2: Application Layer

Domain name space, DNS in Internet, FTP, WWW, Electronic mail, HTTP, SNMP.

Text Books:

1. "Computer Communications and Networking Technologies", Michel A. Gallo and William H. Hancock, Thomson Brooks / Cole.
2. "Data Communications and Networking" – Behrouz A. Forouzan, Fourth Edition MC GRAW HILL EDUCATION, 2006.

Reference Books:

1. "Principles of Computer Networks and Communications", M. Barry Dumas, Morris Schwartz, Pearson.
2. "Computer Networking: A Top-Down Approach Featuring the Internet", James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.
3. "Modern Digital and Analog Communication Systems", B.P.Lathi ,3rd edition, Oxford University Press.

E - Resources:

1. https://link.springer.com/bookseries/4198.
2. https://link.springer.com/book/10.1007%2Fb101863.
3. https://learn.saylor.org/course/cs402 .

Course Outcomes:

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

1. explain the networking of computers and data transmission between computers.
2. exposure about the various communication concepts.
3. analyse about the structure and equipment of computer network structures.
4. illustrate the Physical and data link layer concepts.
5. get knowledge about network hardware components.

M.Tech. **L T P C**
II Year I-Sem **3 0 0 3**

PYTHON PROGRAMMING

(Open Elective)

Course objectives:
Student will:

1. Learn how to design and program Python applications.
2. Learn how to use lists, tuples, and dictionaries in Python programs.
3. Learn how to identify Python object types, Components, decision statements, pass arguments in Python.
4. Learn how to build and package Python modules for reusability, design object oriented programs with Python classes, use class inheritance in Python for reusability.
5. Learn how to use exception handling in Python applications for error handling

Course outcomes:
Students will abel to:

1. Describe to design and program Python applications.
2. Analyze and conversion of to use lists, tuples, and dictionaries in Python programs.
3. Explain the concept to identify Python object types, Components
4. ,decision statements, pass arguments in Python.
5. Apply decision for building and package Python modules for reusability, design object-oriented programs with Python classes,use class inheritance in Python for reusability.

UNIT - I:

Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance; Introduction to Python Getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition. Functions function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return

statement; Recursion, infinite recursion.

UNIT - II:

Python data structures Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. **Lists:** Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries

Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples

Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

UNIT - III:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, attributes, instances as arguments, instances as return values, objects are mutable, copying; classes and functions: pure function, modifiers; Exceptions: raising exceptions, handling exceptions, exception hierarchy.

UNIT - IV:

Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism. Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem, different sets of arguments.

UNIT - V:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;

Database Programming in Python: Connection module, connect MySQL Data base, perform DDL, DML and DQL operations.

Text Books:

1. **Python 3 Object Oriented Programming,** Dusty Phillips, Packet Publishing, 2010.
2. **Programming in Python 3** - A complete Introduction to the Python Language- Second Edition, Mark Summerfiels, Addison-Wesley 2010.

Reference Books:

1. **Programming Python- 4th Edition**, Mark Lutz, O'Reilly, 2011.
2. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

M.Tech. **L T P C**

II Year I-Sem **3 0 0 3**

E-COMMERCE
(Open Elective)

Course objectives:

At the end of the course, students will :

1. Gain knowledge of E Commerce Frame work Applications, Business Models ,
2. Learn about Consumer Oriented Applications ,Electronic Payment Systems
3. Learn about EDI Applications ,Supply Chain Management
4. Know about Document Library, Advertising and Marketing
5. Know about Consumer Search and Resource Discovery, Key Multimedia concepts.

Course outcomes:

Students will be able to:

1. Demonstrate an understanding of the foundations and importance of e-commerce.
2. Demonstrate an understanding of retailing in e-commerce by:

a. Analyzing branding and pricing strategies,

b. Using and determining the effectiveness of market research.

c. Assessing the effects of disintermediation.

3. Analyze the impact of e-commerce on business models and strategy.
4. Describe internet trading relationships including business-to-business, intra-organizational.
5. Describe the infrastructure for E-Commerce.

UNIT-I:

Introduction, Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT-II:

Consumer Oriented Applications, mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.

Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit

Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT-III:

Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks.

Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT-IV:

Making a business case for a Document Library, Digital document types, Corporate Data warehouses, Advertising and Marketing, the new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison- Wesley.
2. Goel, Ritendra "E-commerce", New Age International
3. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education.