G.Pullaiah College of Engineering and Technology
(Autonomous)
(Approved by AICTE | NAAC Accreditation with 'A' Grade | Accredited by NBA (CSE, ECE & EEE) | Permanently Affiliated to JNTUA)
Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

MASTER OF TECHNOLOGY

ACADEMIC REGULATIONS
GPCET – R23

M.Tech Regular Two Year Degree Programme
(for the batches admitted from the academic year 2023-24)

Preliminary Definitions and Nomenclatures

AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated asAutonomous by University Grants Commission(UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University, Ananthapur).

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programs,granted by UGC for Promoting Excellence.

Academic Council: The Academic Council is the highest academic body of the institute and isresponsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Year: It is the period necessary to complete an actual course of study within a year. Itcomprises two main semesters i.e., (one odd and one even).

Branch: Means specialization in a program like M.Tech degree program in Electronics and Communication Engineering,M.Tech degree program in Computer Science and Engineering etc.

Board of Studies (BOS):BOS is an authority as defined in UGC regulations, constituted by Head of theOrganization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

Backlog Course:A course is considered to be a backlog course, if the student has obtained a failuregrade in that course.

Reregistration: Betterment is a way that contributes towards improvement of the students' grade in anycourse(s). It can be done by re-registering for the course by paying the requisite fee.

Choice Based Credit System: The credit based semester system is one which provides flexibility indesigning curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Internal Examination: It is an examination conducted towards sessional assessment.

Core: The courses that are essential constituents of each engineering discipline are categorized asprofessional core courses for that discipline.

Course:A course is a subject offered by a department for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit:A credit is a unit that gives weight to the value, level or time requirements of an academic course.The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student overall the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content,materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involvingboth teaching and non-teaching staff, and other resources in the process of study for a degree.

Detention in a Course: Student who does not obtain minimum prescribed attendance in a course shall bedetained in that particular course.

Elective Course:A course that can be chosen from a set of courses. An elective can be ProfessionalElective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/hiscourses. It is done through a combination of continuous internal examinations and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated byalphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Means G.Pullaiah College of Engineering and Technology, Kurnool unless indicated otherwise by thecontext.

Pre-requisite:A specific course or subject, the knowledge of which is required to complete beforestudent register another course at the next grade level.

Program: Means, PG degree program: Master ofTechnology (M.Tech) / Master of Business Administration (MBA).

Program Educational Objectives: The broad career, professional and personal goals that every studentwill achieve through a strategic and sequential action plan.

Project work: It is a design or research based work to be taken up by a student during his/her Second yearto achieve a particular aim. It is a credit based course and is to be planned carefully by the student.

Registration: Process of enrolling into a set of courses in a semester of a program.

Regulations: The regulations, common to all B.Tech programs offered by Institute, are designated as“GPCET Regulations - R18” and are binding on all the stakeholders.

Semester: It is a period of study consisting of 16 to 18 weeks of academic work equivalent to normally90 working days. Odd semester commences usually in July and even semester in December of every year.

Semester End Examinations: It is an examination conducted for all courses offered in a semester at theend of the semester.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/hisprogram of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.

University: Means Jawaharlal Nehru Technological University Ananthapur (JNTUA), Ananthapuramu.

Regulations for Two Year Master of Technology (M.Tech) Degree programme for the batches admitted from the academic year 2023-24

1 Minimum Qualifications for Admission

Admission to M.Tech courses is open to all candidates who have passed B.E/B.Tech course (in relevant specialization) or any other examinations recognized by Jawaharlal Nehru Technological University, Anantapur, Ananthapuramu/Govt. of A.P as equivalent thereto.

2 Programmes of Study

The Programmes of study prescribed for M.Tech Degree are

- M.Tech (Digital Electronics and Communication Systems)
- M.Tech (Computer Science and Engineering)
- M.Tech (Electrical Power Systems)

COURSE WORK:

- A Candidate after securing admission must pursue the M.Tech. course of study for Four semesters duration.
- Each semester shall be of 20 weeks duration including all examinations.
- A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.
- The medium of instruction shall be English for all theory and practical courses, examinations, Seminar, Teaching Assignments, Comprehensive Viva-Voce and Project thesis/dissertation reports.

3. Attendance:

- A candidate shall be deemed to have eligibility to write end semester examinations if he/she has put in atleast 75% of attendance on cumulative basis of all subjects/courses in the semester.
- Condonation of shortage of attendance up to 10% i.e., from 65% and above and less than 75% may be given by the college on the recommendation of the Principal.
- Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence.
- If the candidate does not satisfy the attendance requirement he/she is detained for want of attendance and shall reregister for that semester. He/she shall not be promoted to the next semester.

4. Evaluation:

The performance of the candidate in each semester program shall be evaluated subject wise, with a maximum of 100 marks for theory and 100 marks for practical examination, on the basis of Internal Evaluation and End Examination.

- There shall be five units in each of the theory subjects.For the theory subjects 60% of the marks will be for the End Examination and 40% of the marks will be for Internal Evaluation.

- Two Internal Examinations shall be held during the semester for 20 marks. First internal examination shall be conducted for half of the syllabus and second internal examination shall be conducted for remaining half of the syllabus. In each internal exam, a student shall answer all three questions in 2 hours of time without seeking any choice for 30 marks which will be condensed to 20 marks. Final Internal marks for a total of 20 marks shall be arrived at by considering the average marks secured by the student in both the internal examinations.
- For the remaining 20 marks in internal evaluation, the College shall conduct one online examination.

The following pattern shall be followed in the End Examination.

- Five questions shall be set from each of the five units with either/or type for 12 marks each.
- All the questions have to be answered compulsorily.
- Each question may consist of one, two or more bits.
- For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day to day performance.
- For Comprehensive Viva-Voce and Seminar there will be an internal evaluation of 100 marks in each. A candidate has to secure a minimum of 50% (in each) to be declared successful. The assessment will be made by a board consisting of HOD and two senior internal experts at the end of III semester instruction.
- For Teaching Assignments there will be an internal evaluation of 100 marks. A candidate has to secure a minimum of 50% to be declared successful. Student has to teach 10 Hours in his/her interesting subject/subjects in the entire III Semester instruction period for his juniors at PG level or Under Graduate students who are available on the campus. For each teaching hour maximum of 10 marks are allotted. The assessment will be made by the faculty allotted by the HOD.
- Mandatory MOOCs course is introduced in III Semester as an elective without any credits. A student can choose any subject of his/her choice that has more than 30 hours duration from any MOOCs provider and should obtain satisfactory certificate. An Open Elective is introduced in III semester.
- A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.
- In case the candidate does not secure the minimum academic requirement in any of the subjects (as specified in 4.9.) he/she has to reappear for the Semester Examination either supplementary or regular in that subject, or repeat the course when next offered or do any other specified subject as may be required.

5 Re-Registration For Improvement Of Internal Evaluation Marks:

Following are the conditions to avail the benefit of improvement of internal evaluation marks.

- The candidate should have completed the course work and obtained examinations results for I, II and III semesters.
- He should have passed all the subjects for which the Internal Evaluation marks secured are more than 50%.

- Out of the subjects the candidate has failed in the examination due to Internal Evaluation marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of three Theory subjects for Improvement of Internal evaluation marks.
- The candidate has to re-register for the chosen subjects and fulfill the academic requirements.
- For each subject, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D. in favour of the Principal, G.Pullaiah College of Engineering and Technology, Kurnool payable at Kurnool along with the requisition through the Head of the department.
- In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the reregistered subjects stand cancelled.

6. Evaluation Of Project Work:

- Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the department.
- Registration of Project work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory and practical courses of I & II Semester)
- An Internal Departmental Committee (I.D.C) consisting of HOD, Supervisor and one internal senior expert shall monitor the progress of the project work.
- The first phase of the project work on the project shall be initiated in the third semester and second phase of the project work will be continued in the final semester i.e., fourth semester. The duration of the project work is for two semesters. The candidate can submit Project thesis with the approval of I.D.C. after 36 weeks from the date of registration at the earliest and one calendar year from the date of registration for the project work. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.
- The student must submit status report by giving seminars in three different phases (one in III semester and another two in IV semester) during the project work period. These seminar reports must be approved by the I.D.C before submission of the Project Report.
- A candidate shall be allowed to submit the thesis/dissertation only after obtaining plagiarism report with less than 30% and passing in all the prescribed subjects (both theory and practical), and then take viva-voce examination of the project. The viva-voce examination may be conducted once in two months for all the candidates submitted during that period.
- Three copies of the Thesis/Dissertation certified in the prescribed format by the supervisor & HOD shall be presented to the HOD.
- The department shall submit a panel of three experts for a maximum of five students at a time. However, the thesis/dissertation will be adjudicated by one examiner nominated by the Controller of Examinations.

- ❖ If the report of the examiner is favorable viva-voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the thesis/dissertation. The board shall jointly report candidates work as:
    - Satisfactory Grade A
    - Not satisfactory Grade B
- ❖ If the report of the viva-voce is not satisfactory (Grade B) the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination he will not be eligible for the award of the degree unless the candidate is permitted to revise and resubmit the thesis.

7. Grading

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

Letter Grade	Marks Range	Grade Point
S	91-100	10
A	81-90	9
B	70-80	8
C	60-69	7
D	55-59	6
E	50-54	5
F	<50	0
Absent	Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered.

Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

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

$$\text{SGPA} = \frac{\sum_{i=1}^{n} C_i \times GP_i}{\sum_{i=1}^{n} C_i}$$

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

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

$$\text{CGPA} = \frac{\sum_{j=1}^{m} SGPA_j \times TC_j}{\sum_{j=1}^{m} TC_j}$$

where "$SGPA_j$" is the SGPA of the j^{th} semester and TC_j is the total number of credits in that semester.

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point:It is a numerical weight allotted to each letter grade on a 10-point scale.

Letter Grade:It is an index of the performance of students in a said course. Grades are denoted byletters S, A, B, C, D, E and F.

8. Award Of Degree And Class:

A candidate shall be eligible for the award of respective degree if he/she fulfills the following academic regulations.

- Pursues a course of study for not less than two academic years and in not more than four academic years.
- Registers for 78 credits and secures all 78 credits.A candidate shall be eligible for the award of class if he/she satisfies the minimum academic requirements in every subject and secures 'satisfactory' grade report on his/her project thesis viva-voce. Based on overall percentage of marks obtained, the following class is awarded.

Class Awarded	CGPA Secured
First class with Distinction	>= 8
First class	>= 7 and < 8
Second class	>= 5 and < 7

9. With – Holding Of Results:

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

10. Transitory Regulations:

Candidates who have discontinued or have been detained for want of attendance or who have failed after having undergone the course in earlier regulations and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, Whereas they continue to be in the academic regulations they were first admitted.

11. Rules of Discipline

(i) Use of mobile phones with camera, in the campus is strictly prohibited.

(ii) Students shall behave and conduct themselves in a dignified and courteous manner in the campus/Hostels.

(iii) Students shall not bring outsiders to the institution or hostels.

(iv) Students shall not steal, deface, damage or cause any loss to the institution property.

(v) Students shall not collect money either by request or coercion from others within the campus or hostels.

(vi) Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism.

(vii) Use of vehicles by the students inside the campus is prohibited.

(viii) Any conduct which leads to lowering of the esteem of the organization is prohibited.

(ix) Any student exhibiting prohibited behaviour shall be suspended from the institute. The period of suspension and punishment shall be clearly communicated to the student. The student shall lose the attendance for the suspended period

(x) Dress Code

Boys : All the boy students should wear formal dresses. Wearing T-shirts and other informal dresses in the campus is strictly prohibited.

Girls : All the girls students shall wear saree/chudidhar with dupatta

12. Punishments for Malpractice cases – Guidelines

The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad members etc; during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

S.no	**Nature of Malpractice/Improper conduct**	**Punishment**
1	Possesses or keeps accessible in examination hall, anypaper, note book, programmable calculators, Cellphones, pager, palm computers or any other form ofmaterial concerned with or related to the course of theexamination (theory or practical) in which he isappearing but has not made use of (material shallinclude any marks on the body of the student whichcan be used as an aid in the course of the examination)	Expulsionfrom the examinationhall and cancellation of theperformance in that course only.
2	Uses objectionable, abusive or offensive language inthe answer paper or in letters to the examiners orwrites to the examiner requesting him to award pass marks	Cancellation of the performance inthat course.
3	Copying detected on the basis of internal evidence,such as, during valuation or during special scrutiny.	Cancellation of the performance inthat course and all other courses thecandidatehasappeared includingpracticalexaminations and projectwork of that semester/yearexaminations.
4	Gives assistance or guidance or receives it from anyother student orally or by any other body languagemethods or communicates through cell	Expulsionfromtheexaminationhalland cancellation of theperformance in that course only ofall the

	phones withany other student or persons in or outside the exam hallin respect of any matter.	studentsinvolved. In caseof an outsider, he will be handedover to the police and a case shallbe registered against him.
5	Has copied in the examination hall from any paper,book, programmable calculators, palm computers orany other form of material relevant to the course of theexamination (theory or practical) in which the studentis appearing.	Expulsionfromtheexaminationhall and cancellation of theperformance in that course and allothercourses including practicalexaminations and project work ofthat semester/year.
6	Comes in a drunken condition to the examination hall.	Expulsionfrom the examinationhall and cancellation of theperformance in that course and allothercourses including practicalexaminations and project work ofthat semester/year.
7	Smuggles in the Answer book or takes out orarranges to send out the question paper duringthe examination or answer book during or afterthe examination	Expulsion from the examination hall andcancellation of performance in thatcourse and all the other courses includingpractical examinations and project workof that semester/year. The student is alsodebarred for two consecutive semestersfrom class work and all examinations.The continuation of the course by thestudent is subject to the academicregulations in connection with forfeit of seat.
8	Refuses to obey the orders of the ChiefSuperintendent/Assistant – Superintendent / anyofficer on duty or misbehaves or createsdisturbance of any kind in and around theexamination hall or organizes a walk out orinstigates others to walk out, or threatens theofficer-in charge or any person on duty in oroutside the examination hall of any injury to hisperson or to any of his relations whether by words,either spoken or written or by signs or by visiblerepresentation, assaults the officer-in-charge, orany person on duty in or outside the examinationhall or any of his relations, or indulges in any otheract of misconduct or mischief which result indamage to or destruction of property in theexamination hall or any part of the College campusor engages in any other act which in the opinion ofthe officer on duty amounts to use of unfair meansor misconduct or has the tendency to disrupt theorderly conduct of the examination.	In case of students of the college, theyshall be expelled from examination hallsand cancellation of their performance inthat course and all other courses of thatsemester/year. The students also aredebarred and forfeit their seats. In case ofoutsiders, they will be handed over to thepolice and a police case shall beregistered against them.
9	Leaves the exam hall taking away answer scriptor intentionally tears up the script or any partthereof inside or outside the examination hall.	Expulsion from the examination hall andcancellation of performance in that courseand all the other courses including practicalexaminations and project work of thatsemester/year. The candidate is also debarredfor two consecutive semesters from classwork and all end

		examinations. Thecontinuation of the course by the candidate issubject to the academic regulations inconnection with forfeiture of seat.
10	Possesses any lethal weapon or firearm in theexamination hall.	Expulsion from the examination halland cancellation of the performance inthat course and all other coursesincluding practical examinations andproject work of that semester/year. Thestudent is also debarred and forfeits theseat.
11	If student of the college, who is not acandidate for the particular examination orany person not connected with the collegeindulges in any malpractice or improperconduct mentioned in S.No 7 to S.No 9.	For Student of the college : Expulsion fromthe examination hall and cancellation of theperformance in that course and all othercourses including practical examinations andproject work of that semester/year. Thecandidate is also debarred and forfeits theseat. Person(s) who do not belong to theCollege will be handed over to police and, apolice case shall be registered against them.
12	Impersonates any other student inconnection with the examination	The student who has impersonated shall beexpelled from examination hall. The studentis debarred from writing the remaining exams,and rusticated from the college for oneacademic year during which period thestudent will not be permitted to write anyexam. If the imposter is an outsider, he willbehanded over to the police and a case shall beregistered against him. The performance of the original studentwho has been impersonated, shall becancelled in all the courses of the examinationincluding practicals and project work of thatsemsester /year. The student is rusticated fromthe college for two consecutive years duringwhich period the student will not be permittedto write any exam. The continuation of thecourse by the student is subject to theacademic regulations in connection withforfeiture of seat.
13	If any malpractice is detected which is not covered in the above S.No 1 to S.No 12 items, itshall be reported to the college academic council for further action and award suitablepunishment.	
14	Malpractice cases identified during sessional examinations will be reported to theexamination committee nominated by Academic council to award suitable punishment.	

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY(AUTONOMOUS)

COURSE STRUCTURE AND SYLLABUS

R23 Regulation

M. Tech –COMPUTER SCIENCE AND ENGINEERING

I YEAR I SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
C2501	Advanced Data Structures and Algorithms	PC	4	-	-	4	40	60	100
C2502	Fundamentals of Data Science	PC	4	-	-	4	40	60	100
C2503	Mobile Application Development	PC	4	-	-	4	40	60	100
C2504 **C2505** **C2506** **C2507**	Elective-I a. Software Project Management b. Information Security c. Distributed Databases d. Neural Networks	PE	4	-	-	4	40	60	100
C2508 **C2509** **C2510** **C2511**	Elective-II a. Professional Aspects in Software Engineering b. Artificial Intelligence c. Internals of Operating Systems d. Multicore Architecture & Programming	PE	4	-	-	4	40	60	100
C2512	Advanced Data Structures and Algorithms Lab	PC	-		4	2	40	60	100
C2513	R & Analytics Lab	PC	-		4	2	40	60	100
C2514	Mobile Application Development Lab	PC	-		4	2	40	60	100
TOTAL			**20**	**-**	**12**	**26**	**320**	**480**	**800**

I YEAR II SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
C2515	Advances in Software Testing	PC	4	-	-	4	40	60	100
C2516	Big Data Analytics	PC	4	-	-	4	40	60	100
C2517	Machine Learning	PC	4	-	-	4	40	60	100
C2518	Elective-III a. Internet of Things	PE	4	-	-	4	40	60	100

C2519 **C2520** **C2521**	b. Distributed Computing c. Network Security & Cryptography d. NOSQL Databases								
C2522 **C2523** **C2524** **C2525**	Elective-IV a. DevOps b. Cloud Computing c. Software Configuration Management d. Natural Language Processing	PE	4	-	-	4	40	60	100
C2526	Advances in Software Testing Lab	PC	-	-	4	2	40	60	100
C2527	Map Reduce Programming Lab	PC	-	-	4	2	40	60	100
C2528	Machine Learning Lab	PC	-	-	4	2	40	60	100
		TOTAL	**20**		**12**	**26**	**320**	**480**	**800**

II YEAR I SEMESTER									
Code	**Course**	**Category**	**Periods per Week**			**Credits**	**Scheme of Examination Maximum Marks**		
			L	**T**	**P**		**Internal**	**External**	**Total**
C2215A **C2215B** **C2215C**	Elective-V (Open Elective) 1.Research Methodology 2.Human Values & Professional Ethics 3.Intellectual Property Rights	OE	4	-	-	4	40	60	100
C2529	Elective-VI (MOOCs)	PE		-	-	-			
C2530	Comprehensive Viva-Voice	PW		-	-	2			
C2531	Seminar	PW		-	-	2		50	50
C2532	Teaching Assignment	PW		-	-	2		100	100
C2533	Project work Phase-I	PW		-	-	4			
		TOTAL	**04**	**-**	**-**	**14**	**40**	**210**	**250**

II YEAR II SEMESTER						
Code	**Course**	**Category**	**Periods per Week**			**Credits Internal**
			L	**T**	**P**	
C2534	Project work Phase - II	PW	-		2	12
		TOTAL	-		-	12

CODE	**DESCRIPTION**
PC	PROFESSIONAL COURSE
HS	HUMANITIES COURSE
BS	BASIC SCIENCES
OE	OPEN ELECTIVE
PE	PROFESSIONAL ELECTIVE
PW	PROJECT WORK
ES	ENGINEERING SCIENCE

ADVANCED DATA STRUCTURES AND ALGORITHMS-(C2501)

Title of the course:	**ADVANCED DATA STRUCTURES AND ALGORITHMS**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:

- This course builds on the first-year Design and Analysis of Algorithms course.
- It introduces students to a number of highly efficient algorithms and data structures for fundamental computational problems across a variety of areas.
- Students are also introduced to techniques such as amortised complexity analysis.
- As in the first-year course, the style of the presentation is rigorous but not formal.

COURSE OUTCOMES:

After successful completion of the course, the student will be able to

CO1	Understand theoperations andapplications of basic data structure
CO2	Explain non-linear data structures-binarytrees, binarysearch tree,AVLtrees,Btrees,Red-Black trees and splaytrees.
CO3	Analyzethe timecomplexities ofalgorithms forsolvingproblems
CO4	Be able to understand and apply amortised analysis on data structures, including binary search trees, mergable heaps, and disjoint sets.
CO5	Understand the implementation and complexity analysis of fundamental algorithms such as RSA, primality testing, max flow, discrete Fourier transform.
CO6	Have an idea of applications of algorithms in a variety of areas, including linear programming and duality, string matching, game-theory

Title of the course:	**ADVANCED DATA STRUCTURES AND ALGORITHMS**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:

UNIT-I	**Overview of Data Structures**	**LECTURE HOURS:10**

Arrays, Stacks, Queues, linked lists, Linked stacks and Linked queues, Applications.
Algorithm Analysis - Efficiency of algorithms, Asymptotic Notations, Time complexity of an algorithm using O notation, Polynomial Vs Exponential Algorithms, Average, Best, and Worst Case Complexities, Analyzing Recursive Programs.

UNIT-II	**Trees and Graphs**	**LECTURE HOURS: 12**

Basics of trees and binary trees, Representation of trees and Binary trees, Binary tree Traversals, Threaded binary trees, Graphs, representation and traversals.
Binary Search Trees, AVL Trees and B Trees - Binary Search Trees: Definition, Operations and applications. AVL Trees: Definition, Operations and applications. B Trees: Definition, Operations and applications.

UNIT-III	**Red – Black Trees, Splay Trees and Hash Tables**	**LECTURE HOURS: 11**

Red–Black Trees, Splay Trees and their applications, Hash Tables, Hash Functions and various applications, File Organizations.

UNIT-IV	**Divide – and – Conquer & Greedy Method**	**LECTURE HOURS: 11**

General Method, Binary Search, Finding Maximum and Minimum, Quick Sort, Merge sort, Strassen's Matrix Multiplication, Greedy Method- General Method, Minimum Cost Spanning Trees, Single Source Shortest Path. Back Tracking and Branch – and – Bound - General Method, 8 – Queen's Problem, Graph Coloring. Branch – and – Bound: The Method, LC Search, Control Abstraction, Bounding, 0 / 1 Knapsack Problem.		
UNIT-V	**Dynamic Programming**	**LECTURE HOURS:12**
General Method, All Pairs Shortest Path, Single Source Shortest Path, 0 /1 Knapsack problem, Reliability Design, Traveling Sales Person's Problem.		

Text Books:	
1	Fundamentals of Computer Algorithms by Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, 2nd edition, University Press.

Reference Books:	
1	Data Structures and Algorithms Using C++ by Ananda Rao Akepogu and RadhikaRajuPalagiri, Pearson Education, 2010.
2	Classic Data Structures by D. Samanta, 2005, PHI
3	Data Structures and Algorithms by G.A.V. Pai, 2009, TMH.
4	Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
5	Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG

FUNDAMENTALS OF DATA SCIENCE-(C2502)

Title of the course:	**FUNDAMENTALS OF DATA SCIENCE**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:

This course serves as an introduction to the data science principles required to tackle real-world, data-rich problems in business and academia, including:

- Data acquisition, cleaning, and aggregation
- Exploratory data analysis and visualization
- Feature engineering
- Model creation and validation
- Basic statistical and mathematical foundations for data science

COURSE OUTCOMES:

After successful completion of the course, the student will be able to

CO1	Be able to develop relevant programming abilities.
CO2	Demonstrate proficiency with statistical analysis of data.
CO3	Develop the ability to build and assess data-based models.
CO4	Execute statistical analyses with professional statistical software.
CO5	Demonstrate skill in data management.

Title of the course:	**FUNDAMENTALS OF DATA SCIENCE**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:

UNIT-I	**Statistical Learning**	**LECTURE HOURS: 10**
Introduction, What Is Statistical Learning?, Why Estimate f?, How Do We Estimate f?, The Trade-Off Between Prediction Accuracy and Model Interpretability, Supervised Versus Unsupervised Learning, Regression Versus Classification Problems, Assessing Model Accuracy, Measuring the Quality of Fit, The Bias-Variance Trade-of, The Classification Setting, Introduction to R, Basic Commands, Graphics, Indexing Data, Loading Data, Additional Graphical and Numerical Summaries.		
UNIT-II	**Linear Regression**	**LECTURE HOURS: 12**
Linear Regression, Simple Linear Regression, Multiple Linear Regression, Other Considerations in the Regression Model, Comparison of Linear Regression with K-Nearest Neighbours, Linear Regression		
UNIT-III	**Classification**	**LECTURE HOURS: 11**
Classification, Logistic Regression, Linear Discriminant Analysis, A Comparison of Classification Methods, Logistic Regression, LDA, QDA, and KNN.		
UNIT-IV	**Computational methods and Data Wrangling**	**LECTURE HOURS: 11**
Programming for basic computational methods such as Eigen values and Eigen vectors, sparse matrices, QR and SVD, Interpolation by divided differences. Data Wrangling: Data Acquisition, Data Formats, Imputation, The split-apply-combine paradigm.		
UNIT-V	**Data Visualization and Data Warehouse**	**LECTURE HOURS: 12**

Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.
Data Warehouse: Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction.

Text Books:	
1	Gareth James Daniela Witten Trevor Hastie, Robert Tibshirani, An Introduction to Statistical Learning with Applications in R, February 11, 2013, web link: www.statlearning.com.
2	Mark Gardener, Beginning R The statistical Programming Language, Wiley, 2015.
3	Han ,Kamber, and J Pei, Data Mining Concepts and Techniques, 3rd edition, Morgan Kaufman, 2012.

Reference Books:	
1	SinanOzdemir, Principles of Data Science, Packt Publishing Ltd Dec 2016.
2	Joel Grus, Data Science from Scratch, Oreilly media, 2015.

MOBILE APPLICATION DEVELOPMENT-(C2503)

Title of the course:	**MOBILE APPLICATION DEVELOPMENT**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:
• To understand fundamentals of android operating systems. • Illustrate the various components, layouts and views in creating android applications • To understand fundamentals of android programming.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	To understand the components and structure of mobile development frameworks (using J2ME and Android) and learn how and when to apply the different components to develop a working system.
CO2	To apply the different types of application models/architectures used to develop mobile software applications.
CO3	To Design, implement and deploy mobile applications using the J2me Objects in android.
CO4	To design and implement own user interfaces and different display mechanisms.
CO5	To investigate the capabilities and limitations of mobile computing devices.
CO6	To use modern tools like Android studio, Apache Cordova mobile applications.

Title of the course:	**MOBILE APPLICATION DEVELOPMENT**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		3	1	0	4

Course Content:

UNIT-I	**Basics of Mobile Applications Development:**	**LECTURE HOURS: 10**

Tools: Eclipse ADT, Android Studio.

Understanding the Role of Android Application Components, Understanding the Utility of Android API, Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Creating the User Interface, Commonly Used Layouts and Controls, Event Handling, Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit Text Control, Choosing Options with Checkbox, Choosing Mutually Exclusive Items Using Radio Buttons

UNIT-II	**Building Blocks for Android Application Design**	**LECTURE HOURS: 12**

Introduction to Layouts, Linear Layout, Relative Layout, Absolute Layout, Using Image View, Frame Layout, Table Layout, Grid Layout, Adapting to Screen orientation.

Utilizing Resources and Media Resources, Creating Values Resources, Using Drawable Resources, Switching States with Toggle Buttons, Creating an Images Switcher Application, Scrolling Through Scroll View, playing Audio, Playing Video, Displaying Progress with Progress Bar, Using Assets

UNIT-III	**Using Selection widgets and Debugging**	**LECTURE HOURS: 11**

Using List View, Using the Spinner control, Using the GridView Control, Creating an Image Gallery Using the ViewPager Control, Using the Debugging Tool: Dalvik Debug Monitor Service(DDMS), Debugging Application, Using the Debug Perspective.

Displaying And Fetching Information Using Dialogs and Fragments: What Are Dialogs?, Selecting the Date and Time in One Application, Fragments, Creating Fragments with java Code, Creating Special Fragments

UNIT-IV	**Building Menus**	**LECTURE HOURS: 11**

Creating Interface Menus and Action Bars, Menus and Their Types, Creating Menus Through XML, Creating Menus Through Coding, Applying a Context Menu to a List View, Using the Action Bar, Replacing a Menu with the Action Bar, Creating a Tabbed Action Bar, Creating a Drop-Down List Action Bar		
UNIT-V	**Storing Data & Communicating with SMS and Emails**	**LECTURE HOURS: 12**
Using the SQLiteOpenHelperclasss, Accessing Databases with the ADB, Creating a Data Entry Form. Understanding Broadcast Receivers, Using the Notification System, Sending SMS Messages with Java Code, Receiving SMS Messages, Sending Email, Working With Telephony Manager.Systems and applications.		

Text Books:	
1	Android Programming by B.M Harwani, Pearson Education, 2013.

Reference Books:	
1	Android application Development for Java Programmers, James C Sheusi, Cengage Learning
2	Android In Action by w.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz., Dreamtech.
3	Professional Android 4 applications development, Reto Meier, Wiley India, 2012.
4	Beginning Android 4 applications development, Wei- Meng Lee, Wiley India,2013
5	PawPrints Learning Technologies, Beginning Android Development: Create Your Own Android Apps Today, 2014.
6	Erik Hellman, Android Programming: Pushing the Limits, John Wiley and sons ltd, 2014.
7	Neil Smyth, Android Studio Development Essentials.
8	Joseph Annuzzi,Jr, Lauren Darcey, Introduction to Android Application Development, Addison-Wesley, Fourth Edition.

SOFTWARE PROJECT MANAGEMENT (ELECTIVE-1)-(C2504)

Title of the course:	**SOFTWARE PROJECT MANAGEMENT (ELECTIVE-1)**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:
The conventional model performance and pitfalls, Software economic parameters, Software development lifecycle stages and phases, Artifacts and work flows of the process, Check points of the process(Milestones),Roles and Responsibilities of Management and Technical people, Tailoring of the project, Monitoring and controlling of process status using Metrics, Future software project management

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Ability to achieve cost effective management for the software project and business software
CO2	Develop Strategy to achieve the concurrence among stakeholders at every stage in the life cycle known by the student.
CO3	Provided flexible project management software to meet both current and future demands of a business.
CO4	Ability to incorporate organizational culture into business software to build employee and workplace morale
CO5	Ability to Work within customer budgets
CO6	Capability to reach company goals and customer strategic objectives in every possible way

Title of the course:	**SOFTWARE PROJECT MANAGEMENT (ELECTIVE-1)**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:

UNIT-I	**Project Evaluation and Project Planning**	**LECTURE HOURS:10**

Importance of Software Project Management, Activities Methodologies, Categorization of Software Projects , Setting objectives , Management Principles, Management Control, Project portfolio Management, Cost-benefit evaluation technology, Risk evaluation, Strategic program Management, Stepwise Project Planning.

UNIT-II	**Project Life Cycle And Effort**	**LECTURE HOURS: 12**

Software process and Process Models, Choice of Process models, mental delivery, Rapid Application development, Agile methods, Extreme Programming, SCRUM, Managing interactive processes, Basics of Software estimation, Effort and Cost estimation techniques, COSMIC Full function points, COCOMO II A Parametric Productivity Model, Staffing Pattern..

UNIT-III	**Activity Planning And Risk Management**	**LECTURE HOURS: 11**

Objectives of Activity planning, Project schedules, Activities, Sequencing and scheduling, Network Planning models, Forward Pass & Backward Pass techniques, Critical path (CRM) method, Risk identification, Assessment, Monitoring, PERT technique, Monte Carlo simulation, Resource Allocation, Creation of critical patterns, Cost schedules.

UNIT-IV	**Project Management And Control**	**LECTURE HOURS: 11**

Framework for Management and control, Collection of data Project termination, Visualizing progress, Cost monitoring, Earned Value Analysis- Project tracking, Change control- Software Configuration Management, Managing contracts, Contract Management

UNIT-V	Staffing In Software Projects	LECTURE HOURS:12
Managing people, Organizational behavior, Best methods of staff selection, Motivation, The Oldham-Hackman job characteristic model, Ethical and Programmed concerns, Working in teams, Decision making, Team structures, Virtual teams, Communications genres, Communication plans.		

Text Books:	
1	Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012

Reference Books:	
1	Robert K. Wysocki "Effective Software Project Management" – Wiley Publication,2011.
2	Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013.
3	Walker Royce: "Software Project Management"- Addison-Wesley, 1998.

INFORMATION SECURITY(ELECTIVE-1)-(C2505)

Title of the course:	**INFORMATION SECURITY(ELECTIVE-1)**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:
In this course students learn basics of information security, in both management aspect and technical aspect.

COURSE OUTCOMES:	
CO1	Understand basics of information security
CO2	Understand of various types of security incidents and attacks, and learn methods to prevent, detect and react incidents and attacks.
CO3	Learn basics of application of cryptography which are one of the key technology to implementsecurity functions.
CO4	Identify the basic principles and techniques when designing a secure system
CO5	Understand how to think adversarial, how today's attacks and defenses work in practice
CO6	Understandhow to assess threats for their significance, and how to gauge the protections and limitations provided by today's technology

Title of the course:	**Information Security (ELECTIVE-1)**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:

UNIT-I	**Computer Security concepts**	**LECTURE HOURS:10**

Computer Security concepts, The OSI Security Architecture, Security attacks, Security services and Security mechanisms, A model for Network Security
Classical encryption techniques- symmetric cipher model, substitution ciphers, transposition ciphers, Steganography.
Modern Block Ciphers: Block ciphers principles, Data encryption standard (DES), Strength of DES, linear and differential cryptanalysis, block cipher modes of operations, AES, RC4

UNIT-II	**Introduction to Number theory**	**LECTURE HOURS: 12**

Introduction to Number theory – Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Algebraic Structures, GF(2n) Fields, Primes, Primality Testing, Factorization, Chinese remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm.
Public-key cryptography - Principles of public-key cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, ELGamal cryptographic system, Elliptic Curve Arithmetic, Elliptic curve cryptography

UNIT-III	**Cryptographic Hash functions**	**LECTURE HOURS: 11**

Cryptographic Hash functions: Applications of Cryptographic Hash functions, Requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA)
Message Authentication Codes: Message authentication Requirements, Message authentication functions, Requirements for Message authentication codes, security of MACs, HMAC, MACs based on Block Ciphers, Authenticated Encryption
Digital Signatures-RSA with SHA & DSS

UNIT-IV	**Key Management and distribution:**	**LECTURE HOURS: 11**

Key Management and distribution: Symmetric key distribution using Symmetric Encryption, Symmetric key distribution using Asymmetric, Distribution of Public keys, X.509 Certificates, Public key Infrastructure. User Authentication: Remote user Authentication Principles, Remote user Authentication using Symmetric Encryption, Kerberos, Remote user Authentication using Asymmetric Encryption, Federated Identity Management, Electronic mail security: Pretty Good Privacy (PGP), S/MIME.		
UNIT-V	**Security at the Transport Layer (SSL and TLS**	**LECTURE HOURS:12**
Security at the Transport Layer (SSL and TLS) : SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH Security at the Network layer (IPSec): Two modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange. System Security: Description of the system, users, Trust and Trusted Systems, Buffer Overflow and Malicious Software, Malicious Programs, worms, viruses, Intrusion Detection System(IDS), Firewalls		

Text Books:	
1	"Cryptography and Network Security", Behrouz A. Frouzan and DebdeepMukhopadhyay, McGraw Hill Education, 2nd edition, 2013.
2	"Cryptography and Network Security: Principals and Practice", William Stallings, Pearson Education , Fifth Edition, 2013.

Reference Books:	
1	"Network Security and Cryptography", Bernard Menezes ,Cengage Learning.
2	"Cryptography and Security", C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.
3	"Applied Cryptography, Bruce Schiener, 2nd edition, John Wiley & Sons.
4	"Cryptography and Network Security", AtulKahate, TMH.
5	'Introduction to Cryptography", Buchmann, Springer.
6	'Number Theory in the Spirit of Ramanujan", Bruce C.Berndt, University Press
7	"Introduction to Analytic Number Theory", Tom M.Apostol, University Press

DISTRIBUTED DATABASE (ELECTIVE-1)-(C2506)

Title of the course:	**DISTRIBUTED DATABASE(ELECTIVE-1)**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:
This course will deal with the fundamental issues in large distributed database systems which are motivated by the computer networking and distributionof processors, and control..... Concurrency, Consistency, Integrity, Reliability, Privacy, and Security in distributed database systems will be included.

COURSE OUTCOMES:	
CO1	Understand techniques used for data fragmentation, replication, and allocation during the distributed database design process.
CO2	Evaluate simple strategies for executing a distributed query to select the strategy that minimizes the amount of data transfer.
CO3	Identify the two-phase commit protocol is used to deal with committing a transaction that accesses databases stored on multiple nodes.
CO4	Describe distributed concurrency control
CO5	Understand the techniques used for data fragmentation, replication, and allocation during the distributed database design process.
CO6	Distinguish copy techniques and the voting method

Title of the course:	**DISTRIBUTED DATABASE(ELECTIVE-1)**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:

UNIT-I	**Introduction of DDBMS**	**LECTURE HOURS:10**

Distributed data processing- Data delivery alternatives- challenges of DDBSs-Design issues- Distributed DBMS Architecture-Overview of relational DBMS-review of computer networks- Distributed databases design-Top down design process-Distribution design issues- Fragmentation- Allocation-data directory-database integration- bottom up design methodology-schema matching- schema integration- schema mapping- data cleaning.

UNIT-II	**Data and Access control**	**LECTURE HOURS: 12**

View management-data security-semantic integrity control-overview of query processing-query processing problem-objectives of query processing-complexity of relational Algebra operations-characterization of query processors-layers of query processing-query decomposition and data localization-query decomposition-localization of distributed data.

UNIT-III	**Optimization of queries and transaction management**	**LECTURE HOURS: 14**

Query optimization-centralized query optimization-join ordering in distributed queries- Distributed query optimization-multi database query processing-issues in multi database query processing- multi database query processing archicture-query rewriting using views-query optimization and execution-query translation and execution-introduction to transaction management- definition of a transaction-properties of transactions-types of transactions-archicture revisited.

UNIT-IV	**Distributed concurrency control & Replication**	**LECTURE HOURS: 16**

Serialization theory-Taxonomy of concurrency control mechanisms-locking based concurrency control algorithms-timestamp based concurrency control algorithms-optimistic concurrency control algorithms-deadlock management-"Relaxed" concurrency control-Distributed DBMS Reliability- Reliability concepts and measures-failures in Distributed DBMS-local Reliability protocols- Distributed Reliability protocols-Dealing with site failure- network partitioning-architectural considerations-data replication-consistency of replicated databases-update management strategies-replication protocols-group communication-replication and failures-replication mediator service.		
UNIT-V	**Database systems-Various Models**	**LECTURE HOURS:12**
Parallel database system architectures-parallel data placement-parallel query processing load balancing-database clusters-distributed object database management-fundamental object concepts and object models-object distributed design- architectural issues-object management-distributed object storage-object query processing-transaction management-web data management-web graph management-web search-web querying-distributed XML Processing.		

Text Books:	
1	M. Tamer Ozsu, Patrick Valduriez, Principles of Distributed Database Systems, Springer, 2011.

Reference Books:	
1	Chhandra Ray, Distributed database systems, Pearson education, India, 2012.
2	Stefano Ceri, GiuseppuPelagatti, Distributed databases: Principles and systems, McGraw Hill Education, 2008.

NEURAL NETWORKS (ELECTIVE-1)-(C2507)

Title of the course:	**Neural Networks(ELECTIVE-1)**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:
Neural networks provide a model of computation drastically different from traditional computers. Typically, neural networks are not explicitly programmed to perform a given task; rather, they learn to do the task from examples of desired input/output behavior. The networks automatically generalize their processing knowledge into previously unseen situations, and they perform well even when the input is noisy, incomplete or inaccurate. These properties are well-suited for modeling tasks in ill-structured domains such as face recognition, speech recognition and motor control.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	State the artificial neural network architecture.
CO2	Design perceptron network with back propagation technique, auto associative network, bidirectional associative network
CO3	Design perceptron network withKohonen Self-Organizing Feature Map, Learning Vector Quantization and Counter Propagation Network.
CO4	Explain the fuzzy logic, fuzzy relation, fuzzy arithmetic and fuzzy measures.
CO5	Understand fuzzy rule base system and approximate reasoning system.
CO6	Explain encoding, selection, crossover and mutation technique in genetic algorithm.

Title of the course:	**Neural Networks(ELECTIVE-1)**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:		
UNIT-I	**BASICS OF ARTIFICIAL NEURAL NETWORKS**	**LECTURE HOURS:10**
BASICS OF ARTIFICIAL NEURAL NETWORKS: Characteristics of Neural Networks, Historical Development of Neural Network Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws		
UNIT-II	**ACTIVATION AND SYNAPTIC DYNAMICS**	**LECTURE HOURS: 10**
ACTIVATION AND SYNAPTIC DYNAMICS: Activation Dynamics Models, Synaptic Dynamics Models, Learning Methods, Stability and Convergence, Recall in Neural Networks		
UNIT-III	**FUNCTIONAL UNITS OF ANN FOR PATTERN RECOGNITION TASKs**	**LECTURE HOURS: 14**
FUNCTIONAL UNITS OF ANN FOR PATTERN RECOGNITION TASKs: Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units: Pattern Recognition Tasks by Feed forward Neural Networks, Pattern Recognition Tasks by Feedback Neural Networks, Pattern Recognition Tasks by Competitive Learning Neural Networks		
UNIT-IV	**FEEDFORWARD NEURAL NETWORKS:**	**LECTURE HOURS: 11**
FEEDFORWARD NEURAL NETWORKS: Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks		

UNIT-V	FEEDBACK NEURAL NETWORKS:	LECTURE HOURS:10
FEEDBACK NEURAL NETWORKS: Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks, Stochastic Networks and Simulated Annealing, Boltzmann Machine		

Text Books:	
1	"Artificial Neural Networks", B. Yegnanarayana – PHI Publications

PROFESSIONAL ASPECTS IN SOFTWARE ENGINEERING (Elective-II)-(C2508)

Title of the course:	**PROFESSIONAL ASPECTS IN SOFTWARE ENGINEERING(Elective-II)**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:

This course serves as an introduction to the data science principles required to tackle real-world, data-rich problems in business and academia, including:

- Data acquisition, cleaning, and aggregation
- Exploratory data analysis and visualization
- Feature engineering
- Model creation and validation
- Basic statistical and mathematical foundations for data science

COURSE OUTCOMES:

After successful completion of the course, the student will be able to

CO1	Ability to identify the minimum requirements for the development of application.
CO2	Ability to develop, maintain, efficient, reliable and cost effective software solutions
CO3	Ability to critically thinking and evaluate assumptions and arguments.
CO4	Understanding of different software architectural styles, requirements and SRS.
CO5	Understanding of software testing approaches such as unit testing and integration testing.
CO6	Understanding on quality control and how to ensure good quality software.

Title of the course:	**PROFESSIONAL ASPECTS IN SOFTWARE ENGINEERING(Elective-II)**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:

UNIT-I	**Intellectual Property rights**	**LECTURE HOURS: 10**
Intellectual Property rights Confidential Information, Copyright, Infringement of Copyright, Acts permitted in Relation to Copyright Works, Licensing and Assignment of Copyright, Moral Rights, Designs, Trademarks, The tort of passing off, Domain Names, Patents.		
UNIT-II	**Software Licenses**	**LECTURE HOURS: 12**
Software Licenses, Copyright, Contract, Patent, Free Software and Open Source Software, MIT License, BSD, License, GNU General Public License, GNU Lesser General Public License, Q Public License, Proprietary License, Sun Community License.		
UNIT-III	**Software Contracts**	**LECTURE HOURS: 11**
Basics of Software Contracts, Extent of liability, Contract for the supply of custom-built software at a fixed price, other types of software service Contract, Liability for defective software.		
UNIT-IV	**Software Crime Prevention**	**LECTURE HOURS: 11**

Computing and criminal Activity, Reforms of Criminal Law, Categories of Misuse, Computer Fraud, Obtaining Unauthorized Access to Computer, Unauthorized Alteration or Destruction of Information, Denying Access to an Authorized user, Unauthorized Removal of Information Stored in a Computer.

UNIT-V	**Data Protection Regulations**	**LECTURE HOURS: 12**

Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.
Data Warehouse: Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction.

Text Books:

1	Andrew M. St. Laurent, “Open Source and Free Software Licensing”, O’Reilly, Publications.
2	Frank Bott, et. al, “Professional Issues in Software Engineering”, Taylor

ARTIFICIAL INTELLIGENCE (Elective-II) – (C2509)

Title of the course:	**ARTIFICIAL INTELLIGENCE (Elective-II)**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)
COURSE OVERVIEW:	
This course serves as an introduction to the principles, applications of Artificial Intelligence and its various models.	
COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Understand the basic principles, applications of Artificial Intelligence.
CO2	Formalize a given problem in the language/framework of AI methods (search problem, as a constraint satisfaction problem).
CO3	Represent Knowledge using Predicate logic and rules.
CO4	Describe how to implement strategies, procedures for game playing.
CO5	Understanding Supervised and Unsupervised learning
CO6	Learning Probabilistic Models

Title of the course:	**ARTIFICIAL INTELLIGENCE (Elective-II)**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:		
UNIT-I	**Foundations of AI**	**LECTURE HOURS: 10**
Foundations of AI: What is AI, History of AI, Strong and weak AI, The State of the Art. Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.		
UNIT-II	**Solving Problems by Searching**	**LECTURE HOURS: 12**
Solving Problems by Searching: Problem – Solving Agents, Example Problems, Searching for Solutions, uniformed search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.		
UNIT-III	**Knowledge Representation**	**LECTURE HOURS: 11**
Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information, The Internet Shopping World.		
UNIT-IV	**Learning from Examples**	**LECTURE HOURS: 11**
Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Learner Models, Nonparametric Models, Support Vector Machines, Ensemble Learning, Practical Machine Learning.		
UNIT-V	**Learning Probabilistic Models**	**LECTURE HOURS: 12**
Learning Probabilistic Models: Statistical Learning, Learning with Complete data, Learning with Hidden variables: The EM Algorithm.		

Text Books:	
1	"Artificial Intelligence A Modern Approach", Stuart J. Russell & Peter Norvig – Pearson.

INTERNALS OF OPERATING SYSTEMS (Elective-II)- (C2510)

Title of the course:	**INTERNALS OF OPERATING SYSTEMS (Elective-II)**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)
COURSE OVERVIEW:	
This course serves as an introduction to have a thorough understanding of the basic structure and operation of a digital computer and its operations	
COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	To learn thefundamentals of Operating Systems
CO2	To learn the mechanisms of OS to handle processes and threads and their communication
CO3	To learn the mechanisms involved in memory management in contemporary OS
CO4	To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
CO5	To know the components and management aspects ofconcurrency management
CO6	To learn programmatically to implement simple OS mechanisms

Title of the course:	**INTERNALS OF OPERATING SYSTEMS (Elective-II)**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:

UNIT-I	**BUFFER CACHE AND FILE SUB-SYSTEM**	**LECTURE HOURS: 10**
Introduction to kernel- Architecture of the UNIX operating system, System Concepts, Data structures. Buffer Cache: Buffer header, Structure of buffer pool, Reading and writing disk blocks. Files INODES, Structure of a regular file, Directories, Super block, Inode assignment.		
UNIT-II	**SYSTEM CALLS AND PROCESS SUB-SYSTEM**	**LECTURE HOURS: 12**
System calls- OPEN, READ, CLOSE, WRITE, CREATE, CHMOD, CHOWN, Pipes, Mounting and Unmounting. Process Layout the system memory, context, process control, process creation, signals, process scheduling, time, clock.		
UNIT-III	**INTER PROCESS COMMUNICATIONS**	**LECTURE HOURS: 11**
Inter-process communications- Process tracing, System V IPC, Shared Memory, Semaphores. Network Communications- Socket Programming: Sockets, descriptors, connections, socket elements, Stream and datagram sockets.		
UNIT-IV	**WINDOWS SYSTEM COMPONENTS**	**LECTURE HOURS: 11**
Windows Operating System- versions, concepts and tools, Windows internals, System architecture, requirements and design goals, operating system model, architecture overview, key system components. System mechanisms- Trap dispatching, object manager, synchronization, system worker threads, windows global flags, local procedural calls, kernel event tracing.		
UNIT-V	**REGISTRY AND PROCESS MANAGEMENT**	**LECTURE HOURS: 12**
Windows management mechanisms- the registry, registry usage, registry data types, local structure, trouble shooting registry problems, registry internals, services, applications, accounts, service control manager, windows management instrumentation, processes, threads and jobs: Process internals, flow of create process, thread internals, examining thread creation, thread scheduling, job objects.		

Text Books:

1	Maurice J. Bach, The design of the UNIX operating system, Prentice hall of India,1991
2	Mark E. Russinovich and David A. Solomon, Microsoft Windows Internals, Microsoft Press, 2004.

Reference Books:	
1	William Stallings, “Operating Systems: Internals and Design Principles”, 5th Edition, Prentice Hall, 2005.

MULTI-CORE ARCHITECTURES & PROGRAMMING (Elective-II)-(C2511)

Title of the course:	**MULTI-CORE ARCHITECTURES & PROGRAMMING (Elective-II)**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)
COURSE OVERVIEW:	
This course serves as an introduction to have a thorough understanding of the basic structure and operation of a multi-core computer and its programming	
COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	To learn thefundamentals of Multi-Core
CO2	To learn the architecture of Multi-Core to handle processes and threads and their communication
CO3	To learn the mechanisms involved in MPI Programming
CO4	To gain knowledge on Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.
CO5	To implement various search techniques P-Depth, bfs, dfs,etc
CO6	To learn PRAM

Title of the course:	**MULTI-CORE ARCHITECTURES & PROGRAMMING (Elective-II)**					
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C	
		4	0	0	4	
Course Content:						
UNIT-I	**Introduction**	**LECTURE HOURS: 10**				
Fundamentals of SuperScalar Processor Design, Introduction to Multicore Architecture – Chip Multiprocessing, homogeneous Vs heterogeneous design - SMP – Multicore Vs Multithreading. Shared memory architectures– synchronization – Memory organization – Cache Memory – Cache Coherency Protocols - Design of Levels of Caches.						
UNIT-II	**Multicore programming Model**	**LECTURE HOURS: 12**				
Multicore programming Model – Shared memory model, message passing model, transaction model – OpenMP and MPI Programming. PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management - Power 5 Multicore architecture design, Power 6 Architecture.						
UNIT-III	**Cell Broad band engine**	**LECTURE HOURS: 11**				
Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.						
UNIT-IV	**PRAM**	**LECTURE HOURS: 11**				
PRAM Model – PRAM Algorithms – Parallel Reduction – Prefix Sums – List Ranking – Preorder Tree Traversal – Merging Two Sorted Lists – Graph Coloring – Reducing Number of Processors – NC Class. Classifying MIMD Algorithms – Hypercube SIMD Model – Shuffle Exchange SIMD Model – 2D Mesh SIMD Model – UMA Multiprocessor Model – Broadcase – Prefix Sums. Enumeration Sort – Lower Bound on Parallel Sorting – Odd-Even Transposition Sort –Bitonic Merge – Parallel Quick Sort – Complexity of Parallel Search – Searching on Multiprocessors.						
UNIT-V	**P-Depth**	**LECTURE HOURS: 12**				
P-Depth Search – Breadth Death Search – Breadth First Search – Connected Components – All pair Shortest Path – Single Source Shortest Path – Minimum Cost Spanning Tree. Matrix Multiplication on 2-D Mesh, Hypercube and Shuffle Exchange SIMD Models – Algorithms for Multiprocessors – Algorithms for						

Multicomputers – Mapping Data to Processors.

Text Books:	
1	Hennessey and Pateterson, “Computer Architecture A Quantitative Approach”, Harcourt Asia, Morgan Kaufmann, 1999.
2	Joseph JaJa, “Introduction to Parallel Algorithms”, Addison-Wesley, 1992.
3	Kai Hwang, “Advanced Computer Architecture: Parallelism, Scalability and Programmability” McGraw-Hill, 1993.
4	Richard Y. Kain, “Advanced Computer Architecture: A System Design Approach”, PHI, 1999.
5	Rohit Chandra, Ramesh Menon, Leo Dagum, and David Kohr, “Parallel Programming in OpenMP”, Morgan Kaufmann, 2000.
6	Michael J. Quinn, “Parallel Computing: Theory & Practice”, Tata McGraw Hill Edition, 2003.

Reference Books:	
1	AnanthGrame, George Karpis, Vipin Kumar and Anshul Gupta, “Introduction to
2	Parallel Computing”, 2nd Edition, Addison Wesley, 2003.

ADVANCED DATA STRUCTURES AND ALGORITHMS LAB-(C2512)

Title of the course:	**ADVANCED DATA STRUCTURES AND ALGORITHMS LAB**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:

- To strengthen the ability to identify and apply the suitable data structure for the given real world problem

COURSE OUTCOMES:

After successful completion of the course, the student will be able to

CO1	Familiarize the student with good programming design methods, particularly Top-Down design
CO2	To develop skills to design and analyze linear and non linear data structures.
CO3	Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs
CO4	Develop recursive algorithms as they apply to trees and graphs.
CO5	To develop a base for advanced computer science study.
CO6	Familiarize the student with the issues of Time complexity and examine various algorithms from this perspective

Title of the course:	**ADVANCED DATA STRUCTURES AND ALGORITHMS LAB**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		0	0	4	2

Course Content:

TASK-1		**PRACTICAL HOURS: 12**
Write C++ programs to implement the following using an array. a) Stack ADT b) Queue ADT		
TASK-2		**PRACTICAL HOURS: 12**
Write C++ programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT		
TASK-3		**PRACTICAL HOURS: 12**
Write C++ programs to implement the deque (double ended queue) ADT using a doubly linked list and an array.		
TASK-4		**PRACTICAL HOURS: 14**
Write a C++ program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree.		
TASK-5		**PRACTICAL HOURS: 12**
Write C++ programs that use recursive functions to traverse the given binary tree in a) Preorder b) inorder and c) postorder.		
TASK-6		**PRACTICAL HOURS: 12**
Write C++ programs that use non-recursive functions to traverse the given binary tree in b) Preorder b) inorder and c) postorder.		

TASK-7	**Recursion**	**PRACTICAL HOURS: 12**
Write C++ programs for the implementation of bfs and dfs for a given graph.		
TASK-8	**Linked List, Stack, Queue**	**PRACTICAL HOURS: 12**
Write C++ programs for implementing the following sorting methods: a) Merge sort b) Heap sort		
TASK-9		**PRACTICAL HOURS: 12**
Write a C++ program to perform the following operations a) Insertion into a B-tree b) Deletion from a B-tree		
TASK-10		**PRACTICAL HOURS: 12**
Write a C++ program to perform the following operation a) Insertion into an AVL-tree		
TASK-11		**PRACTICAL HOURS: 12**
Write a C++ program to implement all the functions of a dictionary (ADT)using hashing.		
TASK-12		**PRACTICAL HOURS: 12**
Write a C++ program for implementing Knuth-Morris- Pratt pattern matchingalgorithm.		

Reference books:	
1	Data Structures and Algorithms Using C++ by Ananda Rao Akepogu and RadhikaRajuPalagiri, Pearson Education, 2010.
2	Classic Data Structures by D. Samanta, 2005, PHI
3	Data Structures and Algorithms by G.A.V. Pai, 2009, TMH.
4	Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
5	Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG
6	Design and Analysis of Algorithms by E. Horowitz, S. Sahani, 3rd Edition, Galgotia.
7	Data Structures and Algorithms in C++ by Drozdek 2nd Edition, Thomson.
8	Fundamentals of Computer Algorithms by Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, 2nd edition, University Press

R & ANALYTICS LAB-(C2513)

Title of the course:	**R & ANALYTICS LAB**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)

COURSE OVERVIEW:
• In this lab you will learn how to run analytics and machine learning using R. Also, you will learn unification of R with Hadoop and Tableau.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	To Familiarize the student with RStudio
CO2	To develop skills to implement the data structures using R Programming
CO3	ToDevelop algorithms to Implement the Graphical Analysis using R
CO4	To Develop in memory Data Analytics
CO5	To implement the Descriptive Statistics using R.
CO6	To implement Experiments on Hive and Pig

Title of the course:	**R & ANALYTICS LAB**				
Branches for which this course is offered:	M.TECH I SEMESTER (CSE)	L	T	P	C
		0	0	4	2

Course Content:

TASK-1	**Installation of R**	**PRACTICAL HOURS: 12**
Installing R in windows, R Console (R window to edit and execute R Commands), Commands and Syntax (R commands and R syntax), Packages and Libraries (Install and load a package in R), Help In R, Workspace in R.		
TASK-2	**Implement the data structures using R Programming**	**PRACTICAL HOURS: 12**
Introduction to Data Types (Why Data Structures?, Types of Data Structures in R), Vectors, Matrices, Arrays, Lists, Factors, Data Frames, Importing and Exporting Data.		
TASK-3	**Implement the Graphical Analysis using R**	**PRACTICAL HOURS: 12**
Creating a simple graph (Using plot() command), Modifying the points and lines of a graph (Using type, pch, font, cex, lty, lwd, col arguments in plot() command), Modifying Title and Subtitle of graph (Using main, sub, col.main, col.sub, cex.main, cex.sub, font.main, font.sub arguments in plot() command), Modifying Axes of a Graph (Using xlab, ylab, col.lab, cex.lab, font.lab, xlim, ylim, col.axis, cex.axis, font.axis arguments and axis() command), Adding Additional Elements to a Graph (Using points(), text(), abline(), curve() commands), Adding Legend on a Graph (Using legend() command), Special Graphs (Using pie(), barplot(), hist() commands), Multiple Plots (Using mfrow or mfcol arguments in par() command and layout command).		
TASK-4	**Implement the Descriptive Statistics using R.**	**PRACTICAL HOURS: 14**
Measure of Central Tendency (Mean, Median and Mode), Measure of Positions (Quartiles, Deciles, Percentiles and Quantiles), Measure of Dispersion (Range, Median, Absolute deviation about median, Variance and Standard deviation), Measure of Distribution (Skewness and Kurtosis), Box and Whisker Plot (Box Plot and its parts, Using Box Plots to compare distribution).		
TASK-5	**In memory Data Analytics**	**PRACTICAL HOURS: 12**
Window and text functions in SQL; Advanced SQL functions		

TASK-6	**MongoDB**	**PRACTICAL HOURS: 12**
Installation of MongoDB, Features of MongoDB: CRUD operations; import and export functions, indexes, aggregate functions, dealing with Nulls, count, limit, skip and sort functions and cursors		
TASK-7	**Experiments on Hive and Pig**	**PRACTICAL HOURS: 12**
Data Wrangling using R Open refine tool for handling messy data		

MOBILE APPLICATION DEVELOPMENT LAB-(C2514)

Title of the course:	**MOBILE APPLICATION DEVELOPMENT LAB**
Branches for which this course is offered:	M.TECH I SEMESTER(CSE)
COURSE OVERVIEW:	
In this lab you will learn how to Construct UML diagrams for static view and dynamic view of the system, generate creational patterns by applicable patterns for given context.	

COURSE OVERVIEW:
• In this lab, a student is expected to design, implement, document and present a mobile client/server system using standard Java and Java 2 Micro Edition (J2ME) platform.
• Specifically it is required to design and implement a system that consists mainly of a mobile client (MC) and a Proxy Server (PS).
• MC will be written in J2ME, MIDP 2.0, while PS will be written in standard Java. It is necessary to use a mobile phone emulator to develop and demonstrate the experiments.
• It may be necessary to use other components or existing resources (servers) as needed. For instance a database local to PS or a web service available on the Internet that can be invoked by the PS.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Store and retrieve textual documents using appropriate models
CO2	Use the various retrieval utilities for improving search
CO3	Do indexing and compressing documents to improve space and time efficiency
CO4	Formulate SQL like queries for unstructured data
CO5	Understand the challenges over information retrieval systems by exploring functional difficulties over multimedia search.
CO6	Generalize classification among the web pages using clustering techniques to locate information resources within the library, Inverted Files, and Web Classification.

Title of the course:	**MOBILE APPLICATION DEVELOPMENT LAB**			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		0	0	3

Course Content:		
TASK-1		**PRACTICAL HOURS: 12**
Design and develop an Mobile App for smart phones The Easy Unit Converter using Android. This application should have approximately 20 categories to be used in your daily life. It includes following units: Acceleration, Angle, Area, Circle, Capacitor, Cooking, Data Size, Density, Data Transfer rate, Electric Current, Energy, Flow Rate, and Force..		
TASK-2		**PRACTICAL HOURS: 14**

Design and develop an Mobile App for smart phones Currency Converter. .This applications should synchronize online as you run it and sends you back the latest and most reliable exchange rates possible.

This application should support following conversions:

EUR->Euro

GBP->British Pound

USD->United States Dollar AUD->Australian Dollar CAD->Canadian Dollar CHF->Swiss Franc

CNY->Chinese Yuan HKD->Hong Kong Dollar IDR->Indonesian Rupiah INR->Indian Rupee JPY->Japanese Yen THB->Thai Bah

TASK-3		**PRACTICAL HOURS: 12**
Design and develop an Mobile App game for smart phones The Tic Tac Toe using Android.		
TASK-4		**PRACTICAL HOURS: 14**
Design and develop an Mobile App for smart phones ,The Health Monitoring System using Android. This App should record Biochemistry Lab Parameters and if abnormal shold send an SMS to doctor for Medications.		
TASK-5		**PRACTICAL HOURS: 12**
Design and develop an Mobile App for smart phones The Expense Manager using Android. This is an application for managing your expenses and incomes: Tracking expenses and incomes by week, month and year as well as by categories, Multiple accounts in multiple currencies, Schedule the payments and recurring payments, Take a picture of receipt, Payment alerts, Budget by day, week, month and year, Search and reports, Import and export account activities in CSV for desktop software, Customize expense categories, payer/payer, payment methods, date format, white or black background, button style etc, Account transfer, Convenient tools such calculator, currency converter, tip calculator, sales and tax calculator and credit card calculator.		

Reference Books:

1	Mobile Computing: (technologies and Applications- N. N. Jani Schand
2	B.M.Hirwani- Android programming Pearson publications-2013

ADVANCES IN SOFTWARE TESTING-(C2515)

Title of the course:	**ADVANCES IN SOFTWARE TESTING**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
• Study the significance oftesting
• Study the testing to be done at variouslevels
• Understand the procedure for designing testcases.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Ability to systematically test theapplications
CO2	Ability to write the testcases
CO3	Ability to use testing toolseffectively
CO4	Graph input space modeling using combinatorial designs, combinatorial test generation.
CO5	Justify test adequacy assessment using: control flow, data flow, and program mutations.
CO6	Recite the use of various testing tools, application of software testing techniques in commercial environments.

Title of the course:	**ADVANCES IN SOFTWARE TESTING**			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		3	1	0

Course Content:		
UNIT-I	**Control flow graph**	**LECTURE HOURS: 10**
Basic blocks, flow graphs, paths, basic paths, path conditions and domains, Dominators and post-dominators; Program dependence graph – data dependence, control dependence, call graph, **Tests generation** Test selection Problem, equivalence partitioning, Equivalence class partitioning, boundary value analysis and category partitioning method.		
UNIT-II	**Finite state machines (FSM)**	**LECTURE HOURS: 12**
Properties of FSM, Conformance testing, test generation, test optimization, Fault detection. **Combinatorial designs** – combinatorial test design process. **Pair wise design:** Binary factors and multi-valued factors. **Orthogonal arrays** and multi level orthogonal arrays.		
UNIT-III	**Test Adequacy**	**LECTURE HOURS: 11**
Basics, Measurement of test adequacy, infeasibility and test adequacy. Adequacy criteria based control – statement, block, conditions and decisions coverage techniques. Basics of Junit tool for Java. **Metrics** Importance of Metrics in Testing - Effectiveness of Testing – Defect Density – Defect Leakage		

Ratio – Residual Defect Density – Test Team Efficiency – Test Case Efficiency.		
UNIT-IV	**Regression Testing**	**LECTURE HOURS: 11**
What is Regression Testing? Regression test process. Regression test selection techniques: Test all, Random selection, modification traversing tests, using execution trace. Test minimization and prioritization.		
UNIT-V	**Non-functional testing**	**LECTURE HOURS: 12**
Load testing, performance testing, GUI testing, Security testing techniques and tools. **Automation**: Case studies functional test automation using Selenium.		

Text Books:	
1	Aditya P Mathur, Foundations of software testing, 2nd edition, Pearson ,2013.
2	"Boris Beizer, "Software Testing Techniques", 2nd Edition, Dream tech press,2003.

Reference Books:	
1	M G Limaye, "Software Testing – Principles, Techniques and Tools", Tata McGraw Hill, 2009.
2	Edward Kit, "Software Testing in the Real World - Improving the Process", Pearson Education,2004.
3	William E. Perry, "Effective methods for software testing", 2nd Edition, John Wiley, 2000.

BIG DATA ANALYTICS-(C2516)

Title of the course:	**BIG DATA ANALYTICS**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
• To learn to analyze the big data using intelligent techniques. • To understand the various search methods and visualization techniques. • To learn to various techniques for mining data stream. • To understand the applications using Map Reduce Concepts.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Analyze the big data analytics techniques for useful businessapplication.
CO2	Design efficient algorithms for mining the data from large volumes.
CO3	Analyze the HADOOP and Map Reduce technologies associated with big data analytics.
CO4	Explore on big data applications using Pig and Hive.
CO5	Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.
CO6	Ability to think critically in making decisions based on data and deep analytics.

Title of the course:	**BIG DATA ANALYTICS**			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		3	1	0

Course Content:		
UNIT-I	**Introduction to Big Data**	**LECTURE HOURS: 10**
Introduction to Big Data Platform – Challenges of Conventional System – Intelligent data analysis – Nature of Data – Analytic Processes and Tool – Analysis vs Reporting – Modern Data Analytic Tool – Statistical Concepts: Sampling Distributions – Re-Sampling – Statistical Inference – Prediction Error.		
UNIT-II	**Mining Data Streams**	**LECTURE HOURS: 12**
Introduction To Stream Concepts – Stream Data Model and Architecture - Stream Computing – Sampling Data in a Stream – Filtering Stream – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions.		
UNIT-III	**Hadoop**	**LECTURE HOURS: 11**
History of Hadoop- The Hadoop Distributed File System – Components of Hadoop – Analyzing the Data with Hadoop – Scaling Out – Hadoop Streaming – Design of HDFS- Java interfaces to HDFSBasics- Developing a Map Reduce Application – How Map Reduce Works – Anatomy of a Map Reduce Job run – Failures – Job Scheduling – Shuffle and Sort – Task Execution – Map Reduce Types and Formats – Map Reduce Features.		
UNIT-IV	**Hadoop Environment**	**LECTURE HOURS: 11**

Setting up a Hadoop Cluster – Cluster specification – Cluster Setup and Installation –Hadoop Configuration – Security in Hadoop – Administering Hadoop – HDFS – Monitoring – Maintence – Hadoop Benchmarks – Hadoop in the Cloud.		
UNIT-V	**Frameworks**	**LECTURE HOURS: 12**
Applications on Big Data Using Pig and Hive – Data Processing operators in Pig – Hive Services – HiveQL – Querying Data in Hive – fundamentals of HBase and Zookeeper – IBM Info Sphere Big Insights and Streams. Visualization - Visual data analysis techniques, interaction techniques; Systems and applications.		

Text Books:	
1	Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007.
2	Tom White, Hadoop: The Definitive Guide Third Edition, O'reilly Media, 2012.
3	Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Uderstanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012.
4	AnandRajaraman and Jeffrey David UIIman, Mining of Massive Datasets Cambridge University Press, 2012.

Reference Books:	
1	Bill Franks, Taming the big Data tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons, 2012.
2	Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
3	Jiawei Han, MichelineKamber, Data Mining Concepts and Techniques, Second Edition.
4	Elsevier, Reprinted 2008. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007.
5	Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, Harness the Power of Big Data the IBM Big Data Platform, Tata McGraw Hill Publications, 2012.
6	Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhirraj (Author), Big Data, Biganalytics.

MACHINE LEARNING-(C2517)

Title of the course:	MACHINE LEARNING
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
• To understand the basic theory underlying machinelearning. • To be able to formulate machine learning problems corresponding to different applications. • To understand a range of machine learning algorithms along with their strengths and weaknesses..

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Identify various approaches in learning like concept learning and decision tree learning etc
CO2	Analyze different types of neural networks as multi layer and back propagation networks and genetic algorithms
CO3	Identify different topic s in Bayesian and computational learning as bayes theorem, gibbs algorithm and Bayesian belief networks
CO4	Analyze different types of learning and learning set of rules such as case based reasoning and learning first order rules
CO5	Summarize various concepts of analytical learning and reinforcement learning in terms of FOCL algorithm and Q learning
CO6	Acquire knowledge deep learning and be able to implement deep learning models for language, vision, speech, decision making, and more

Title of the course:	MACHINE LEARNING(Elective-IV)			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		3	0	0

Course Content:		
UNIT-I	INTRODUCTION	LECTURE HOURS: 10
Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.		
UNIT-II	NEURAL NETWORKS AND GENETIC ALGORITHMS	LECTURE HOURS: 12
NEURAL NETWORKS AND GENETIC ALGORITHMS Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evalution and Learning		
UNIT-III	BAYESIAN AND COMPUTATIONAL LEARNING	LECTURE HOURS: 11
BAYESIAN AND COMPUTATIONAL LEARNING: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model		
UNIT-IV	INSTANCE BASED LEARNING	LECTURE HOURS: 11
INSTANCE BASED LEARNING :K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.		

UNIT-V	ADVANCED LEARNING	LECTURE HOURS: 12

ADVANCED LEARNING

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

Text Books:	
1	Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley , Eight Edition, 2014.

Reference Books:	
1	Operating systems by A K Sharma, Universities Press
2	Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3	Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
4	Operating Systems, A.S.Godbole, Second Edition, TMH.
5	An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6	Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education
7	Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.
8	Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
9	Operating System Desgin, Douglas Comer, CRC Press, 2nd Edition.

INTERNET OF THINGS (Elective –III)-(C2518)

Title of the course:	**INTERNET OF THINGS (Elective – III)**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
• Makes clear view over physical computing, ubiquitous computing, or the Internet of Things, it's a hot topic in technology. • It discusses design concepts that will make IOT products eye-catching and appealing.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Identify the basic components in IoT
CO2	Understand IoT Market perspective
CO3	Understand State of the Art – IoT Architecture.
CO4	Data and Knowledge Management and use of Devices in IoT Technology
CO5	Real World IoT Design with Privacy and Security
CO6	Better idea of the overview of necessary steps to take the idea of IOT concept through production.

Title of the course:	**INTERNET OF THINGS (Elective –III)**			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		3	1	0

Course Content:		
UNIT-I	**Introduction**	**LECTURE HOURS: 10**
Internet of Things – **Design Principles for Connected Devices** – Web Thinking for Connected Devices – **Internet Principles** – IP – TCP – IP Protocol Suite – UDP – IP Address – MAC Address – TCP and UDP Ports – Application LayerProtocols.		
UNIT-II	**Prototyping**	**LECTURE HOURS: 12**
Prototypes and Production – Cloud – Open Source vs Closed Source – Tapping into the Community **– Prototyping Embedded Devices** – Electronics – Embedded Computing Basics – Ardunio – Raspberry Pi – Beagle Bone Black – Electronic Imp.		
UNIT-III	**Prototyping the Physical Design**	**LECTURE HOURS: 11**
Laser Cutting – 3D Printing – CNC Milling – Repurposing and Recycling – **Prototyping Online Components** – New API – Real Time Reactions – Other Protocols.		
UNIT-IV	**Techniques for writing Embedded Code**	**LECTURE HOURS: 11**
Memory Management – Performance and Battery life – Libraries – Debugging – **Business Models** – Models – Funding an Internet of Things Startup.		

UNIT-V	Moving to Manufacture	LECTURE HOURS: 12
Designing Kits – Designing Printed Circuit Boards – Manufacturing Printed Circuit Boards – Mass Producing the case and other Fixtures – Scaling up Software – **Ethics** – Characterizing the Internet of Things – Control – Environment –Solutions.		

Text Books:	
1	Adrian Mcewen and HakinCassimally, "Designing The Internet of Things" Wiley Publications , 2015.
Reference Books:	
1	Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014.
2	Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013 CunoPfister, "Getting Started with the Internet of Things",

DISTRIBUTEDCOMPUTING(Elective-III)- (C2519)

Title of the course:	**DISTRIBUTEDCOMPUTING(Elective-III)**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
• Broad and detailed coverage of the theory is balanced with practical systems-related issues such as mutual exclusion, deadlock detection, authentication, and failurerecovery. • Gives clear understanding of the fundamental principles and models underlying the theory, algorithms and systems aspects of distributedcomputing.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Provides solid understanding of the design problems and the theoretical and practical aspects of their solutions
CO2	Simple explanations and illustrations are used to elucidate the algorithms.
CO3	Study software components of distributed computing systems. Know about the communication and interconnection architecture of multiple computer systems.
CO4	Recognize the inherent difficulties that arise due to distributed-ness of computing Resources.
CO5	At the end students will be familiar with the design, implementation and security issues of distributed system.
CO6	Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.

Title of the course:	**DISTRIBUTED COMPUTING(Elective-III)**			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		3	1	0

Course Content:		
UNIT-I	**Introduction**	**LECTURE HOURS: 10**
Message-passing systems versus shared memory systems - Primitives for distributed communication - Synchronous versus asynchronous executions - **A model of distributed computations** - A model of distributed executions - Models of communication networks - Models of communication networks - Models of process communications.		
UNIT-II	**Global State And Snapshot Recording Algorithms**	**LECTURE HOURS: 12**
System model and definitions - Snapshot algorithms for FIFO channels - Variations of the Chandy–Lamport algorithm - Snapshot algorithms for non-FIFO channels - Snapshots in a causal delivery system - Monitoring global state **Terminology and basic algorithms** - Topology abstraction and overlays - Classifications and basic concepts - Complexity measures and metrics.		
UNIT-III	**Message ordering and group communication**	**LECTURE HOURS: 11**
Asynchronous execution with synchronous communication - Synchronous program order on an asynchronous system - Group communication - A nomenclature for multicast - Propagation trees for multicast - Classification of application-level multicast algorithms **Termination detection** - Termination detection using distributed snapshots - Termination detection by weight throwing - A spanning-tree-based termination detection algorithm.		

UNIT-IV	Distributed mutual exclusion	LECTURE HOURS: 11
Algorithms - Lamport's algorithm - Ricart–Agrawala algorithm - Singhal's dynamic information-structure algorithm - Lodha and Kshemkalyani's fair mutual exclusion algorithm - Quorum-based mutual exclusion algorithms - Maekawa's algorithm - Agarwal–El Abbadi quorum-based algorithm		
UNIT-V	**Deadlock detection in distributed systems**	**LECTURE HOURS: 12**
Models of deadlocks - Knapp's classification of distributed deadlock detection algorithms - Mitchell and Merritt's algorithm for the singleresource model - Chandy–Misra–Haas algorithm for the AND model - Chandy–Misra– Haas algorithm for the OR model.		

Text Books:	
1	Kshemkalyani, Ajay D., and Mukesh Singhal, "Distributed computing: principles, algorithms, and systems Cambridge University Press, 2011.

Reference Books:	
1	SunitaMahajan and Seema Shah, "Distributed Computing", Oxford University Press, Second Edition,2011.
2	Albert Y.Zomaya, "Parallel and Distributed Computing Hand book", Second edition, McGrawl Publications,2005.
3	Francesco Pierfederici, "Distributed Computing with Python", First Edition, Packt Publishing,2016.
4	Mahajan, Sunita, and Seema Shah, "Distributed Computing", Oxford University Press, Inc.,2013.

NETWORK SECURITY & CRYPTOGRAPHY)-(Elective-III)-(C2520)

Title of the course:	**NETWORK SECURITY & CRYPTOGRAPHY)(Elective-III)**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:

- Extensive, thorough and significant understanding of the concepts, issues, principles and theories of computer networksecurity
- Identifying the suitable points for applying security features for networktraffic
- Understanding the various cryptographic algorithms and implementation of the same at softwarelevel
- Understanding the various attacks, security mechanisms andservices

COURSE OUTCOMES:

After successful completion of the course, the student will be able to

CO1	Analyze the basic concepts of cryptography and network security and classify attacks on a network
CO2	Analyze the different process for hiding the information with conventional cryptographic algorithms
CO3	Understand the working of various block cipher cryptosystems
CO4	Analyze public cryptosystems and disseminate from conventional systems for the security
CO5	Apply authentication techniques to provide secure communication.
CO6	Protect the network from both internal and externalattacks

Title of the course:	**NETWORK SECURITY & CRYPTOGRAPHY)(Elective-III)**			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		3	1	0

Course Content:

UNIT-I	**Introduction**	**LECTURE HOURS: 10**

Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services And Security Mechanisms, Classical Encryption Techniques- Symmetric Cipher Model, Substitution Ciphers, Transposition Ciphers, Steganography, Modern Block Ciphers, Modern Stream Ciphers.

Modern Block Ciphers: Block Ciphers Principles, Data Encryption Standard (DES), Linear And Differential Cryptanalysis, Block Cipher Modes Of Operations, AES.

UNIT-II	**Public-Key Cryptography**	**LECTURE HOURS: 12**

Principles Of Public-Key Cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Arithmetic, Elliptic Curve Cryptography

Cryptographic Hash Functions: Applications Of Cryptographic Hash Functions, Requirements And Security, Hash Functions Based On Cipher Block Chaining, Secure Hash Algorithm (SHA).

UNIT-III	**Message Authentication Codes**	**LECTURE HOURS: 11**

Message Authentication Requirements, Message Authentication Functions, Requirements For Message Authentication Codes, Security Of Macs, HMAC, Macs Based On Block Ciphers, Authenticated Encryption.

Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols.

UNIT-IV	Key Management And Distribution	LECTURE HOURS: 11
Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric, Distribution Of Public Keys, X.509 Certificates, Public Key Infrastructure. **Electronic Mail Security:** Pretty Good Privacy (PGP), S/MIME		
UNIT-V	**Security At The Transport Layer(SSL And TLS)**	**LECTURE HOURS: 12**
SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH **Security At The Network Layer (Ipsec):** Two Modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange.		

Text Books:	
1	Cryptography and Network Security: Principals and Practice, William Stallings, Fifth Edition, PearsonEducation.
2	Cryptography and Network Security, Behrouz A.Frouzan and Debdeep Mukhopadhyay, 2nd edition, Mc Graw Hill Education

Reference Books:	
1	Network Security and Cryptography, Bernard Menezes , Cengage Learning.
2	Cryptography and Security, C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.
3	Applied Cryptography, Bruce Schiener, 2nd edition, John Wiley & Sons.
4	Cryptography and Network Security, Atul Kahate, TMH.
5	Introduction to Cryptography, Buchmann, Springer.
6	Number Theory in the Spirit of Ramanujan, Bruce C.Berndt, University Press
7	Introduction to Analytic Number Theory, Tom M.Apostol, University Press

NOSQL DATABASES-(Elective-III)-(C2521)

Title of the course:	**NOSQL DATABASES (Elective-III)**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
• Understand the basic difference between traditional relational databases and NoSQL • Explore the fundamentals of NoSQL Databases • Understanding the storage architecture • Learn various NoSQL systems and their features • To understand variety of NoSQL database tools

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Examine issues on data storing , accessing from MongoDB, Redis, HBase and query processing and can develop suitable solutions.
CO2	Able to apply the features of NoSQL tand analyze the datasets
CO3	Compare and Contrast NoSQL databases with Relational Database Systems
CO4	Critically analyze and evaluate variety of NoSQL databases
CO5	Able to design and implement advanced queries using MangoDB, Redis, and HBase
CO6	Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.

Title of the course:	**NOSQL DATABASES (Elective-III)**			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		3	1	0

Course Content:		
UNIT-I	**NOSQL: WHAT IT IS AND WHY YOU NEED IT**	**LECTURE HOURS: 10**
Big Data ,Scalability, Sorted Ordered Column-Oriented Stores: Key/Value Stores, Document Databases Graph Databases Examples, **INTERFACING AND INTERACTING WITH NOSQL:** Storing and Accessing Data, Storing Data In and Accessing Data from MongoDB, Querying MongoDB, Storing Data In and Accessing Data from Redis Querying Redis, Storing Data In and Accessing Data from HBase, Querying HBase Storing Data In and Accessing Data from Apache Cassandra, Querying Apache Cassandra		
UNIT-II	**Language Bindings for NoSQL Data Stores**	**LECTURE HOURS: 12**
Language Bindings for Java Language Bindings for Python, Language Bindings for Ruby, Language Bindings for PHP **UNDERSTANDING THE STORAGE ARCHITECTURE:** Working with Column-Oriented Databases, Contrasting Column Databases with RDBMS, Column Databases as Nested Maps of Key/Value Pairs, Laying out the Web table, HBase Distributed Storage Architecture Document Store Internals , Storing Data in Memory-Mapped Files, Guidelines for Using Collections and Indexes in MongoDB, MongoDB Reliability and Durability ,Horizontal Scaling, Understanding Key/Value Stores in Memcached and Redis Under the Hood of Memcached Redis Internals , Eventually Consistent Non-relational Databases Consistent Hashing Object Versioning, Gossip-Based Membership and Hinted Handoff		

UNIT-III	PERFORMING CRUD OPERATIONS	LECTURE HOURS: 11

Creating Records, Creating Records in a Document-Centric Database, Using the Create Operation in Column-Oriented Databases, Using the Create Operation in Key/Value Maps Accessing Data, Accessing Documents from MongoDB, Accessing Data from HBase, Querying Redis, Updating and Deleting Data , Updating and Modifying Data in MongoDB, HBase, and Redis, Limited Atomicity and Transactional Integrity.

QUERYING NOSQL STORES: Similarities between SQL and MongoDB Query Features, Map Reduce in MongoDB, Accessing Data from Column-Oriented Databases like HBase, Querying Redis Data Stores, Changing Document Databases, Schema-less Flexibility, Exporting and Importing Data from and into MongoDB, Schema Evolution in Column- Oriented Databases, HBase Data Import and Export, Data Evolution in Key/Value Stores

UNIT-IV	INDEXING AND ORDERING DATA SETS	LECTURE HOURS: 11

Essential Concepts Behind a Database Index, Indexing and Ordering in MongoDB, Creating and Using Indexes in MongoDB, Indexing and Ordering in CouchDB, Indexing in Apache Cassandra.

MANAGING TRANSACTIONS AND DATA INTEGRITY: RDBMS and ACID, Upholding CAP, Consistency Implementations in a Few NoSQL Products

UNIT-V	USING NOSQL IN THE CLOUD	LECTURE HOURS: 12

Google App Engine Data Store, Amazon SimpleDB

SCALABLE PARALLEL PROCESSING WITH MAP REDUCE: Understanding

MapReduce, MapReduce with Hbase, MapReduce Possibilities and Apache Mahout. ANALYZING BIG DATA WITH HIVE: Hive Basics, Back to Movie Ratings, Good Old SQL, JOIN(s) in Hive QL,

SPEECH ENHACEMENT: Nature of inter fearing sounds, Speech enhancement techniques, Spectral subtraction, Enhancement by re-synthesis.

Text Books:

1	Sashank Thiwari, Professional NoSQL, Wiley- August 2011

Reference Books:

1	Dan MC Creary and Ann Kelly, Making Sense of NoSQL: A guide for Managers and the Rest of Us, Dreamtech Press, 2013
2	David Hows, Peter Membrey, Eelco Plugge, Tim Hawkins, The Definitive Guide: A Complete Guide to Dealing with Big Data Using MongoDB to MongoDB, Second Edition, Apress, 2013.
3	Guy Harrison, Next Generation Databases: NoSQL, NewSQL, and Big Data, Apress, 2015.
4	Adam Fowler, “Nosql for Dummies”, Wiley.

DEVOPS -(Elective-IV)-(C2522)

Title of the course:	DEVOPS
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:

This course enlightens the agile relationship between development and IT operations and providestheknowledge about various DevOps tools. It focuses onprofessional principles that help businessunits

Collaborateinsidetheenterpriseandbreak

COURSE OUTCOMES:
CO1. After successful completion of the course, the student will be able to
CO2. AnalyzeDevOpsmethodologiesincollaborationwiththeDevelopmentandOperation steam
CO3. Apply configuration management strategies for better integrations and deployment
CO4.Make use of various DevOps tools to ease of collaboration and development A30527.4
CO5.Determine thespeedofproductivityfor in timedelivery
CO6. Applicationdeploymentandconfigurationforuninterruptedusage

Title of the course:	DEVOPS (Elective-IV)			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		3	0	0

Course Syllabus

UNIT - I

SDLC : Introductionto SDLC, agile model.

Introduction to Devops: Introduction, Devops features,work management, source code management, build automation, delivery automation, understanding code quality, automation of CI/CD.

UNIT - II

Source Code Management: WhatisversioncontrolandGIT,standardbranchingworkflows,BranchingWorkflow, GitHubflow.

UNIT - III

Build Automation , CI: Build(CI) Orchestration using Jenkins automation server, build tools ,Apache Maven, Gradle, Ant, NPM/Node.js, pipeline Basics, Jenkins master, node, agent, and executor, freestyle projects & pipelines

UNIT - IV

Artifact Management: Nexus, JFrog Artifactory, JFro gArtifactory as Kubernetis registry, Helm chartfor Microsoftazure pipeline.

Continuous Delivery: Software components can be released in short cycles, every change is automatically deployed to the evenvironment

UNIT - V

Continuous Deployment: Extends continuous delivery, every change is automatically deployed toProduction, CD Flow, containerization with Docker, Introduction to Docker, images & containers,Docker File, working with containers and publish to Docker Hub, Configuration management Ansible, Introduction to Ansible,Ansible tasks, Roles, Jinja templates, vaults, deployments using Ansible

TextBook(s)

1. Gene Kim, Jez Humble, Patrick Debois, John Willis, *The DevOps Handbook: How to Create World,Class Agility, Reliability,* 2016.

Reference Book(s)

1. Michael Huttermann, *DevOpsfor Developers*, 2012.
2. Joakim Verona**,** *Practical DevOps,* packet open source publications*,* 2016.

CLOUD COMPUTING-(Elective-IV)-(C2523)

Title of the course:	**CLOUD COMPUTING (Elective-IV)**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
• Cloud computing is a type of Internet-based computing that provides shared computer processing resources and data to computers and other devices on demand. It is the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	To provide students with the fundamentals and essentials of Cloud Computing.
CO2	To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
CO3	To enable students exploring some important cloud computing driven commercial systems such as GoogleApps, Microsoft Azure and Amazon Web Services and other businesses cloud applications Graph input space modeling using combinatorial designs, combinatorial test generation
CO4	Classify and describe the architecture and taxonomy of parallel and distributed computing, including shared and distributed memory, and data and task parallel computing. Explain and contrast the role of Cloud computing within this space.
CO5	Explain virtualization and their role in elastic computing.
CO6	Characterize the distinctions between Infrastructure, Platform and Software as a Service (IaaS, PaaS, SaaS) abstractions, and Public and Private Clouds, and analyze their advantages and disadvantages. Describe service oriented architectures that are foundational to the WWW.

Title of the course:	**CLOUD COMPUTING(Elective-IV)**			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		3	1	0

Course Content:		
UNIT-I	**Introduction to cloud computing**	**LECTURE HOURS: 10**
Introduction to cloud computing – The Evolution of cloud computing – Hardware Evolution- Internet Software Evolution – Server Virtualization – Web Services Deliver from the cloud– Communication-as-a-service–Infrastructure-as-a-service–Monitoring-as-a-service–Platform- as-a-Service - Software-as-a-service – Building Cloud Network.		
UNIT-II	**Federation in the cloud**	**LECTURE HOURS: 12**
Federation in the cloud – presence in the cloud – Privacy and its Relation to cloud-Based Information Systems– Security in the cloud – Common Standards in the cloud-End-User Access to the cloud Computing.		
UNIT-III	**Introduction – Advancing towards a Utility Model**	**LECTURE HOURS: 11**
Introduction – Advancing towards a Utility Model – Evolving IT infrastructure – Evolving Software Applications – Continuum of Utilities- Standards and Working Groups- Standards Bodies and Working Groups- Service Oriented Architecture- Business Process Execution Language- Interoperability Standards for Data Center Management – Utility Computing Technology- Virtualization – Hyper Threading – Blade		

Servers- Automated Provisioning- Policy Based Automation- Application Management – Evaluating Utility Management Technology – Virtual Test and development Environment – Data Center Challenges and Solutions – Automating the Data Center.		
UNIT-IV	**Software Utility Application Architecture**	**LECTURE HOURS: 11**
Software Utility Application Architecture – Characteristics of a SaaS – Software Utility Applications – Cost Versus Value – Software Application Services Framework – Common Enablers – Conceptual view to Reality – Business profits – Implementing Database System for Multitenant Architecture.		
UNIT-V	**Other Design Consideration**	**LECTURE HOURS: 12**
Other Design Consideration – Design of a Web Services Metering Interface – Application Monitoring Implementation – A Design for an update and Notification Policy – Transforming to Software as a Service – Application Transformation Program – Business Model Scenarios – Virtual Services for Organizations – The Future.		

Text Books:	
1	Guy Bunker and Darren Thomson, Delivering utiliy Computing, John Wiley & Sons Ltd, 2012.

Reference Books:	
1	John W. Rittinghouse and Ames F. Ransome, Cloud Computing Implementation , Management and security, CRC press & Francis Group, Boca Raton London New York. 2010.
2	Alfredo Mendroza, Utility Computing Technologies, Standards, and Strategies Artech House INC, 2007.

SOFTWARE CONFIGURATION MANAGEMENT-(C2524)

Title of the course:	**Software Configuration Management(Ele-IV)**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:

- To learn the changing nature of software and need for change management.
- To study the different phases involved in software configuration management.
- To learn about the SCM plans, audits and reviews
- To study the various SCM tools and implementation techniques
- To study the SCM different scenarios and future directions

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Identifying items that need to be controlled for changes.
CO2	Systematically controlling changes to them.
CO3	Establishing & maintaining integrity of these items and providing accurate status of items to relevant stakeholders (like developers, end users, and customers) throughout the Software Development Lifecycle.
CO4	To develop coordination among stakeholders
CO5	Students can design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs..
CO6	An ability to assist in the creation of an effective project plan.

Title of the course:	**Software Configuration Management(Ele-IV)**				
Branches for which this course is offered:	M.TECH II SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:

UNIT-I	**OVERVIEW THE SOFTWARE CONFIGURATION MANAGEMENT**	**LECTURE HOURS: 10**

OVERVIEW THE SOFTWARE CONFIGURATION MANAGEMENT

SCM: Concepts and definitions – SCM Plan – Software development life cycle models – SDLC Phases – Need and importance of Software configuration management – Increased complexity and demand – Changing nature of software and need for change management – Lower maintenance costs and better quality assurance – Faster problem identification and bug fixes - SCM: Basic concepts – Baselines – Check-in and Check-out- Versions and Variants –System Building – Releases

UNIT-II	**DIFFERENT PHASES OF SOFTWARE CONFIGURATION MANAGEMENT**	**LECTURE HOURS: 12**

DIFFERENT PHASES OF SOFTWARE CONFIGURATION MANAGEMENT

Different Phases Of Scm – SCM System design - SCM Plan preparation – SCM Team organization – SCM Infrastructure organization – SCM Team training – Project team training – Configuration identification – Configuration Control –Configuration status accounting – Configuration audits.

UNIT-III	**CONFIGURATION AUDITS AND MANAGEMENT PLANS**	**LECTURE HOURS: 11**

CONFIGURATION AUDITS AND MANAGEMENT PLANS

When, what and who of auditing - Functional Configuration audit – Physical Configuration audit – Auditing the SCM System – Role of SCM Team in configuration audits – SCM plan and the incremental approach – SCM Plan and SCM Tools – SCM Organization.

UNIT-IV	SOFTWARE CONFIGURATION MANAGEMENT TOOLS AND IMPLEMENTATION	LECTURE HOURS: 11

SOFTWARE CONFIGURATION MANAGEMENT TOOLS AND IMPLEMENTATION

Advantages of SCM tools – Reasons for the increasing popularity of SCM tools – SCM Tools and SCM Functions – SCM tool selection – Role of Technology –Selection criteria – Tool implementation – SCM implementation plan –implementation strategy – SCM Implementation team.

UNIT-V	TRENDS IN SCM: FUTURE DIRECTIONS	LECTURE HOURS: 12

TRENDS IN SCM: FUTURE DIRECTIONS: SCM in different scenarios – SCM and project size – SCM in integrated development environments – SCM In distributed environments – SCM and CASE Tools - Trends in SCM - Hardware and Software Management – Better integration with IDE'S and CASE environments – Customization – Better decision making capabilities – Reduction in SCM Team size – Market snapshot

Reference Text Books:

1	Jessica Keyes, Software Configuration Management, Auerbach Publications, 2008.
2	Alexis Leon, Software Configuration Management Handbook, Artech Print on Demand; 2 edition, 2009.
3	Robert Aiello and Leslie Sachs Configuration Management Best Practices: Practical Methods that work in Real World, , Addison-Wesley Professional; 1 edition, 2010.
4	4. Stephen P. Berczuk, Brad Appleton and Kyle Brown , "Software Configuration Management Patterns: Effective Teamwork and Practical Integration", Addison-Wesley , 2003

Natural Language Processing-(Elective-IV)-(C2525)

Title of the course:	**Natural Language Processing(Ele-IV)**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
Upon completion, students will be able to explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP). In particular, students will: • Understand current methods for statistical approaches to machinetranslation. • Understand languagemodeling. • Understand machine learning techniques used inNLP.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Understand approaches to syntax and semantics in NLP.
CO2	Understand approaches to discourse, generation, dialogue and summarization within NLP.
CO3	Understand current methods for statistical approaches to machine translation.
CO4	Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars, clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied within NLP
CO5	Apply fundamental algorithms and techniques in the area of natural language processing (NLP)
CO6	Describe approaches to syntax and semantics in NLP.

Title of the course:	**Natural Language Processing(Ele-IV)**				
Branches for which this course is offered:	M.TECH II SEMESTER (CSE)	L	T	P	C
		4	0	0	4

Course Content:		
UNIT-I	**Introduction to Natural Language**	**LECTURE HOURS: 10**
Introduction to Natural Language, Applications of NLP, Corpora and Corpus Analysis, Lexicon and Morphology, Syntax and Semantics.		
UNIT-II	**Language Modeling**	**LECTURE HOURS: 12**
Language Modeling: Introduction, n-gram models, Smoothing: Interpolation and Backoff.		
UNIT-III	**Introduction to Machine Translation**	**LECTURE HOURS: 11**
Introduction to Machine Translation: History, Rule Based MT, Direct Transfer & INTERLINGUA Approaches, MT Evaluation.		
UNIT-IV	**Statistical MT**	**LECTURE HOURS: 11**

Statistical MT: Parallel Corpus and Alignment, Lexical Translation Model, Decoding Algorithms		
UNIT-V	**Applications**	**LECTURE HOURS: 12**
Applications: Automatic Text Categorization, Text Summarization, Information Extraction, Sentiment Analysis.		

Text Books:	
1	"Natural Language Processing: An Information Access Perspective", Ess Ess Publications, Kavi Narayana Murthy, 2006.
2	"Foundations of Statistical Natural Language Processing", Christopher Manning, MIT Press, 1999.

Reference Books:	
1	James A. Natural language Understanding 2e, Pearson Education, 1994
2	Bharati A, Sangal R., Chaitanya V. Natural language processing: a Paninian perspective, PHI, 2000

ADVANCES IN SOFTWARE TESTING LAB-(C2526)

Title of the course:	**ADVANCES IN SOFTWARE TESTING LAB**
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
• To learn to use the following (or Similar) automated testing tools to automate testing: • Win Runner/QTP for functional testing. • Load Runner for Load/Stress testing. • Test Director for test management. • JUnit, HTMLUnit, CPPUnit. • To study state-of-art tools for software testing and Middleware technologies

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Test the software applications using standard tools available in the market.
CO2	To understand how to prevent the defects.
CO3	To gain the techniques and skills on how to use modern software testing tools to support software testing projects.
CO4	Have an ability to identify the needs of software test automation and define and develop a test tool to support test automation.
CO5	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
CO6	To understand software test automation problems and solutions.

Title of the course:	**ADVANCES IN SOFTWARE TESTING LAB**			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		0	0	3

Course Content:		
TASK-1	**Loops**	**PRACTICAL HOURS: 12**
Write programs in C Language to demonstrate the working of the following constructs: i) do...while ii) while….do iii) if…else iv) switch v)for .		
TASK-2		**PRACTICAL HOURS: 14**
A program written in C language for Matrix Multiplication fails. Introspect the causes for its failure and write down the possible reasons for itsfailure.		
TASK-3		**PRACTICAL HOURS: 12**
Consider ATM System and Study its system specifications and report the various bugs.		
TASK-4		**PRACTICAL HOURS: 14**
Write the test cases for Bankingapplication.		
TASK-5		**PRACTICAL HOURS: 12**
Create test plan document for Library ManagementSystem		

TASK-6		**PRACTICAL HOURS: 12**
Create test cases for RailwayReservation.		
TASK-7		**PRACTICAL HOURS: 12**
Create test plan document for OnlineShopping.		

Reference Books:	
1	M G Limaye, “Software Testing – Principles, Techniques and Tools”, Tata McGraw Hill, 2009.
2	Edward Kit, “Software Testing in the Real World - Improving the Process”, Pearson Education, 2004.
3	William E. Perry, “Effective methods for software testing”, 2nd Edition, John Wiley, 2000.

MAP REDUCE PROGRAMMING LAB-(C2527)

Title of the course:	MAP REDUCE PROGRAMMING LAB
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:
• Getting familiar with Hadoop distributions, configure Hadoop and perform File Management Tasks • To understand Map Reduce in Hadoop works • To implement Map Reduce programs • Understanding Map Reduce support for debugging • Understanding new approaches for building Hadoop Map Reduce programs for real-time applications

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Configure Hadoop and perform File Management Tasks
CO2	Applying Map Reduce programs to real time issues like word count, weather dataset and sales of a company
CO3	Critically analyze huge data set using hadoop distributed file systems and map reduce programs
CO4	Demonstrate skills of Hadoop
CO5	Identify single node and multi node Hadoop clusters
CO6	create mapper and reducer functions

Title of the course:	**MAP REDUCE PROGRAMMING LAB**			
Branches for which this course is offered:	M.Tech II SEMESTER (CSE)	L	T	P
		3	1	0

Course Content:		
TASK-1		**PRACTICAL HOURS: 12**
Install Apache Hadoop.		
TASK-2		**PRACTICAL HOURS: 12**
Write a map reduce program to calculate the frequency of a given word in a given file?		
TASK-3		**PRACTICAL HOURS: 12**
Write a Map Reduce program to find the maximum temperature in each year?		
TASK-4		**PRACTICAL HOURS: 14**
Write a Map Reduce program to find the grades of student's?		
TASK-5		**PRACTICAL HOURS: 12**
Write a map reduce program to implement Matrix Multiplication?		
TASK-6		**PRACTICAL HOURS: 12**
Write a map reduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year?		

TASK-7		**PRACTICAL HOURS: 12**
Write a map reduce to analyze weather data set and print whether the day is shinny or cool day?		
TASK-8		**PRACTICAL HOURS: 12**
Write a map reduce program to find the number of products sold in each country by considering sales data containing from given fields		
TASK-9		**PRACTICAL HOURS: 12**
Write a map reduce program to find the tags associated with each movie by analyzing movielens data?		
TASK-10		**PRACTICAL HOURS: 12**
Write a map reduce program to find the frequency of books published each year and find in which year maximum number of books were published using the given data?		
TASK-11		**PRACTICAL HOURS: 12**
Write a map reduce program to analyze Uber data set to find the days on which each basement has more trips using the following dataset. The Uber dataset consists of four columns they are dispatching_base_number, date, active_vehicles and trips.		

Reference Books:	
1	Srinath Perera and Thilina Gunarathne Hadoop MapReduce Cookbook, Packt publishing, 2003
2	Bill Franks, Taming the big Data tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons, 2012.
3	Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
4	Jiawei Han, MichelineKamber, Data Mining Concepts and Techniques, Second Edition
5	Elsevier, Reprinted 2008. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007.

MACHINE LEARNING LAB-(C2528)

Title of the course:	MACHINE LEARNING LAB
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)

COURSE OVERVIEW:

Course Overview

The goal of this course is to give foundation in machine learning and basic concepts used in the design of classification, prediction models. It includes different machine learning algorithms and methods. In addition, it helps to apply the appropriate machine learning technique for classification, pattern recognition and optimization and decision problems.

COURSE OUTCOMES:

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

A30530.1 Distinguish between, supervised, unsupervised and semi-supervised learning

A30530.2 Apply the opt machine learning strategy for any given problem

A30530.3 Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem

A30530.4 Design a system that uses the appropriate graph models of machine learning

A30530.5 Modify existing machine learning algorithms to improve classification efficiency

Title of the course:	MACHINE LEARNING LAB			
Branches for which this course is offered:	M.TECH II SEMESTER(CSE)	L	T	P
		0	0	3

Course Content:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based ona given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent withthe training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test thesame using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy,precision, and recall for your data set
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate

the diagnosis of heart patients using standard Heart Disease Data Set. You can useJava/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the qualityof clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10.Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points.Select appropriate data set for your experiment and draw graphs.
Books and Materials **Text Book(s)** 1. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014. 2. Tom M Mitchell, ―Machine Learning‖, First Edition, McGraw Hill Education, 2013
Reference Book(s) 1. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012. 2. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014

RESEARCHMETHODOLOGY-(OPEN ELECTIVE)-(C2215A)

Title of the course:	**RESEARCHMETHODOLOGY** (Open Elective)
Branches for which this course is offered:	M.TECH III SEMESTER(CSE)

COURSE OVERVIEW:
• To develop understanding of the basic framework of research process. • To develop an understanding of various research designs and techniques. • To identify various sources of information for literature review and data collection. • To develop an understanding of the ethical dimensions of conducting applied research. • Appreciate the components of scholarly writing and evaluate its quality.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Demonstrate knowledge of research processes (reading, evaluating, and developing);
CO2	Identify, explain, compare, and prepare the key elements of a research proposal/report;
CO3	compare and contrast quantitative and qualitative research paradigms, and explain the use of each in research;
CO4	Explain the rationale for research ethics, and the importance of and local processes for Institutional Review Board (IRB) review
CO5	Demonstrate how educational research contributes to the objectives of your doctoral program and to your specific career aspirations.
CO6	Describe, compare, and contrast descriptive and inferential statistics, and provide examples of their use in research;

Title of the course:	**RESEARCHMETHODOLOGY (Open Elective)**			
Branches for which this course is offered:	M.Tech III SEMESTER (CSE)	L	T	P
		3	1	0

Course Content:		
UNIT-I	**Meaning, Objective and Motivation in Research**	**LECTURE HOURS: 10**
Meaning, Objective and Motivation in Research: Types of Research, Research Approaches, Research Process, Validity and Reliability in Research.		
UNIT-II	**Research Design**	**LECTURE HOURS: 10**
Research Design: Features of Good Design, Types of Research Design, Basic Principles of Experimental Design		
UNIT-III	**Sampling Design**	**LECTURE HOURS: 11**
Sampling Design: Steps in Sampling Design, Characteristics of a Good Sample Design, Random Samples and Random Sampling		
UNIT-IV	**Measurement and Scaling Techniques**	**LECTURE HOURS: 12**
Measurement and Scaling Techniques: Errors in Measurement, Tests of Sound Measurement, Scaling and Scale Construction Techniques, Forecasting Techniques, Time Series Analysis, Interpolation and Extrapolation, Methods of Data Collection: Primary Data, Questionnaire and Interviews, Collection of Secondary Data, Cases and Schedules. Professional Attitude and Goals, Concept of Excellence, Ethics in Science and Engineering, Some Famous Frauds in Science (Case Studies).		

UNIT-V	Data and Report Writing	LECTURE HOURS: 12
Interpretation of Data and Report Writing, Layout of a Research Paper, Techniques o f Interpretation. Making Scientific Presentation at Conferences and Popular Lectures to Semi Technical Audience, Participating in Public Debates on Scientific Issues.		

Text Books:	
1	Research Methodology: Methods And Techniques - C. R. Kothari,2nd Edition, New Age Intemational Publishers.
2	Research Methodology And Statistical Tools - P. Narayana Reddy And G.V,R.K, Acharyulu, l" Edition, Excel Books, New Delhi, 2008

HUMAN VALUES & PROFESSIONAL ETHICS - (Open Elective)-(C2215B)

Title of the course:	HUMAN VALUES & PROFESSIONAL ETHICS (Open Elective)
Branches for which this course is offered:	M.TECH III SEMESTER(CSE)

COURSE OVERVIEW:

- To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

COURSE OUTCOMES:	
CO1	Assess their own ethical values and the social context of problems
CO2	Identify ethical concerns in research and intellectual contexts, including academic
CO3	Integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects demonstrate knowledge of ethical values in non-classroom activities, such as service
CO4	Learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research
CO5	Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
CO6	Ability to identify and develop appropriate technologies and management patterns for above production systems.

Title of the course:	HUMAN VALUES & PROFESSIONAL ETHICS			
Branches for which this course is offered:	M.Tech III SEMESTER (CSE)	L	T	P
		3	1	0

Course Content:

UNIT-I	Course Introduction	LECTURE HOURS: 11

Course Introduction - Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self exploration. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-II	Understanding Harmony in the Human Being	LECTURE HOURS: 11

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT-III	Understanding Harmony in the Family and Society	LECTURE HOURS: 11
Understanding Harmony in the Family and Society - Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family		
UNIT-IV	**Understanding Harmony in the nature and Existence**	**LECTURE HOURS: 12**
Understanding Harmony in the nature and Existence - Whole existence as Coexistence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence		
UNIT-V	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**	**LECTURE HOURS: 12**
Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order.		

Text Books:	
1	R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2	Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:	
1	Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2	E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3	E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
4	M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd
5	A. N. Tripathy, 2003, Human Values, New Age International Publishers.

INTELLECTUAL PROPERTYRIGHTS (OPEN ELECTIVE)-(C2215C)

Title of the course:	INTELLECTUAL PROPERTYRIGHTS(Open Elective)
Branches for which this course is offered:	M.TECH III SEMESTER(CSE)

COURSE OVERVIEW:

- To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

COURSE OUTCOMES:

After successful completion of the course, the student will be able to

CO1	Able to understand the basics of the four primary forms of intellectual property rights.
CO2	Able to compare and contrast the different forms of intellectual property protection in terms of their key differences and similarities.
CO3	Able to assess and critique some basic theoretical justifications for each form of intellectual property protection
CO4	Able to analyze the effects of intellectual property rights on society as a whole.
CO5	Understanding, defining and differentiating different types of intellectual properties (IPs) and their roles in contributing to organizational competitiveness
CO6	Understanding the Framework of Strategic Management of Intellectual Property (IP).

Title of the course:	INTELLECTUAL PROPERTYRIGHTS(Open Elective)			
Branches for which this course is offered:	M.Tech III SEMESTER (CSE)	L	T	P
		3	1	0

Course Content:

UNIT-I	Introduction to Intellectual property	LECTURE HOURS: 11
Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.		
UNIT-II	**Trade Marks**	**LECTURE HOURS: 11**
Trade Marks : Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.		
UNIT-III	**Law of copy rights**	**LECTURE HOURS: 11**
Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.		
UNIT-IV	**Trade Secrets**	**LECTURE HOURS: 12**

Trade Secrets: Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, and protections for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, False advertising.

UNIT-V	**New development of intellectual property**	**LECTURE HOURS: 12**
New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.		

Text Books:	
1	Fundamentals of IP for Engineers: K.Bansal & P.Bansal
2	Intellectual property right, Deborah, E. Bouchoux, Cengage learning
3	Intellectual property right - Unleashing the knowledge economy, Prabuddha Ganguli, Tata McGraw Hill Publishing Company Ltd.

REFERENCE BOOKS:	
1	Electronic resource guide ERG published online by the American Society International Law
2	Intellectual Property Rights and Development Policy: Report of the Commission on Intellectual Property Rights , London September 2002 (Web resource)