AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

(Approved by AICTE | Accredited by NAAC | Affiliated to JNTUA)

Gudur, Nellore Dist - 524101, A.P (India)

OUTCOME BASED EDUCATION

WITH

CHOICE BASED CREDIT SYSTEM

MASTER OF TECHNOLOGY

SOFTWARE ENGINEERING

ACADEMIC REGULATIONS

UNDER AUTONOMOUS STATUS

M.Tech Regular Two Year PG Programme

(for the batches admitted from the academic year 2018 - 2019)

ACADEMIC REGULATIONS (R18) FOR M.TECH. REGULAR STUDENTS WITH EFFECT FROM ACADEMIC YEAR 2018-2019

1.0 Post- Graduate Degree Programme in Engineering & Technology

1.1 These academic rules and regulations are applicable to the students admitted from the academic year 2018-19 onwards into 2 year (4 Semesters) M.Tech Programmes under Choice Based Credit System(CBCS) at its autonomous institution with effect from the academic year 2018-19 in the following specializations of Engineering:

M.Tech Specializations offered

1. Embedded Systems (ES)
2. VLSI (VL)
3. Electrical Power Systems (EP)
4. Power Electronics (PE)
5. Computer Science & Engineering (CO)
6. Software Engineering (SE)
7. Structural Engineering (ST)

2.0	**Eligibility for admission**
2.1	Admission to the post graduate programme shall be made either on the basis of the merit rank obtained by the qualified student in entrance test PGECET conducted by the Andhra Pradesh State Government as per the norms of Andhra Pradesh State Council of Higher Education (APSCHE)
2.2	The medium of instructions for the entire post graduate programme in Engineering & Technology will be English only.
3.0	**M.Tech. Programme Pattern**
3.1	A student after securing admission shall pursue the post graduate programme in M.Tech in a minimum period of two academic years (4 semesters), and a maximum period of four academic years (8 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit the M.Tech course. Each semester is structured to around 20 credits, totaling to 78 credits for the entire M.Tech programme. Each student shall secure 78 credits required for the completion of the post graduate programme and award of the M.Tech degree.
3.2	A student eligible to appear for the end examination in a course, but absent or has failed in the end examination may appear for that course at the next supplementary examination when offered
3.3	When a student is detained due to lack of shortage of attendance he/she may be re-admitted when the semester is offered after fulfillment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

3.4	UGC/ AICTE specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms, which are listed below.
3.5	**Semester scheme** Each under graduate programme is of 2 academic years (4 semesters) with the academic year being divided into two semesters of 16 weeks (around 90 instructional days) each and semester having – Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). Choice based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and curriculum / course structure as suggested by AICTE are followed.
3.6	**Credit courses** All subjects/ courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: Tutorial periods: Practical periods: Credits) structure based on the following general pattern. • One credit for one hour/ week/ semester for theory/ lecture (L) courses. • One credit for two hours/ week/ semester for laboratory/ practical (P) courses or Tutorials (T).
3.7	**Subject Course Classification** All subjects/ courses offered for the post graduate programme in Engineering & Technology (M.Tech. degree programmes) are broadly classified as follows. The ASCET has followed almost all the guidelines issued by AICTE/UGC.
4.0	**Attendance requirements:**
4.1	A student shall be eligible to appear for the semester end examinations, if student acquires a minimum of 75% of attendance in aggregate of all the subjects/ courses for that semester.
4.2	Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.
4.3	A stipulated fee shall be payable towards condonation for shortage of attendance to the institute as decided by the College Academic Committee.
4.4	Shortage of attendance below 65% in aggregate shall in no case be condoned.
4.5	Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the same set of elective subjects offered under that category.
4.6	A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.
5.0	**Academic requirements** The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no.4.

5.1	A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 40% of marks (i.e., 24) in the end semester examination and a minimum of 50% of marks (i.e., 50) in the sum total of the internal evaluation and end examination taken together.
5.6	A student shall register and put up minimum attendance in all 78 credits and earn all the 78 credits. Marks obtained in all 78 credits shall be considered for the calculation of aggregate percentage of marks obtained
5.7	Students who fail to earn 78 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in M.Tech. Course and their admission shall stand cancelled
6.0	**Distribution and Weightage of marks**
6.1	The performance of a student in each semester shall be evaluated through internal evaluation and /or an external evaluation conducted semester wise.
6.2	The performance of a student in every theory course shall be evaluated for total of 100 marks each, of which the relative weightage for Continuous Internal Evaluation and Semester End Examination shall be 40 marks and 60 marks respectively.
6.3	The performance of a student in every practical course shall be evaluated for total of 75 marks each, of which the relative weightage for Continuous Internal Evaluation and Semester End Examination shall be 25 marks and 50 marks respectively.
6.4	**Internal Evaluation for Theory Course:** The total internal weightage for theory courses is 40 marks with the following distribution. ➢ 30 marks for Mid-Term Examination ➢ 10 marks for Assignment Test While the first mid-term examination shall be conducted on the 50% of the syllabus (Unit-I, Unit-II, & 50% of Unit-III), the second mid-term examination shall be conducted on the remaining 50% of the syllabus (50 % of Unit III, Unit-IV & Unit-V). 10 marks are allocated for assignment test (as specified by the subject teacher concerned). The first assignment should be conducted after completion of Unit-I for 5 marks and the second assignment should be conducted after completion of Unit- IV for 5 marks. The final Assignment Test marks will be the addition of these two. Two midterm examinations each for **30 marks** with the duration of 90 minutes each will be conducted for every theory course in a semester. The midterm examination marks shall be awarded giving a weightage of 80% in the midterm examination in which the student scores better performance and 20% in the remaining midterm examination. The final mid-term marks obtain by the addition of these two (80% + 20%). **Example**: If a student scores 33 marks and 34 marks in the first and second mid-term examinations respectively, then Weighted Average Marks = 34 x 0.8 + 33 x 0.2 = 33.8, rounded to 34 Marks. **Note**: The marks of any fraction shall be rounded off to the next higher mark.
6.5	**Pattern of the midterm examination question paper is as follows:** ➢ A total of three questions ➢ Question paper contains six questions are to be designed taking three questions from

	each unit (Unit Wise - Either or type) of the three units. (3X10=30 Marks) **Pattern of the Assignment Test is as follows:** ➢ Five assignment questions are given in advance, out of which two questions given by the concerned teacher has to be answered during the assignment test ➢ Sum of Assignment Tests marks is considered. **Note:** A student who is absent for any Mid-Term Examination/ Assignment Test, for any reason whatsoever, shall be deemed to have scored zero marks in that Mid-Term Examination/ Assignment Test and no make-up test shall be conducted.
6.6	**Internal Evaluation for Practical Course:** For practical subjects there shall be a Continuous Internal Evaluation during the semester for 25 internal marks. Out of the 25 marks for internal evaluation, day-today assessment in the laboratory shall be evaluated for 10 marks and internal practical examination shall be evaluated for 15 marks conducted by the laboratory teacher concerned.
6.7	**Internal Evaluation for Term Paper:** The Term Paper is a self study report and shall be carried out either during II semester along with other lab courses. Every student will take up this term paper individually and submit a report. The scope of the term paper could be an exhaustive literature review choosing any engineering concept with reference to standard research papers or an extension of the concept of earlier course work in consultation with the term paper supervisor. The term paper reports submitted by the individual students during the II semester shall be evaluated for a total of 50 marks for continuous assessment; it shall be conducted by two Examiners, one of them being term paper supervisor as internal examiner and an external examiner nominated by the Principal from the panel of experts recommended by HOD.
6.8	**Project Work:** The Project work is spread over to two semesters having Project Work Phase-I and Project Work Phase-II. Project Work Phase-I is included in III Semester and Project Work Phase-II in IV Semester as detailed below: A student has to select topic of his Project Work based on his interest and available facilities, in the III semester which he will continue through IV semester also.
6.9	**External Evaluation for Theory Course - Semester End Examination:** The Semester End Examination in each theory subject shall be conducted for 3 hours duration at the end of the semester for 60 marks. **Pattern of the Semester End Examination question paper is as follows:** ➢ Question Paper contains ten questions are to be designed taking two questions from each unit (Unit Wise - Either or type) of the total five units. (5X12=60 Marks) A student has to secure not less than a minimum of 40% of marks (24 marks) exclusively at the Semester End Examinations in each of the theory subjects in which the candidate had appeared. However, the candidate shall have to secure a minimum of 50% of marks (50 marks) in both external and internal components put together to become eligible for passing in the subject.
6.10	**External Evaluation for Practical Course** Out of 50 marks **35** marks are allocated for experiment (procedure for conducting the experiment carries 15 marks & readings, calculation and result-20) and **10** marks for viva-

voce examination with **5** marks for the record.

Each Semester External Lab Examination shall be evaluated by an Internal Examiner along with an External Examiner appointed by the Principal.

A candidate shall be declared to have passed in individual lab course if he secures a minimum of 50% aggregate marks (38 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (25 marks) in the semester external examination.

6.11 Project Work Phase-I:

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the college/ concerned department.

- **Registration of Project work**: A candidate is permitted to register for the project work phase-I after satisfying the attendance requirement of all the courses (theory and practical courses of I & II Semesters).
- An Internal Departmental Committee (I.D.C) consisting of HOD, Supervisor/ Guide and one Internal senior expert shall monitor the progress of the project work.
- The work on the project work phase-I shall be initiated in the III semester and continued in the final semester. The candidate can submit Project work phase-I dissertation with the approval of I.D.C. after 18 weeks from the date of registration at the earliest from the date of registration for the project work phase-I.
- The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C before submission of the Project Report.
- Three copies of the Dissertation certified in the prescribed form by the supervisor and HOD shall be submitted to the HOD.
- The semester end examination for project work phase-I done during III Semester, shall be conducted by a Project Review Committee (PRC). The evaluation of project work shall be conducted at the end of the III Semester.
- The PRC comprises of an External examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor to adjudicate the dissertation. The PRC shall jointly evaluate candidates work and award grades as given below.

S.No	Description	Grade	Grade Point (GP) Assigned
1	Very Good	Grade A	10
2	Good	Grade B	9
3	Satisfactory	Grade C	8
4	Not satisfactory	Grade D	0

If the report of the viva-voce is not satisfactory (Grade D) 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 dissertation.

6.12 Project Work Phase-II:

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the college/ concerned department.

- **Registration of Project work**: A candidate is permitted to register for the project work phase-I after satisfying the attendance requirement of all the courses (theory and practical courses of I & II Semesters)
- An Internal Departmental Committee (I.D.C) consisting of HOD, Supervisor/ Guide and one Internal senior expert shall monitor the progress of the project work.
- The work on the project work phase-II shall be initiated in the IV semester. The candidate can submit Project work phase-II dissertation with the approval of I.D.C. after 18 weeks from the date of registration at the earliest from the date of registration for the project work phase-I.
- The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C before submission of the Project Report.
- Three copies of the Dissertation certified in the prescribed form by the supervisor and HOD shall be submitted to the HOD.
- The semester end examination for project work phase-I done during III Semester, shall be conducted by a Project Review Committee (PRC). The evaluation of project work shall be conducted at the end of the IV Semester.
- The PRC comprises of an External examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor to adjudicate the dissertation. The PRC shall jointly evaluate candidates work and award grades as given below

S.No	Description	Grade	Grade Point (GP) Assigned
1	Very Good	Grade A	10
2	Good	Grade B	9
3	Satisfactory	Grade C	8
4	Not satisfactory	Grade D	0

If the report of the viva-voce is not satisfactory (Grade D) 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 dissertation.

6.13 <u>Re-Registration For Improvement of Internal Evaluation Marks:</u>

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 & 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 more chance for each Theory subject and for a maximum of **<u>three</u>** Theory subjects for Improvement of

Internal evaluation marks.

- ❖ The candidate has to re-register for the subjects so chosen and fulfill all 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, Audisankara College of Engineering & Technology' payable at Gudur** along with the requisition through the Controller of the Examinations of the college.
- ❖ 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.

7.0 **SEMESTER – WISE DISTRIBUTION OF CREDITS**

Semester	Theory	Practicals	Credits
M.Tech I Semester	5	2	22
M.Tech II Semester	4	2 + Term Paper	22
M.Tech III Semester	2	Project Work Phase-I	18
M.Tech IV Semester	0	Project Work Phase-II	16
		Total	78

8.0 **GRADING PROCEDURE**

Grades will be awarded to indicate the performance of students in each theory subject, laboratory / practicals, Term Paper and project Work Phase-I & II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 6 above, a corresponding letter grade shall be given.

8.1 As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

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

8.2	A student who has obtained an 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier
8.3	To a student who has not appeared for an examination in any subject, 'Ab' grade will be allocated in that subject, and he is deemed to have 'failed'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.
8.4	A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.
8.5	A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course. Credit points (CP) = grade point (GP) x credits …. For a course
8.6	A student passes the subject/ course only when GP ≥5 ('E' grade or above)
8.7	➢ A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered. ➢ For Mandatory courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.
8.8	**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. $$SGPA = \sum_{i=1}^{n}(Ci \times Gi) / \sum_{i=1}^{n} Ci$$ Where, Ci is the number of credits of the i^{th} subject, Gi is the grade point scored by the student in the i^{th} course and n is the number of subjects. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e. $$CGPA = \sum_{i=1}^{n}(Ci \times Si) / \sum_{i=1}^{n} Ci$$ Where 'Si' is the SGPA of the i^{th} semester, Ci is the total number of credits in that semester and n is the number of semesters. 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 by letters as mentioned in the above table.
9.0	**Award of Class**
9.1	After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of M.Tech. Degree he/she shall be placed in one of the following four classes:

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

10.0	**Transitory regulations**
10.1	For students detained due to shortage of attendance: 1. A Student who has been detained in I year of R16 Regulations due to lack of attendance, shall be permitted to join I year I Semester of R18 Regulations and he is required to complete the study of M.Tech/ programme with in the stipulated period of eight academic years from the date of first admission in I year. 2. A student who has been detained in any semester of II, III and IV years of R16 regulations for want of attendance, shall be permitted to join the corresponding semester of R18 regulations and is required to complete the study of M.Tech within the stipulated period of eight academic years from the date of first admission in I Year. The R18 Academic Regulations under which a student has been readmitted shall be see rule 10.3 for further Transitory Regulations.
10.2	For students detained due to shortage of credits: A student of R16 Regulations who has been detained due to lack of credits, shall be promoted to the next semester of R18 Regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the study of M.Tech. within the stipulated period of eight academic years from the year of first admission. The R18 Academic Regulations are applicable to a student from the year of readmission onwards. See rule 10.3 for further Transitory Regulations.
10.3	For readmitted students in R18 Regulations: 1. A student who has failed in any subject under any regulation has to pass those subjects in the same regulations. 2. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R18 Regulations. 3. If a student readmitted to R18 Regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R18 Regulations will be substituted by another subject to be suggested by the College standing committee. Note: If a student readmitted to R18 Regulations, has not studied any subjects/topics in

	his/her earlier regulations of study which is prerequisite for further subjects in R18 Regulations, the department HOD concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.
11.0	**Supplementary Examinations:** Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day.
12.0	**Student Transfers** Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.
13.0	**With–Holding of Results** If the candidate has any dues not paid to the institute or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld and he/she will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.
12.0	**Conduct and Discipline** ➢ Students shall conduct themselves within and outside the premises of the Institute in a descent and dignified manner befitting the students of Audisankara College of Engineering & Technology. ➢ As per the order of the Honorable Supreme Court of India, ragging in any form is considered a criminal offence and is totally banned. Any form of ragging will be severely dealt with The following acts of omission and / or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging. (i) Lack of courtesy and decorum; indecent behavior anywhere within or outside the college campus. (ii) Damage of college property or distribution of alcoholic drinks or any kind of narcotics to fellow students / citizens. ➢ Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs. ➢ Mutilation or unauthorized possession of library books. ➢ Noisy and unruly behavior, disturbing studies of fellow students. ➢ Hacking in computer systems (such as entering into other person's areas without prior permission, manipulation and / or damage of computer hardware and software or any other cyber crime etc. ➢ Usage of camera /cell phones in the campus. ➢ Plagiarism of any nature. ➢ Any other act of gross indiscipline as decided by the college academic council from time to time.

	➢ Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute/ hostel, debarring from examination, disallowing the use of certain facilities of the Institute, rustication for a specified period or even outright expulsion from the Institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances. ➢ For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief Warden, the concern Head of the Department and the Principal respectively, shall have the authority to reprimand or impose fine. ➢ Cases of adoption of unfair means and/ or any malpractice in an examination shall be reported to the principal for taking appropriate corrective action. ➢ All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the Academic council of the college. ➢ The Institute Level Standing Disciplinary Action Committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed. ➢ The Principal shall deal with any problem, which is not covered under these rules and regulations. ➢ **"Grievance and Redressal Committee" (General)** constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. ➢ All the students must abide by the code and conduct rules prescribed by the college from time to time.
13.0	**General** ➢ s/he represents "she" and "he" both ➢ Where the words 'he', 'him', 'his', occur, they imply 'she', 'her', 'hers' also. ➢ The academic regulations should be read as a whole for the purpose of any interpretation. ➢ In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Academic Council will be final. The college may change or amend the academic regulations or syllabi from time to time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the institute.

RULES FOR
DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers, blue tooth or any other form of material concerned with or related to the course of the examination (theory or practical) in which he/she is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the examination hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3	Impersonates any other candidate in connection with the examination	The candidate who has impersonated shall be expelled from examination hall. The Candidate is also debarred for four consecutive semesters from class work and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with for feature of seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that Semester/year. The candidate is also debarred for four consecutive Semesters from class work and all Semester end examinations if his involvement is established. Otherwise the candidate is debarred for two consecutive

		semesters from class work and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he/she will be handed over to the police and a case is registered against him.
4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all Semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	Refuses to obey the orders of the any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walkout or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that Semester. If candidate physically assaults the invigilator or/officer in charge of the examination, then the candidate is also barred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	Leaves the examination hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations

		and project work and shall not be permitted for the remaining examinations of the courses of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all Semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of that Semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that Semester examinations depending on the recommendation of the committee.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal for further action to award suitable punishment.	

Note:

i. All malpractices cases are to be handled by the Chief Controller with a committee consist of Controller of Examinations, HOD concerned and subject expert.

ii. Whenever the performance of a student is cancelled in any course/ courses due to Malpractice, he has to register for the End Examination in those course/courses consequently and has to fulfill all the norms required for award of Degree.

COURSE STRUCTURE

M.Tech I Semester – Software Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18SE101	Advanced Data Structures and Algorithms	4	0	0	40	60	100	4
2	18SE102	Object Oriented Software Engineering	4	0	0	40	60	100	4
3	**Elective-I**								
	18SE103	Artificial Intelligence	4	0	0	40	60	100	4
	18SE104	Cloud Computing							
	18SE105	Software Project Management							
4	**Elective-II**								
	18SE106	Middleware Technologies	4	0	0	40	60	100	4
	18SE107	Software Reliability							
	18SE108	Data Analytics							
5	18AS101	Research Methodology and IPR	2	0	0	40	60	100	2
6	18SE110	Advanced Data Structures And Algorithms Lab	0	0	4	25	50	75	2
7	18SE111	Web Technologies Lab	0	0	4	25	50	75	2
		Total	**18**	**0**	**8**	**250**	**400**	**650**	**22**

M.Tech II Semester – Software Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18SE201	Software Architecture And Design Patterns	4	0	0	40	60	100	4
2	18SE202	Software Testing	4	0	0	40	60	100	4
3	**Elective-III**								
	18SE203	Software Quality Assurance	4	0	0	40	60	100	4
	18SE204	Secure Software Engineering							
	18SE205	Grid Computing Techniques							
4	**Elective-IV**								
	18SE206	Internet of Things	4	0	0	40	60	100	4
	18SE207	Distributing Computing							
	18SE208	Knowledge Engineering							
5	18SE209	Design Patterns Lab	2	0	0	40	60	100	2
6	18SE210	Software Testing Lab	0	0	4	25	50	75	2
7	18SE211	Term Paper	0	0	4	50	-	50	2
		Total	**18**	**0**	**8**	**275**	**350**	**625**	**22**

M.Tech III Semester – Software Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1		**Open Elective**	4	0	0	40	60	100	4
2	**Elective-V**								
	18SE304	Advanced Web Technologies	4	0	0	40	60	100	4
	18SE305	Service Oriented Architecture							
	18SE306	Machine Learning							
3	18SE307	Project Work Phase-I	0	0	20	Grade			10
		Total	**8**	**0**	**8**	**80**	**120**	**200**	**18**

M.Tech IV Semester – Software Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18SE401	Project Work Phase-II	0	0	32	Grade			16
		Total	**0**	**0**	**32**	**Grade**			**16**

Open Electives – Software Engineering

S.No	Course Code	Course Title
1	18SE301	Business Analytics
2	18SE302	Operations Research
3	18SE303	Cost Management of Engineering projects

ADVANCED DATA STRUCTURES & ALGORITHMS

M.Tech I Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE101	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Be familiar with basic techniques of algorithm analysis.
2. Be familiar with writing recursive methods.
3. Master the implementation of linked data structures such as linked lists and binary trees.
4. Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure.

UNIT-I	**Overview of Data Structures & Algorithm Analysis**	**Classes:12**

Overview of Data Structures: Review of Arrays, Stacks, Queues, linked lists, Linked stacks and Linked queues, Applications.

Algorithm Analysis: Efficiency of algorithms, Apriori Analysis, Asymptotic Notations, Time complexity of an algorithm using BigO notation, Polynomial Vs Exponential Algorithms, Average, Best, and Worst Case Complexities, Analyzing Recursive Programs.

UNIT-II	**Trees and Graphs**	**Classes:12**

Trees and Graphs: Introduction, Definition and Basic terminologies of trees and binary trees, Representation of trees and Binary trees, Binary tree Traversals, Threaded binary trees, Graphs-basic concepts, representation and traversals.

Binary Search Trees, AVL Trees and B Trees: Introduction, **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, Divide – and – Conquer & Greedy Method**	**Classes:12**

Red – Black Trees, Splay Trees and Hash Tables: Red – Black Trees, Splay Trees and its applications. Hash Tables: Introduction, Hash Tables, Hash Functions and its applications.

Divide – and – Conquer & Greedy Method: General Method, Binary Search, Finding Maximum and Minimum, Quick Sort, Merge sort, Stassen's Matrix Multiplication, Greedy Method- General Method, Minimum Cost Spanning Trees, Single Source Shortest Path

UNIT-IV	**Dynamic Programming**	**Classes:12**

Dynamic Programming: General Method, All Pairs Shortest Path, Single Source Shortest Path, Knapsack problem, Reliability Design, Traveling Sales Person's Problem.

UNIT-V	**Back Tracking and Branch – and – Bound**	**Classes:12**

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.

Text Books:

1. G.A.V. Pai ,Data Structures and Algorithms, TMH, 2009.
2. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, 2nd Edition, University Press.

Reference Books:

1. D. Samanta, Classic Data Structures, PHI, 2005.
2. Aho, Hopcraft, Ullman, Design and Analysis of Computer Algorithms, PEA, 1998.
3. Goodman, Hedetniemi, Introduction to the Design and Analysis of Algorithms TMG.
4. E. Horowitz, S. Sahani, Design and Analysis of Algorithms 3rd Edition, Galgotia.
5. Drozdek, Data Structures and Algorithms in C++ 2nd Edition, Thomson.

Web References:

1. https://nptel.ac.in/courses/110104073/
2. https://www.geeksforgeeks.org/advanced-data-structures/

Outcomes:

At the end of the course students will be able to

1. Describe and implement a variety of advanced data structures (hash tables, priorityqueues, balanced search trees, graphs).
2. Analyze the space and time complexity of the algorithms studied in the course.
3. Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions.
4. Demonstrate an understanding of external memory and external search and sorting algorithms.
5. Demonstrate an understanding of Dynamic Programming.

OBJECT ORIENTED SOFTWARE ENGINEERING

M.Tech I Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
18SE102	Core	4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Investigate principles of object-oriented software engineering, from analysis through testing.
2. Learn techniques at each stage of development, including use cases, UML, Java and the JDK, and Junit.
3. Practice these principles and techniques by developing a "real world" software system prototype.
4. Study and experiment with alternative models of the software development process from the classical waterfall model to Extreme programming.

UNIT-I	Classical Software Engineering	Classes:12

Introduction to Classical software Engineering: Historical, Economic and Maintenance aspects. Introduction to OO Paradigm. Different phases in structured paradigm and OO Paradigm. Software Process and different life cycle models and corresponding strengths and weaknesses. Planning and Estimation: Estimation of Duration and Cost – COCOMO components of software.

UNIT-II	Requirement phase	Classes:12

Requirement phase: Rapid Prototyping method, Specification phase, Specification Document, Formal methods of developing specification document, Examples of other semi - formal methods of using Finite-State- Machines, Petri nets. Cost - Benefit analysis, Introduction to software metrics and CASE tools. Taxonomy and scope of CASE tools.

UNIT-III	Analysis and Design phase	Classes:12

Analysis and Design phase:

Use case Modeling, Class Modeling, Dynamic Modeling, Testing during OO Analysis. Design phase: Data oriented design, Object Oriented design, and Formal techniques for detailed design. Challenges in design phase.

UNIT-IV	Modules to objects	Classes:12

Modules to objects: Cohesion and Coupling, Data Encapsulation and Information hiding aspects of Objects. Inheritance, polymorphism and Dynamic Binding aspects.

UNIT-V	Testing	Classes:12

Testing: Testing, Implementation, Integration and maintenance phases, OOSE aspects in these phases, one case study

Text Books:

1. Object oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH
2. Object oriented and classical software Engineering, Timothy Lethbridge, Robert Laganiere, TMH.

Reference Books:

1. Roger S. Pressman, Software Engineering, A practitioner's Approach- 7th edition, McGrawHill International Edition.
2. Sommerville, Software Engineering- 7th edition, Pearson education.

3. Shely Cashman Rosenblatt,Systems Analysis and Design- Thomson Publications.
4. Waman S Jawadekar, Software Engineering principles and practice- The McGraw-Hill Companies.
3. Component-based software engineering: 7th international symposium, CBSE 2004, Ivica Crnkovic,

Web References:

1. https://www.tutorialspoint.com/object_oriented.../ooad_object_oriented_paradigm.html
2. https://nptel.ac.in/courses/106105087/

Outcomes:

At the end of the course students will be able to

1. Gather and specify requirements of the software projects.
2. Differentiate different testing methodologies.
3. Analyze software requirements with existing tools.
4. Design and understand and apply the basic project management practices in real life projects.
5. Work in a team as well as independently on software projects.

ARTIFICIAL INTELLIGENCE
(Elective-I)

M.Tech I Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE103	Core	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Introduction to Artificial Intelligence, Autonomous Agents.
2. Problem solving, Search, Heuristic methods.
3. Introduction to Robotics.
4. Expert Systems, Intelligent Tutoring Systems.

UNIT-I	PROBLEM SOLVING	Classes:12

PROBLEM SOLVING Introduction – Agents – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction

UNIT-II	LOGICAL REASONING	Classes:12

LOGICAL REASONING Logical agents – propositional logic – inferences – first-order logic – inferences in first order logic – forward chaining – backward chaining – unification – resolution

UNIT-III	PLANNING	Classes:12

PLANNING Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world

UNIT-IV	UNCERTAIN KNOWLEDGE AND REASONING	Classes:12

UNCERTAIN KNOWLEDGE AND REASONING Uncertainty – review of probability - probabilistic Reasoning .

UNIT-V	BAYESIAN NETWORKS	Classes:12

BAYESIAN NETWORKS – inferences in Bayesian networks – Temporal models – Hidden Markov models.

Text Books:

1. S. Russel and P. Norvig, ―Artificial Intelligence – A Modern Approach‖, Second Edition, Pearson Education, 2003.
2. Artificial Intelligence: A New Synthesis by Nils J.Nilson.

Reference Books:

1. David Poole, Alan Mackworth, Randy Goebel, ‖Computational Intelligence : a logical approach, Oxford University Press, 2004
2. G. Luger, ―Artificial Intelligence: Structures and Strategies for complex problem solving, Fourth Edition, Pearson Education, 2002.
3. J. Nilsson, ―Artificial Intelligence: A new Synthesis‖, Elsevier Publishers, 1998.

Web References:

1. https://nptel.ac.in/courses/106105077/
2. www.philocomp.net/links/ai.htm

Outcomes:

At the end of the course students will be able to

1. Select a search algorithm for a problem and estimate its time and space complexities.
2. Possess the skill for representing knowledge using the appropriate technique for a given problem.
3. Possess the ability to apply AI techniques to solve problems of game playing, expert systems, machine learning and natural language processing.

CLOUD COMPUTING
(Elective-I)

M.Tech I Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE104	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Clarify what cloud computing services can and cannot be used.
2. Detail what class of information can and cannot be placed into cloud computing services.
3. Inform staff where to get advice on the use of alternative technologies or services where it is not appropriate to place information into a cloud computing service.

UNIT-I	History Of Centralized And Distributed Computing	Classes:12

History of Centralized and Distributed Computing - Overview of Distributed Computing, Cluster computing, Grid computing. Technologies for Network based systems- System models for Distributed and cloud computing- Software environments for distributed systems and clouds.

UNIT-II	Introduction To Cloud Computing	Classes:12

Introduction to Cloud Computing- Cloud issues and challenges - Properties - Characteristics – Service models, Deployment models. Cloud resources: Network and API - Virtual and Physical computational resources - Data-storage. Virtualization concepts - Types of Virtualization- Introduction to Various Hypervisors - High Availability (HA)/Disaster Recovery (DR) using Virtualization, Moving VMs .

UNIT-III	Service Models	Classes:12

Service models - Infrastructure as a Service (IaaS) - Resource Virtualization: Server, Storage, Network - Case studies. Platform as a Service (PaaS) - Cloud platform & Management: Computation, Storage - Case studies. Software as a Service (SaaS) - Web services - Web 2.0 - Web OS – Case studies – Anything as a service (XaaS).

UNIT-IV	Cloud Programming and Software Environments	Classes:12

Cloud Programming and Software Environments –Programming on Amazon AWS and Microsoft Azure – Programming support of Google App Engine – Emerging Cloud software Environment.

UNIT-V	Cloud Access	Classes:12

Cloud Access: authentication, authorization and accounting - Cloud Provenance and meta-data – Cloud Reliability and fault-tolerance - Cloud Security, privacy, policy and compliance- Cloud federation, interoperability and standards.

Text Books:

1. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, "Distributed and cloud computing from Parallel Processing to the Internet of Things", Morgan Kaufmann, Elsevier – 2012.
2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy An Enterprise Perspective on Risks and Compliance, O'Reilly 2009.

Reference Books:

1. Anthony T.Velte, TobeJ.Velte, Robert Elsenpeter, Cloud Computing: A Practical Aprroach, Publication Person Education, 2009
2. Tom Clark,Addison ,Storage Virtualization: Technologies for Simplifying Data Storage and Management, -Wesley, 2005.
3. Curtis Franklin Jr.Brian J.S. Chee**,** Cloud Computing Technologies and Strategies of the Ubiquitous Data Center, 2010.
4. Timothy Chou, Introduction to Cloud Computing: Business & Technology, 2009.

Web References:

1. https://nptel.ac.in/courses/106105167/
2. https://www.tutorialspoint.com/cloud_computing/

Outcomes:

At the end of the course students will be able to

1. Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.
2. Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
3. Explain the core issues of cloud computing such as security, privacy, and interoperability.
4. Provide the appropriate cloud computing solutions and recommendations according to the applications used.
5. Collaboratively research and write a research paper, and present the research online.

SOFTWARE PROJECT MANAGEMENT
(Elective-I)

M.Tech I Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE105	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Deliver successful software projects that support organization's strategic goals.
2. Match organizational needs to the most effective software development model.
3. Plan and manage projects at each stage of the software development life cycle (SDLC).

UNIT-I	Conventional Software Management & Software Economics	Classes:12

CONVENTIONAL SOFTWARE MANAGEMENT: Waterfall model, Conventional Software Management performance, Evolution of software economics- Software economics, Pragmatic software cost estimation.

IMPROVING SOFTWARE ECONOMICS-Reducing Software product size, improving software processes, improving team effectiveness, improving automation, achieving required quality, peer inspections

UNIT-II	The old way and the new & Life Cycle Phases	Classes:12

THE OLD WAY AND THE NEW: The principles of conventional software Engineering, Principles of modern software management, transition to an iterative process.

LIFE CYCLE PHASES-Engineering and Production stages, Inception, Elaboration, Construction, Transition phases. Artifacts of the process-The Artifact sets, Management artifacts, Engineering artifacts, Program aticartifacts.

UNIT-III	Model Based Software Architectures & Iterative Process Planning	Classes:12

MODEL BASED SOFTWARE ARCHITECTURES: A Management perspective and technical perspective, Software process work lows, Iteration workflows. Checkpoints of the process-Major mile stones, Minor Milestones, Periodic status assessments.

ITERATIVE PROCESSPLANNING: Work break down structures, Planning guidelines, Cost and Schedule estimating, Iteration planning process, Pragmatic planning

UNIT-IV	Project Organization And Responsibilities	Classes:12

PROJECT ORGANIZATION AND RESPONSIBILITIES: Line-of-Business organizations, ProjectOrganizations,evolutionofOrganizations.processautomationAutomationBuildingblocks, The Project Environment.

UNIT-V	Project control and Process instrumentation	Classes:12

PROJECT CONTROL AND PROCESS INSTRUMENTATION: The seven core Metrics, Management indicators, Quality indicators, Life cycle exceptions, Pragmatic Software Metrics, Metrics automation tailoring the process- Process discriminates. Modern process transitions. CCPDS-R CASE STUDY-life cycle overview.

Text Books:

1. Software Project Management, WalkerRoyce: PearsonEducation,2005.
2. Software Project Management, Joe lHenry, Pearson Education.

Reference Books:

1. Software Project Management,Walker Royce, Bob Hughesand Mike Cotterell, TataMcGraw-Hill Edition.

2. SoftwareProjectManagementinpractice,Pankaj Jalote, Pearson Education.
3. Software Engineering, K.K.Aggarwa l& Yogeshsingh, New Age International publishers.

Web References:

1. https://www.tutorialspoint.com/software.../software_project_management.htm
2. https://nptel.ac.in/courses/110104073/

Outcomes:

At the end of the course students will be able to

1. Understand and practice the process of project management and its application in delivering successful IT projects Solve.
2. Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities.
3. Understand and use risk management analysis techniques that identifies the factors that put a project at risk and to quantify the likely effect of risk on project timescales.

MIDDLEWARE TECHNOLOGIES
(Elective-II)

M.Tech I Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE106	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Understand Distributed systems design and implementation.
2. Understand existing Distributed Technologies.
3. Use Middleware to Build Distributed Applications.
4. Understand Middleware Interoperability.
5. Understand Web services architectures

UNIT-I	Client/Server Computing	Classes:12

Client/Server Computing

Building blocks-types of servers-types of Clients-types of middleware-aspects of client/server systems-sizing-scalability-tiered architecture-client/server models-requirements of client/server systems-Distributed objects-benefits-drawbacks-from distributed objects to components

UNIT-II	Component Technology & Component Architecture	Classes:12

Component Technology

Components- definitions-properties-benefits-components and interfaces- direct and indirect interfaces- versions-interfaces as contracts- callbacks- forms of design levels reuse- connection oriented programming – connectable objects.

Component Architecture

Component architecture- component frameworks- composition- data driven, contextual, aspect oriented programming, subject oriented programming, XML components-component development- assembly.

UNIT-III	Common Language Infrastructure	Classes:12

Common Language Infrastructure

Common language infrastructure- common language Runtime.NET framework class library-ADO.NET, ASP.NET- enterprise services. CORBA Component model

UNIT-IV	The Microsoft Way	Classes:12

THE MICROSOFT WAY

Component object model- from COM, COM+, DCOM to .NET framework-evolution

UNIT-V	Web services technologies	Classes:12

Web services technologies- XML, WSDL, UDDI, SOAP.

Text Books:

1. Clemens szyperski, Dominik Gruntz and Stephan Murer, “Component Software Beyond object oriented Programming” Second edition, Pearson education, 2004.
2. Robert Orfali, Dan Harkey, Jeri Edwards, “Client/Server Survival Guide” third edition, John Wiley Inc, 2003.

Reference Books:

1. David Chappell, “Understanding .NET”, Pearson education Inc, 2002.
2. Bill Burke, Richard Monson-Haefel, “Enterprise JavaBeans”, Fifth Edition, O‟Reily, 2001.

3. Dan harkey, Roberrt Orfali, " Client/Server programming with JAVA and CORBA", second edition, wiley& sons Inc, 1999.

Web References:

1. www.w3schools.com
2. middlewaretutorial.com/

Outcomes:

At the end of the course students will be able to

1. Expand various algebraic, trigonometric and hyperbolic functions in Fourier series in different intervals
2. Solve various boundary value problems using Fourier transforms
3. Evaluate the multiple integrals and apply the concept to find areas and volumes
4. Evaluate the line, surface and volume integrals and converting them from one form to another

SOFTWARE RELIABILITY
(Elective-II)

M.Tech I Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
18SE107	**Core**	4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Study the importance, software reliability and hardware reliability and difficulties in achieving software reliability.
2. Study the various metrics used to measure the quality factors of software reliability.
3. Understand the software reliability growth model.
4. Understand the responsibility of organization and staffing in achieving software reliability, and computer architecture and program correctness.

UNIT-I	INTRODUCTION	Classes:12

INTRODUCTION

Need and Concepts of Software Reliability, Failure and Faults – Prevention, Removal, Tolerance, Forecast**, Dependability Concept** – Failure Behavior, Characteristics, Maintenance Policy, Reliability and Availability Modeling, Reliability Evaluation

UNIT-II	SOFTWARE RELIABILITY MODELS	Classes:12

SOFTWARE RELIABILITY MODELS Introduction - Historical Perspective and Implementation, classification, limitations and issues, Exponential Failure Models – Jelinski-moranda model, Poisson, Musa, Exponential models, Weibull Model, Musa-okumoto Model, Bayseian Model – Littlewood verral Model, Phase Based Model

UNIT-III	PREDICTION ANALYSIS	Classes:12

PREDICTION ANALYSIS Model Disagreement and Inaccuracy – Short & Long Term Prediction, Model Accuracy, nalyzing Predictive Accuracy – Outcomes, PLR, U & Y Plot, Errors and Inaccuracy, Recalibration – tecting Bias, Techniques, Power of Recalibration, Limitations in Present Techniques, mprovements.

UNIT-IV	THE OPERATIONAL PROFILE	Classes:12

THE OPERATIONAL PROFILE Concepts and Development Procedures – Customer Type, User Type, System Mode, Functional and Operational Profile, Test Selection - Selecting Operations, Regression Test, Special Issues – Indirect Input Variables, Updating, Distributed system, CASE STUDY - Application of DEFINITY & FASTAR, Power Quality Resource System.

UNIT-V	TESTING FOR RELIABILITY MEASUREMENT	Classes:12

TESTING FOR RELIABILITY MEASUREMENT- Testing Methods, Limits, Starvation , Coverage, Filtering, Microscopic Model of Software Risk.

Text Books:

1. Patric D. T.O connor, "*Practical Reliability Engineering*", 4th Edition, John Wesley & sons, 2003.
2. John D. Musa, "*Software Reliability Engineering",* Tata McGraw Hill, 1999.
3. Michael Lyu, "*Handbook of Software Reliability Engineering"*, IEEE Computer Society Press, ISBN: 0-07-039400-8, 1996.

Reference Books:

1. Software Reliability Engineered Testing (The McGraw-Hill series on software

development) by John Musa (Author)
2. Software Reliability Engineering by Michel R.LYU , Editor.

Web References:

1. https://www.tutorialspoint.com/software_testing_dictionary/reliability_testing.htm
2. https://nptel.ac.in/courses/106105087/pdf/m13L32.pdf

Outcomes:

At the end of the course students able to

1. Understand the software reliability and its various model.
2. Understand the metrics used for software reliability and maintainability.
3. Understand the fault detection and correction approaches used in developing a quality software
4. Understand the design principles for achieving higher reliable software system.
5. Understand the fault detection and correction approaches

DATA ANALYTICS
(Elective-II)

M.Tech I Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE108	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Use their data a decision supporting tool and to build data-intensive products and services.
2. Support the functions under the term "Data Sciences".
3. Cover the basic concepts of big data, methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and the business needs.

UNIT-I	Introduction to Analytics and R programming & Manage your work to meet requirements	Classes:12

Introduction to Analytics and R programming: Introduction to R, RStudio (GUI): R Windows Environment, introduction to various data types, Numeric, Character, date, data frame, array, matrix etc., Reading Datasets, Working with different file types .txt,.csv etc. Outliers, Combining Datasets, R Functions and loops.

Manage your work to meet requirements: Understanding Learning objectives, Introduction to work & meeting requirements, Time Management, Work management & prioritization, Quality & Standards Adherence,

UNIT-II	Summarizing Data & Revisiting Probability & Work effectively with Colleagues	Classes:12

Summarizing Data & Revisiting Probability (NOS 2101): Summary Statistics - Summarizing data with R, Probability, Expected, Random, Bivariate Random variables, Probability distribution. Central Limit Theorem etc.

Work effectively with Colleagues (NOS 9002): Introduction to work effectively, Team Work, Professionalism, Effective Communication skills, etc.

UNIT-III	SQL using R	Classes:12

SQL using R:
Introduction to NoSQL, Connecting R to NoSQL databases. Excel and R integration with R connector.

UNIT-IV	Correlation and Regression Analysis	Classes:12

Correlation and Regression Analysis: Regression Analysis, Assumptions of OLS Regression, Regression Modeling. Correlation, ANOVA, Forecasting, Heteroscedasticity, Autocorrelation, Introduction to Multiple Regression etc.

UNIT-V	Understand the Verticals - Engineering, Financial and others	Classes:12

Understand the Verticals - Engineering, Financial and others: Understanding systems viz. Engineering Design, Manufacturing, Smart Utilities, Production lines, Automotive, Technology etc. Understanding Business problems related to various businesses

Text Books:

1. Student's Handbook for Associate Analytics.
2. Data Analytics for Beginners: A Beginner's Guide to Learn and Master Data Analytics by Robert J.WOZ

Reference Books:

1. Introduction to Probability and Statistics Using R, ISBN: 978-0-557-24979-4, is a textbook written for an undergraduate course in probability and statistics.
2. An Introduction to R, by Venables and Smith and the R Development Core Team. This may be downloaded for free from the R Project website (http://www.r-project.org/, see Manuals). There are plenty of other free references available from the R Project website.
3. Montgomery, Douglas C., and George C. Runger, Applied statistics and probability for engineers. John Wiley & Sons, 2010.
4. The Basic Concepts of Time Series Analysis.http://anson.ucdavis.edu/~azari/sta137/AuNotes.pdf.
5. Time Series Analysis and Mining with R,Yanchang Zhao.

Web References:

1. https://www.tutorialspoint.com/big_data_analytics/
2. https://nptel.ac.in/courses/110106072/

Outcomes:

At the end of the course students will be able to

1. Identify the need for big data analytics for a domain.
2. Apply big data analytics for a given problem.
3. Suggest areas to apply big data to increase business outcome.
4. Use Hadoop, Map Reduce Framework handle massive data.

RESEARCH METHODOLOGY AND IPR

M.Tech I Semester: Common to all Branches								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18AS101	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: -**	**Practical Classes: Nil**			**Total Classes:60**			

OBJECTIVES:

The course should enable the students to:

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand the IOR protection provides an incentive to inventors for further research work and investment in R&D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT-I	**Classes:12**

Research Methodology:

Meaning of research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowledge how Research is done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.

Research Design:

Meaning of Research Design, Need for Research Design, Features of Good Design, Important concepts relating to Research Design, Different Research Designs, Basic principles of experimental designs.

UNIT-II	**Classes:12**

Methods of Data Collection:

Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some other methods of data collection, Collection of secondary data, Selection of appropriate method for data collection, Case study method.

UNIT-III	**Classes:12**

Testing of Hypotheses:

What is a Hypothesis, Basic concepts concerning testing of hypothesis, Procedure for hypothesis testing, Flow diagram for hypothesis testing, Measuring the power of a hypothesis test, Tests of hypotheses, Importance of Parametric Tests, Hypothesis testing of means, Hypothesis testing for differences between means, Hypothesis testing for comparing two related samples, Hypothesis testing of proportions, Hypothesis testing for difference between proportions, Hypothesis testing for comparing a variance some hypothesized population variance, Testing and equality of variances of two normal populations, Hypothesis testing of correlation coefficients, Limitations of the tests of Hypotheses.

UNIT-IV	**Classes:12**

Interpretation and Report Writing:

Meaning of Interpretation, Why Interpretation?, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different steps in writing report, Layout of the

Research Project, Types of reports, Oral presentation, Mechanics of writing a research report, Precautions for writing research reports.

UNIT-V	Classes:12

Intellectual Property Rights:

Module I- Introduction

1) Intellectual property: meaning, nature and significance
2) Various forms of intellectual properties: copyright, patent, trademark, design, geographical indication, semiconductor and plant variety
3) Major international instruments relating to the protection of intellectual properties

Module II- Copyright

1) Copyright: meaning ,scope
2) Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings
3) Ownership of copyright , Assignment and licence of copyright
4) Infringement and exceptions of infringement of copyright and remedies against infringment of copyright: civil, criminal and administrative.

Module III – Trade Marks

1. Trade mark: meaning, scope
2. Absolute and relative grounds of refusal
3. Doctrine of honest concurrent user
4. Procedure for registration and term of protection
5. Rights of holder and assignment and licensing of marks
6. Infringement and remedies
7. Trademarks registry and appellate board

Module IV- Patents

1. Patent: meaning
2. Criteria for patentability and non-patentable inventions
3. Procedure for registration and term of protection
4. Grants of patent, rights of patentee and revocation of patent
5. Compulsory license and government use of patent
6. Infringement, exceptions to infringement of patent and remedies
7. Patent office and Appellate Board

Text Books

1. Kothari. C.R, 1990, "Research methodology: Methods and Techniques. New Age International, 418P
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A step by Step Guide for beginners"

Reference Books:

1. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd. 2007
2. Mayall, "Industrial Design", McGraw Hill, 1974.
3. Niebel, "Product Design", McGraw Hill, 1974.
4. Asimov, "Introduction to Design", Prentice Hall, 1962.
5. Robert P.Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
6. T.Ramappa, "Intellectual Property Rights Under WTO", S.Chand, 2008

ADVANCED DATA STRUCTURES AND ALGORITHMS LABORATORY

M.Tech I Semester: Software Engineering

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
18SE110	Core	-	-	4	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil		Practical Classes: 36			Total Classes: 36		

OBJECTIVES:

At the end of the course students will be able to

1. Impart the basic concepts of data structures and algorithms
2. Understand concepts about searching and sorting techniques
3. Understand basic concepts about stacks,queues,lists,trees and graphs

LIST OF EXPERIMENTS

Expt. 1 — Applications Of Arrays

Implement the applications of Arrays:

a. Ordered List.(Different operations)
b. Sparse Matrix to Efficient Matrix.
c. Checking an expression whether it is completely fully parenthesis or not.

Expt. 2 — Applications of Stacks

Implement the applications of Stacks: a) Infix To Postfix ression. b) Infix To Prefix Expression. c) Prefix To Postfix Expression. d) Evaluation Postfix Expression.

Expt. 3 — Queues Using Array

Implement Queues Using Array

Expt. 4 — Circular Queue

Implement Circular Queue Using Array: a) Ascending Priority Queue. b) Descending Priority Queue. c) Input & Output De-queue.

Expt. 5 — Applications of Linked List.

Implement applications of

a. Stack Using Linked List.
b. Queue Using Linked List.
c. Circular Queue Using Linked
d. Single Linked List.
e. Double Linked List.

Expt. 6 — Binary Search Tree In order Traversal

Arrange words in dictionary order using Binary Search Tree In order Traversal.

Expt.7 — Search traversals

Implement search traversals for Graphs.

a) DFS b) BFS

Expt. 8 — Minimum cost spanning tree

Find minimum cost spanning tree using Kruskal's and Prism's Algorithms.

Expt. 9 — All Pair Shortest Path

Using Floyd's Algorithm find out" All Pair Shortest Path".

Expt. 10 — N-Queens Problem

Implement N-Queens Problem.

Course Home Page:
SOFTWARE AND HARDWARE REQUIREMENTS FOR STUDENTS: **SOFTWARE:** Dev C++, Turbo C **HARDWARE:** Desktop Computers
Outcomes: **At the end of the course, a student will be able to:** 1. Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs). 2. Analyze the space and time complexity of the algorithms studied in the course. 3. Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions. 4. Demonstrate an understanding of external memory and external search and sorting algorithms.

WEB TECHNOLOGIES LABORATORY

M.Tech I Semester: Software Engineering

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
18SE111	Core	-	-	4	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			

OBJECTIVES:

At the end of the course students will be able to

1. Develop an ability with students to design and implement static and dynamic website.
2. Study about Basic HTML Tags with help of CSS Styling and client side Event handling using VB Script & java Script
3. Web Technology Lab is a part of Server side programming like ASP, Servlet, JSP and PHP Technologies
4. Finally study about Cookies, Sessions and Database Handling with ASP, Servlet, JSP and PHP Technologies

LIST OF EXPERIMENTS

Expt. 1 **Web page Design**

Week-1

Design a web page using basic html tags like list, frame, table, images etc.

Expt. 2 **registration form**

Week-2

Prepare a "**registration form** "with the following fields
Name (Text field)
Password (password field)
E-mail id (text field)
Phone number (text field)
Sex (radio button) Date of birth (3 select boxes.
Languages known (check boxes – English, Telugu, Hindi)
Address (text area)

Expt. 3 **JavaScript**

Week-3

Write *JavaScript* to validate the following fields of the above registration page.
Name (Name should contain alphabets and length should not be less than 6 characters).
Password (Password should not be less than 6 characters length).
E-mail id (Must follow the standard pattern name@domain.com)
Phone number (Phone number should contain 10 digits only).

Expt. 4 **Cascading Style Sheets**

Week-4

Design a web page using CSS (Cascading Style Sheets) which includes the following:
1) Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.
2) Set a background image for both the page and single elements on the page. You can define the background image for the page like this:
3) Control the repetition of the image with the background-repeat property. As background-

repeat: repeat Tiles the image until the entire page is filled, just like an ordinary background image in plain HTML.
4) Define styles for links as A: link A: visited A: active A: hover
5) Work with layers
6) Add a customized cursor: Selector {cursor: value}

Expt. 5	APACHE Tomcat Server

Week-5
1) Install and run Hello world Application in APACHE Tomcat Server.

Expt. 6	Servelet Program

Week-6
Write a Servelet Program to connect to the database and extract the data from the table and display in html tabular model.

Expt.7	Servelet Program

Week-7
User Authentication: Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a Servelet for doing the following.
1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies. If he is a valid user you should welcome him by name else you should display "You are not an authenticated user ".

Expt. 8	database Installation

Week-8
Install a database (Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).

Expt. 9	JSP program

Week-9
Write a JSP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

Expt. 10	JSP program

Week-10
Write a JSP which does the following job: Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

Expt. 11	JDBC

Week-11
Create tables in the database which contain the details of items of each category. Modify your catalogue page in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using JDBC

Expt. 12	HTTP

Week-12
HTTP is a stateless protocol. Session is required to maintain the state. The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time. This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get

invalidated. Modify your JSP pages to achieve the above mentioned functionality using sessions.

Reference Books:

1. Java Server Pages, Pekowsky, Pearson.
2. Core Servlets and JavaServer Pages Volume 1: Core Technologies by Marty Hall and Larry Brown Pearson
3. Internet and world wide web – How to program by Dietel and Nieto PHI/Pearson Education Asia .
4. Murach's beginning Java JDK 5, Murach, SPD.

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR STUDENTS:

SOFTWARE: Dev C++, Turbo C

HARDWARE: Desktop Computers

Outcomes:

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

1. Design a web page using basic html tags like list, frame, table
2. Use client-side technologies (XHTML, CSS, forms, JavaScript, and Use server-side technologies (Servlets and JSP) to implement websites.
3. Program to connect to the database and extract the data from the table
4. Create tables in the database which contain the details of items of each category
5. Create an XML application.

SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

M.Tech II Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
18SE201	**Core**	4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: 0**	**Practical Classes: Nil**			**Total Classes:60**			

OBJECTIVES:

The course should enable the students to:

1. Understand the creational and structural patterns.
2. Be capable of applying his knowledge to create an architecture for given application.
3. Explain the role of analyzing architectures
4. Identify different structural patterns.

UNIT-I	Envisioning and Creating an Architecture	Classes:12

Envisioning An Architecture : The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

Creating An Architecture: Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT-II	Creating, Reconstructing and Analyzing Architectures	Classes:12

Creating an Architecture: Designing the Architecture, Documenting software architectures, **Reconstructing Software Architecture**, **Analyzing Architectures**: the ATAM, the CBAM

UNIT-III	Patterns and creational patterns	Classes:12

Patterns: Pattern Description, Organizing catalogs, role in solving design problems Selection and usage.

Creational patterns: Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight, Proxy.

UNIT-IV	Behavioral Patterns	Classes:12

Behavioral Patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor..

UNIT-V	The World Wide Web	Classes:12

The World Wide Web: A case study in interoperability. Air Traffic Control: A case study in designing for high availability. Celsius Tech: A case study in product line development

Text Books:

1. Len Bass,Paul Clements & Rick Kazman, Software Architecture in Practice, second edition, Pearson Education,2003..
2. Erich Gamma, Design Patterns, Pearson Education,1995.

Reference Books:

1. Luke Hohmann, Beyond Software architecture, Addison wesley, 2003.
2. David M. Dikel, David Kane and James R. Wilson, Software architecture, Prentice Hall PTR,2001
3. F.Buschmann, Pattern Oriented Software Architecture, John Wiley & Sons.
4. Eric Freeman & Elisabeth Freeman, Head First Design patterns, O'REILLY, 2007

Web References:

1. https://nptel.ac.in/syllabus/106104027/
2. https://lecturenotes.in/subject/645/software-architecture-sa

Outcomes:

At the end of the course students will be able to

1. Understand the architecture, creating it and moving from one to any, different structural patterns.
2. Understanding of the tools and techniques that may be used for the automatic analysis and evaluation of software.

SOFTWARE TESTING

M.Tech II Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE202	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: 0**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. Discuss various software testing issues and solutions in software unit test; integration, regression, and system testing..
3. Learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
4. Expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions..

UNIT-I	Introduction	Classes:12

INTRODUCTION: Software Engineering-Software Process- Generic process model-Prescriptive process model-specialized, unified process-Agile development-Agile Process-Extreme Programming- Other agile Process models-Software engineering Knowledge-core Principles-Principles that guide each framework Activity.

UNIT-II	Software Requirements And Analysis	Classes:12

SOFTWARE REQUIREMENTS AND ANALYSIS: Requirements Engineering-Establishing the Groundwork-Eliciting Requirements-Developing use cases-Building the requirements model-Negotiating, validating Requirements-Requirements Analysis-Requirements Modeling Strategies.

UNIT-III	Software Design	Classes:12

SOFTWARE DESIGN: Design Diagrams: Use Case Diagrams - Class Diagrams - Interaction Diagrams -State chart Diagrams - Activity Diagrams - Package Diagrams - Component Diagrams – Deployment Diagrams - Diagram Organization- Diagram Extensions. Design Process- Design concepts : Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes- Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements

UNIT-IV	Software Implementation	Classes:12

SOFTWARE IMPLEMENTATION: Structured coding Techniques- Coding Styles-Standards and Guidelines- Documentation Guidelines-Modern Programming Language Features: Type checking-User defined data types-Data Abstraction-Exception Handling- Concurrency Mechanism. Software Testing and Web Apps-Validating Testing- System Testing- Art of Debugging.

UNIT-V	Maintenance	Classes:12

MAINTENANCE - Software Maintenance-Software Supportability- Reengineering-Business Process Reengineering- Software Reengineering- Reverse Engineering-

Text Books:

1. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Tata McGraw-Hill seventh edition, 2009.
2. Richard Fairley, “Software Engineering Concepts” –, Tata Mcgraw Hill, 2008.

Reference Books:

1. Ian Sommerville, *"Software Engineering"*, Seventh Edition, Pearson Education Asia, 2007.
2. Gopalaswamy Ramesh, Ramesh Bhattiprolu, *"Software Maintenance"* Tata Mcgraw Hill, 2003.Eric Freeman & Elisabeth Freeman, Head First Design patterns, O'REILLY, 2007

Web References:

1. https://onlinecourses.nptel.ac.in/noc16_cs16\
2. https://nptel.ac.in/courses/106101163/

Outcomes:

At the end of the course students will be able to

1. Study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods
2. Understand various software testing issues and solutions in software unit test, integration, regression, and system testing.
3. Learn to plan a test project, design test cases and data, conduct testing operations, manage software problems and defects, and generate a testing report
4. Study the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions

SOFTWARE QUALITY ASSURANCE
(Elective-III)

M.Tech II Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
18SE203	**Core**	4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: 0**	**Practical Classes: Nil**				**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Understand quality management processes.
2. Distinguish between the various activities of quality assurance, quality planning and quality control
3. Understand the importance of standards in the quality management process and their impact on the final product.

UNIT-I	Introduction	Classes:12

INTRODUCTION : Introduction – Views on quality – Cost of quality - Quality models – Quality frameworks –Verification and Validation – Defect taxonomy – Defect management – Statistics and measurements – IEEE standards – Quality assurance and control processes.

UNIT-II	Verification, Test Generation	Classes:12

VERIFICATION, TEST GENERATION : Introduction – Verification techniques – Inspections, reviews, walk-throughs – Case studies Software testing- Validation – Test plan – Test cases - Test Generation – Equivalence partitioning – Boundary value analysis – Category partition method – Combinatorial generation – Decision tables – Examples and Case studies..

UNIT-III	Structural Testing	Classes:12

STRUCTURAL TESTING Introduction – Test adequacy criteria – Control flow graph – Coverages: block, conditions, multiple conditions, MC/DC, path – Data flow graph – Definition and use coverages – C-use, P-use, Defclear, Def-use – Finite state machines – Transition coverage – Fault based testing – Mutation analysis – Case studies.

UNIT-IV	Functional Testing	Classes:12

FUNCTIONAL TESTING Introduction – Test adequacy criteria - Test cases from use cases – Exploratory testing - Integration, system, acceptance, regression testing – Testing for specific attributes:Performance.

UNIT-V	load and stress testing	Classes:12

load and stress testing – Usability testing – Security testing - Test automation – Test oracles

Text Books:

1. Boriz Beizer, "Software Testing Techniques", 2nd Edition, DreamTech, 2009..
2. Aditya P. Mathur, "Foundations of Software Testing", Pearson, 2008
3. Mauro Pezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008

Reference Books:

1. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", 2nd Edition,Pearson, 2003
2. Kshirasagar Naik and Priyadarshi Tripathy (Eds), "Software Testing and Quality Assurance: Theory and Practice", John Wiley, 2008

Web References:

1. https://nptel.ac.in/courses/106101061/34
2. http://mbaexamnotes.com/software-quality-assurance.html
3. https://www.academia.edu/9760547/LECTURE_NOTES_2_Software_Quality_Assurance

Outcomes:

At the end of the course students will be able to

1. Understand quality management processes
2. Understand concepts and methods required for effective and efficient SQA
3. Evaluate software processes and provide project staff with feedback about non compliance issues

SECURE SOFTWARE ENGINEERING
(Elective-III)

M.Tech II Semester: Software Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18SE204	Core	L	T	P	C	CIA	SEE	TOTAL
		4	0	0	4	40	60	100
Contact Classes:60	Tutorial Classes: -	Practical Classes: Nil			Total Classes:60			

OBJECTIVES:

The course should enable the students to:

1. Describe the design and implementation of secure software.
2. Cover the characteristics of secure software, the role of security in the development lifecycle, designing secure software, and best security programming practices.
3. Understand security for web and mobile applications

UNIT-I	OSI and Transportation Layer Protocols	Classes:12

OSI: ISO Layer Protocols: Application Layer Protocols-TCP/IP, HTTP, SHTTP, LDAP, MIME,-POP& POP3-RMON-SNTP-SNMP. Presentation Layer Protocols-Light Weight Presentation Protocol Session layer protocols –RPC protocols.

Transport layer protocols ITOT, RDP, RUDP, TALI, TCP/UDP, compressed TCP. Network layer Protocols – routing protocols-border gateway protocol-exterior gateway protocol-internet protocol IPv4- IPv6- Internet Message Control Protocol- IRDP- Transport Layer Security-TSL-SSL-DTLS.

UNIT-II	Data Link layer And Wide Area and Network Protocols	Classes:12

Data Link layer Protocol: ARP – In ARP – IPCP – IPv6CP – RARP – SLIP.

Wide Area and Network Protocols- ATM protocols – Broadband Protocols – Point to Point Protocols – Other WAN Protocols- security issues.

UNIT-III	Local Area Network and LAN Protocols	Classes:12

Local Area Network and LAN Protocols: ETHERNET Protocols – VLAN protocols – Wireless LAN Protocols – Metropolitan Area Network Protocol – Storage Area Network and SAN Protocols -FDMA, WIFI and WIMAX Protocols- security issues.

Mobile IP – Mobile Support Protocol for IPv4 and IPv6 – Resource Reservation Protocol. Multi-casting Protocol – VGMP –IGMP – MSDP.

UNIT-IV	Network Security and Technologies and Protocols	Classes:12

Network Security and Technologies and Protocols: AAA Protocols – Tunneling Protocols – Secured Routing Protocols – GRE- Generic Routing Encapsulation – IPSEC – Security architecture for IP – IPSECAH – Authentication Header – ESP – IKE – ISAKMP and Key management Protocol.

UNIT-V	IEEE 602.11	Classes:12

IEEE 602.11 - Structure of 602.11 MAC – WEP- Problems with WEP –Attacks and Risk-Station security – Access point Security – Gate way Security – Authentication and Encryption

Text Books:

1. Jawin, "Networks Protocols Handbook", Jawin Technologies Inc., 2005.
2. Bruce Potter and Bob Fleck, "602.11 Security", O'Reilly Publications, 2002
3. Lawrence Harte, "Introduction to WCDMA", Althos Publishing, 2004.

Reference Books:

1. Ralph Oppliger "SSL and TSL: Theory and Practice", Arttech House, 2009.
2. Lawrence Harte, "Introduction to CDMA- Network services Technologies and Operations", Althos Publishing, 2004.

3. Lawrence Harte, “Introduction to WIMAX”, Althos Publishing, 2005.

Web References:

1. https://www.guru99.com/what-is-security-testing.html
2. https://www.softwaretestinghelp.com/how-to-test-application-security-web-and-deskto...

Outcomes:

At the end of the course students will be able to

1. Understand quality management processes
2. Distinguish between the various activities of quality assurance, quality planning and quality control
3. Understand the importance of standards in the quality management process and their impact on the final product
4. Evaluate software processes and provide project staff with feedback about non compliance issues
5. Understand concepts and methods required for effective and efficient SQA

GRID COMPUTING TECHNIQUES
(Elective-III)

M.Tech II Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE205	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: -**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Understand the genesis of grid computing
2. Know the application of grid computing
3. Understand the technology and tool kits for facilitating grid computing

UNIT-I	Introduction to Grid Computing	Classes:12

INTRODUCTION AND OVERVIEW OF GRID COMPUTING: Early Grid Activities-Current Grid Activities-An Overview of Grid Business Areas, Grid Applications-Grid Infrastructure.

UNIT-II	Web Services And Related Technologies	Classes:12

WEB SERVICES AND RELATED TECHNOLOGIES : Service – Oriented Architecture-Web Service Architecture-XML, Related Technologies, and Their Relevance to Web services-XML Messages and Enveloping-Service Message Description Mechanisms-Relationship between Web 31 Service and Grid Service – Web Service Interoperability and the Role of the WS-I Organization

UNIT-III	Distributed Object Technology For Grid Computing (OGSA)	Classes:12

DISTRIBUTED OBJECT TECHNOLOGY FOR GRID COMPUTING (OGSA) Introduction to Open Grid Services Architecture(OGSA)- Commercial Data Center National Fusion Collaboratory- The OGSA Platform Components 96

UNIT-IV	Open Grid Services Infrastructure (OGSI)	Classes:12

OPEN GRID SERVICES INFRASTRUCTURE (OGSI) :Introduction-Grid Services-A High-Level Introduction to OGSI – Introduction to Service Data Concepts

UNIT-V	Grid Services	Classes:12

Grid Service: Naming and Change Management Recommendations. OGSA BASIC SERVICES AND THE GRID COMPUTING TOOLKITS Common Management Model(CMM)-Security Architecture.

Text Books:

1. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson/PHI PTR- 2003.

Reference Books:

1. Ahmar Abbas, "Grid Computing: A Practical Guide to technology and Applications", Charles River media – 2003.

Web References:

1. https://www.crcpress.com
2. https://webpages.uncc.edu/abw/GridComputingBook/Slides.html

Outcomes:

At the end of the course students will be able to

1. Evaluate enabling technologies such as high-speed links and storage area networks for building

computer grids

2. Design a grid computing application in one of the key application areas e.g. Computer Animation, E-Research
3. Install a grid computing environment

INTERNET OF THINGS
(Elective-IV)

M.Tech II Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE206	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: -**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Assess the vision and introduction of IoT.
2. Understand IoT Market perspective.
3. Implement Data and Knowledge Management and use of Devices in IoT Technology.
4. Understand State of the Art - IoT Architecture.
5. Classify Real World IoT Design Constraints, Industrial Automation in IoT.

UNIT-I	The IoT Networking Core ,Internet/Web and Networking Basics	Classes:12

The IoT Networking Core : Technologies involved in IoT Development:
Internet/Web and Networking Basics: OSI Model, Data transfer referred with OSI Model, IP Addressing, Point to Point Data transfer, Point to Multi Point Data transfer & Network Topologies, Sub-netting, Network Topologies referred with Web, Introduction to Web Servers, Introduction to Cloud Computing

UNIT-II	IoT Architecture	Classes:12

IoT Architecture: History of IoT, M2M – Machine to Machine, Web of Things, IoT protocols
Applications: Remote Monitoring & Sensing, Remote Controlling, and Performance Analysis
The Architecture The Layering concepts, IoT Communication Pattern, IoT protocol Architecture, Security aspects in IoT

UNIT-III	IoT Application Development And Back-end Application Designing	Classes:12

IoT Application Development:Application Protocols MQTT, REST/HTTP, CoAP, MySQL
Back-end Application Designing Apache for handling HTTP Requests, PHP & MySQL for data processing, MongoDB Object type Database, HTML, CSS & jQuery for UI Designing, JSON lib for data processing, Security & Privacy during development, Application Development for mobile Platforms: Overview of Android / IOS App Development tools

UNIT-IV	Case Study & advanced IoT Applications	Classes:12

Case Study & advanced IoT Applications: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT, Industry concepts

UNIT-V	Sensors and Sensor Nodes	Classes:12

Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/ Arduino)

Text Books:

1. Zach Shelby, Carsten Bormann, The Wireless Embedded Internet Wiley
2. Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers, Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann

Reference Books:

1. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning
2. Internet of Things (A Hands-on-Approach) , Vijay Madisetti , Arshdeep Bahga
3. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally

Web References:

1. https://lecturenotes.in/subject/370/internet-of-things-iot
2. https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1

Outcomes:

At the end of the course students will be able to

1. Understand the vision of IoT from a global context
2. Determine the Market perspective of IoT
3. Use of Devices, Gateways and Data Management in IoT
4. Building state of the art architecture in IoT.

DISTRIBUTING COMPUTING
(Elective – IV)

M.Tech II Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE207	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: -**	**Practical Classes: Nil**			**Total Classes:60**			

OBJECTIVES:

The course should enable the students to:

1. Expose students to both the abstraction and details of file systems.
2. Introduce concepts related to distributed computing systems.
3. Focus on performance and flexibility issues related to systems design decisions.
4. Prepare students for life-long learning.
5. Understand why and not just memorize the details.
6. Expose students to current literature in distributed systems.

UNIT-I	Basic Concepts Introduction	Classes:12

Basic Concepts: Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols – Case Studies

UNIT-II	Processes and Distributed Objects	Classes:12

Processes and Distributed Objects: Inter–process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI – Case Study

UNIT-III	Operating System Issues	Classes:12

Operating System Issues: The OS Layer – Protection – Processes and Threads – Communication and Invocation – OS Architecture – Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System

UNIT-IV	Distributed Transaction Processing	Classes:12

Distributed Transaction Processing: Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols

UNIT-V	Concurrency Control in Distributed Transactions	Classes:12

Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery – Overview of Replication And Distributed Multimedia Systems.

Text Books:

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", 3rd Edition, Pearson Education, 2002.
2. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, "Principles and Pardigms", Pearson Education, 2002.

Reference Books:

1. Sape Mullender, "Distributed Systems", 2nd Edition, Addison Wesley, 1993.
2. Albert Fleishman, Distributes Systems, "Software Design and Implementation", Springer,verlag, 1994.
3. M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.

4. Mugesh Singhal, Niranjan G Shivaratri, “Advanced Concepts in Operating Systems”,Tata McGraw Hill Edition, 2001.

Web References:

1. https://lecturenotes.in/subject/360/distributed-computing-dc
2. https://mrcet.com/downloads/digital_notes/CSE/.../Distributed%20systems.pdf

Outcomes:

At the end of the course students will be able to

1. The differences among: concurrent, networked, distributed, and mobile.
2. Resource allocation and deadlock detection and avoidance techniques
3. Understand Remote procedure calls.
4. Apply IPC mechanisms in distributed systems.
5. Design and build application programs on distributed systems.

KNOWLEDGE ENGINEERING
(Elective – IV)

M.Tech II Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE208	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: 0**	**Practical Classes: Nil**			**Total Classes:60**			

OBJECTIVES:

The course should enable the students to:

1. Elicitate knowledge from experts by using several elicitation techniques.
2. Build all Common Kads models that play a role in the development of a knowledge based system, this includes the context of the KBS and the expertise model based.
3. Implement the expertise model as a prototype.
4. Reflect on your own process of modeling and building a knowledge based system, and to reflect on your product..

UNIT-I	Introduction to Key concepts	Classes:12

INTRODUCTION: Key concepts – Why knowledge Representation and Reasoning – Language of first order Logic – Syntax, Semantics Pragmatics – Expressing Knowledge – Levels of Representation – Knowledge Acquisition and Sharing – Sharing Ontologies – Language Ontologies –Language Patterns – Tools for Knowledge Acquisition

UNIT-II	Resolution And Reasoning	Classes:12

RESOLUTION AND REASONING : Proportional Case – Handling Variables and Qualifies – Dealing with Intractability – Reasoning with Horn Clauses - Procedural Control of Reasoning – Rules in Production –Description Logic - Vivid Knowledge – Beyond Vivid. Representation: Object Oriented Representations – Frame Formalism – Structured Descriptions – Meaning and Entailment - Taxonomies and Classification – Inheritance – Networks – Strategies for Defeasible Inheritance – Formal Account of Inheritance Networks.

UNIT-III	Defaults, Uncertainty And Expressiveness	Classes:12

DEFAULTS, UNCERTAINTY AND EXPRESSIVENESS : Defaults – Introduction – Closed World Reasoning – Circumscription – Default Logic Limitations of Logic – Fuzzy Logic – Non monotonic Logic – Theories and World – Semiotics – Auto epistemic Logic - Vagueness – Uncertainty and Degrees of Belief – Non categorical Reasoning – Objective and Subjective Probability.

UNIT-IV	Actions And Planning	Classes:12

ACTIONS AND PLANNING:

Explanation and Diagnosis – Purpose – Syntax, Semantics of Context – First Order Reasoning – Modal Reasoning in Context – Encapsulating Objects in Context – Agents – Actions .

UNIT-V	Situational Calculus	Classes:12

Situational Calculus – Frame Problem – Complex Actions – Planning –Strips – Planning as Reasoning – Hierarchical and Conditional Planning.

Text Books:

1. Ronald Brachman, Hector Levesque "Knowledge Representation and Reasoning ", The Morgan Kaufmann Series in Artificial Intelligence 2004
2. John F. Sowa, "Knowledge Representation: Logical, Philosophical, and Computational Foundations", 2000.

Reference Books:

1. Arthur B. Markman, "Knowledge Representation", Lawrence Erlbaum Associates,1999

Web References:

1. https://www.investopedia.com
2. https://searchenterpriseai.techtarget.com/definition/knowledge-engineering

Outcomes:

At the end of the course students will be able to

1. Apply KM concepts to devise KM practices, actions, and programmes for effective business support;
2. Apply methods and tools for knowledge engineering and management
3. Use working knowledge and sound skills to plan, assess, develop, and implement KM projects and to address industrial problems;
4. Design and implement a KM system and justify the success of the implementation
5. An understanding of the methods and tools of knowledge engineering and management

DESIGN PATTERN LABORATORY

M.Tech II Semester: Software Engineering

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
18SE209	Core	-	-	4	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			

OBJECTIVES:

At the end of the course students will be able to

1. Construct UML diagrams for static view and dynamic view of the system.
2. Generate creational patterns by applicable patterns for given context
3. Create refined model for given Scenario using structural patterns.
4. Construct behavioral patterns for given applications.

LIST OF EXPERIMENTS

Expt. 1	**Abstract Factory design pattern.**
Define an abstract Shape class that declares an interface for creating each basic kind of shape by implementing Abstract Factory design pattern.	
Expt. 2	**Interface**
Implement an appropriate design pattern that converts the interface of a class into another interface clients expect.	
Expt. 3	**Command Design pattern**
Write a program that implements Command Design pattern encapsulating a request as an object, thereby letting to parameterize clients with different requests, queue or log requests, and support undoable operations.	
Expt. 4	**Composite Design Pattern.**
Compose objects into tree structures to represent part-whole hierarchies Implementing Composite Design Pattern.	
Expt. 5	**Mediator Design pattern**
Write a program that demonstrates Mediator Design pattern where mediator objects are used to encapsulate and centralize the interactions between classes.	
Expt. 6	**proxy class**
Write a program that executes methods of proxy class which are transferred to Real Subject's methods.	
Expt.7	**Singleton design pattern.**
Ensure a class has only one instance and provide a global point of access to it by Singleton design pattern.	
Expt. 8	**State pattern**
Write a program that demonstrates state pattern that allows an object to completely change its behavior depending upon its current internal state.	
Expt. 9	**Visitor Design Pattern**
Implement Visitor Design Pattern that lets you define a new operation to be performed without changing the classes of the elements on which it operates.	
Expt. 10	**Facade design pattern**
Implement Facade design pattern	

Reference Books:

1. Len Bass, Paul Clements & Rick Kazman, Software Architecture in Practice, second

edition, Pearson Education, 2003.

2. Erich Gamma, Design Patterns, Pearson Education, 1995.

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR STUDENTS:

SOFTWARE: Java

HARDWARE: Desktop Computers

Outcomes:

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

1. Develop, test and debug RPC based client-server programs in Unix.
2. Design and build application programs on distributed systems
3. Improve the performance and reliability of distributed programs
4. Design and build newer distributed file systems for any OS.

SOFTWARE TESTING LABORATORY

M.Tech II Semester: Software Engineering

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
18SE210	Core	-	-	4	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			

OBJECTIVES:

At the end of the course students will be able to

1. Describe the Automation Testing Approach.
2. Understand the test suites for software.
3. Describe a Source Code analysis
4. Describe a Rational Functional Tester.

LIST OF EXPERIMENTS

Expt. 1	**SRS concept**
Understand SRS concept and its documentation	
Expt. 2	**Use Case Diagram**
Design a Use Case Diagram for the application	
Expt. 3	**Activity Diagram**
Design an Activity Diagram	
Expt. 4	**Sequence, Collaboration, and Class Diagram**
Design a Sequence, Collaboration, and Class Diagram	
Expt. 5	**Source Code analysis**
Source Code analysis	
Expt.6	**Testing the application**
Testing the application by Rational Functional Tester.	
Expt. 7	**Maintenance activity**
Understand Maintenance activity (change, configuration management) and document it.	

Reference Books:

1. Boris Beizer, "Software Testing Techniques", Second Edition,Dreamtech, 2003
2. Elfriede Dustin, "Effective Software Testing", First Edition, Pearson Education, 2003.

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR STUDENTS:

SOFTWARE: Rational Rose, Testing Tools

HARDWARE: Desktop Computers

Outcomes:

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

1. Develop the software testing, including software testing methods.

2. Apply software testing issues and solutions in software unit test, integration, regression, and system testing.
3. Develop to plan a test project, design test cases and data, conduct testing operations, manage software problems and defects, and generate a testing report.
4. Develop the advanced software testing topics, such as object-oriented software testing methods.
5. Applying software testing knowledge and methods to practice-oriented software testing projects.

TERM PAPER

M.Tech II Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE211	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		0	0	4	2	50	-	50
Contact Classes: Nil	**Tutorial Classes: Nil**		**Practical Classes:20**			**Total Classes:20**		

The Term Paper is a self study report and shall be carried out either during II semester along with other lab courses. Every student will take up this term paper individually and submit a report. The scope of the term paper could be an exhaustive literature review choosing any engineering concept with reference to standard research papers or an extension of the concept of earlier course work in consultation with the term paper supervisor. The term paper reports submitted by the individual students during the II semester shall be evaluated for a total of 50 marks for continuous assessment; it shall be conducted by two Examiners, one of them being term paper supervisor as internal examiner and an external examiner nominated by the Principal from the panel of experts recommended by HOD.

BUSINESS ANALYTICS
(Open Elective)

M.Tech III Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE301	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. To inculcate research based knowledge in the minds of students.
2. To make them to get awareness regarding analytical tools in the contemporary world.
3. To create knowledge over SPSS and R- Programming.

UNIT-I	INTRODUCTION TO BUSINESS ANALYTICS	Classes:12

Introduction to Business Analytics: Evolution and Scope of Business Analytics. Data for Business Analytics. Analyzing uncertainty and model assumptions – What if analysis, Data tables, Scenario manager and Goal Seek. Regression modeling.

UNIT-II	STATISTICS FOR BUSINESS ANALYTICS	Classes:12

Statistics for Business Analytics: Brief overview of descriptive statistics, graphical representation of data, and overview of hypothesis Testing, Introduction to R-statistical software

UNIT-III	PREDICTIVE ANALYTIC METHODS	Classes:12

Predictive Analytic Methods: Forecasting techniques – Statistical forecasting techniques. Decomposition model – Estimation of trend, seasonality and cyclical components. Smoothing models for forecasting – moving average, Exponential smoothing methods, time series analysis

UNIT-IV	SIMULATION, RISK ANALYSIS, DATA MINING	Classes:12

Simulation, Risk Analysis, Data Mining: Simulation and Risk Analysis – Monte Carlo simulation Examples of simulation models, Introduction to Data Mining – Scope of Data Mining. Data exploration and reduction. Classification – Measuring classification performance. Classification techniques – K nearest neighbor, Discriminate Analysis, factor analysis, and Logistic regression.

UNIT-V	DECISION ANALYSIS	Classes:12

Decision Analysis: Decision making with uncertain information. Decision strategies for a minimize objective. Decision strategies for a maximize objective. Decision Trees, Building a decision tree. Decision trees and risk. Sensitivity analysis, Baye‘s Rule.

Text Books:

1. Albright C. S., Winston Wayne L. and Zappe C. J (2009). Decision Making Using Microsoft Excel (India Edition). Cengage Learning.
2. Evans J. R (2013). Business Analytics Methods, Models and Decisions. Pearson, Upper Saddle River, New Jersey.

Reference Books:

1. Essentials of Business Analytics, Jeffrey Camm, James Cochran, Michael Fry, Jeffrey Ohlmann, David Anderson.
2. U Dinesh Kumar, Business Analytics: The Science of Data - Driven Decision Making, Wiley (2017)

Web References:

1. www.businessanalytics.com
2. www.spss.com

E-Text Books:

1. https://www.springer.com/in/book/9783319688367

Outcomes:

At the end of the course students able to

1. Understand the need and significance of business analytics for decision making
2. Use statistical tools to extract information from raw data.
3. Use regression technique to build predictive models.
4. Apply simulation technique to predict business scenarios

OPERATION RESEARCH
(Open Elective)

M.Tech III Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE302	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. To provide a formal quantitative approach to problem solving and an intuition about situations where such an approach is appropriate.
2. To introduce some widely-used mathematical models. The understanding of these models will allow the students to communicate with persons who run them and to evaluate the results they present
3. To provide a tool that the students can use to solve management problems.

UNIT-I	LINEAR PROGRAMMING PROBLEMS	Classes:12

Linear programming problems: Linear programming problems - Formulation - Graphical Solution LP problems - Simplex method – Big – M and Artificial variables methods.

UNIT-II	TRANSPORTATION & ASSIGNMENT PROBLEMS	Classes:12

Transportation & Assignment Problems: Definition and application of transportation problem – Initial Basic Feasible solutions by North – West corner, least cost, and Vogel's approximation methods - Solution of the transportation problem – Optimality test-Hungarian Algorithm for balanced and unbalanced problems - Travelling salesman problem.

UNIT-III	SEQUENCING PROBLEMS	Classes:12

Sequencing problems : Introduction to Sequencing - n' jobs on two and three machines, two jobs on 'n' machines

UNIT-IV	GAME THEORY	Classes:12

Game Theory: Two - person zero - sum game - Pure strategy - Games with saddle point - mixed strategies – 2 X 2 games without saddle point - Arithmetic Methods for 2 x 2 games - Rules of Dominance – Algebraic method.

UNIT-V	INTRODUCTION TO NETWORKS	Classes:12

Introduction to networks - Network diagram construction – PERT- calculations of estimated time - standard deviation and probability - CPM - Identification of critical path.

Text Books:

1. S.D. Sharma, "Operations Research" - S. Chand (For 1, 2, and 3 units)
2. Kanti Swarup, P.K. Gupta, and Man Mohan - "Operations Research" – Sultan Chand & Sons – 8 th thoroughly revised edition

Reference Books:

1. Prem kumar Gupta, Hira, "Operations Research", - S.Chand, 2008
2. Hamdy, A.Taha, "Operations Research" - An Introduction, - Person Education

Web References:

1.www.advancedanalytical.com

2.www.caseeducation.com

E-Text Books:

1. https://faculty.psau.edu.sa/.../doc-6-pdf-14b14198b6e26157b7eba06b390ab763

Outcomes:

At the end of the course students able to

1. get the various methods of simplex methods to industrial applications
2. handle the practical situations of transport, assignment, and sequencing problem
3. gain the decision making analysis using game theory
4. solve the problems related to CPM and PERT using the network construction

COST MANAGEMENT OF ENGINEERING PROJECTS
(Open Elective)

M.Tech III Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE303	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: Nil**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. To apply modern software packages to conduct analysis of real world data.
2. To understand the technical underpinning of engineering economic analysis.
3. To develop knowledge over project management concepts and other issues.

UNIT-I	UNDERSTANDING COST	Classes:12

Understanding Cost: Introduction, Meaning of Cost, Objective of Costing, Methods of Costing, Technique of Costing, Classification of Cost, Elements of Cost, and Statement of Cost Sheet.

UNIT-II	INTRODUCTION TO MANAGEMENT ACCOUNTING	Classes:12

Introduction to Management Accounting: Introduction, Meaning of Management accounting ,The Role of Management Accounting , Management Accounting Framework , Functions of Management Accounting , Merits of Management Accounting , Demerits of Management Accounting , Distinction between Management Accounting and Financial Accounting

UNIT-III	MARGINAL COSTING AND BREAK EVEN ANALYSIS	Classes:12

Marginal Costing and Break Even Analysis: Introduction , Concept of Marginal Costing Characteristics of Marginal Costing , Difference between Absorption Costing and Marginal Costing , Marginal Cost, Contribution , Cost Volume Profit (CVP) Analysis , Break Even Chart , Break Even Point, Profit Volume ratio or MCSR , Target profit , Margin of Safety , Application of Marginal cost , Limitations of Marginal cost , Solved Problems

UNIT-IV	BASICS OF PROJECT MANAGEMENT	Classes:12

Basics of Project Management: Introduction, Need for Project Management, Project Management Knowledge Areas and Processes, The Project Life Cycle, The Project Manager (PM), Phases of Project Management Life Cycle, Project Management Processes, Impact of Delays in Project Completions, Essentials of Project Management Philosophy, Project Management Principles.

UNIT-V	PROJECT MANAGEMENT	Classes:12

Project Management: Introduction – Role of Project Manager - Project Selection – Technical Feasibility – Project Financing – Project Control and Scheduling through Networks (PERT, CPM).

Text Books:

1. A Text book of Cost and Management Accounting – Arora M. N, 11/e, Vikas.
2. Varshney & Maheswari, Managerial Economics, Sultan chand, 2003.

Reference Books:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education.
2. Prasanna Chandra, Project planning and Analysis, TATA MC graw hill, New Delhi

Web References:

1. https://medcraveonline.com/MOJCE/MOJCE-03-00070.pdf
2. https://www.costengineering.eu/images/papers/CEE_2015_Magazine.pdf
3. https://www.cmu.edu/cee/projects/PMbook/12_Cost_Control,_Monitoring,_and_Accou

nnng.html

4. https://bbamantra.com/cost-of-project/

Outcomes:

At the end of the course students able to

1. Understand the concepts in Cost.
2. Know about The Difference Between Cost accounting and management accounting
3. Know about the Marginal Costing and Break Even Analysis
4. Will understand project management concept.
5. Able to do simple problems in PERT, CPM and crashing.

ADVANCED WEB TECHNOLOGIES
(Elective – V)

M.Tech III Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE304	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes: 0**	**Practical Classes: Nil**			**Total Classes:60**			

OBJECTIVES:

The course should enable the students to:

1. Write syntactically correct HTTP messages and describe the semantics of common HTTP methods and header fields.
2. Discuss differences between URIs, URNs, and URLs, and demonstrate a detailed understanding of http-scheme URLs, both relative and absolute.
3. Describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address.
4. Install a web server and perform basic administrative procedures, such as tuning communication parameters, denying access to certain domains, and interpreting an access log.

UNIT-I	**HTML5**	**Classes:12**

HTML5 Introduction, Forms, Graphics, Media, APIs.

UNIT-II	**Web Servers and Servlets**	**Classes:12**

Web Servers and Servlets: The life cycle of a Servlet, Using Tomcat for Servlet Development, A Simple Servlet, Servlet API, The javax. Servlet Package, Reading Servlet Parameters, The javax. servlet.http Package, handling Http request and response, using Cookies, Session Tracking, Security Issues.

UNIT-III	**JSP Application Basics, JSP Application Development**	**Classes:12**

JSP Application Basics: Introducing Java Server Pages, Http and Servelet Basics, JSP Overview, Setting up the JSP Environment.

JSP Application Development: Generating Dynamic Content, Using JavaBeans Components in JSP Pages, Using Custom Tag Libraries and the JSP Standard Tag Library, Processing Input and Output, Error Handling and Debugging, Sharing Data between JSP Pages, Requests and users, Developing Custom Tag Libraries as Tag Files.

UNIT-IV	**Accessing a Database**	**Classes:12**

Accessing a Database: Accessing a database from a JSP page, validating Complex input without a bean, using Transactions, Application –Specific Database Actions.

UNIT-V	**Database Access Strategies**	**Classes:12**

Database Access Strategies: JDBC Basics, Using Connections and Connection pools, making Connection Pool Available to Application Components, Using a Generic Database Bean, Developing Application-Specific Database Components

Text Books:

1. Java Server Pages –Hans Bergsten, SPD O'Reilly, 2003.
2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH, 2002.

Reference Books:

1. Java Server Pages, Pekowsky, Pearson.
2. Core Servlets and JavaServer Pages Volume 1: Core Technologies by Marty Hall and Larry Brown Pearson

3. Internet and world wide web – How to program by Dietel and Nieto PHI/Pearson
4. Education Asia .
5. Murach's beginning Java JDK 5, Murach, SPD.

Web References:

1. https://www.startertutorials.com/ajwt/res/notes/AJWTnotes.pdf
2. http://www.gpcet.ac.in/wp-content/uploads/2018/02/unit-1.pdf
3. http://www.geethanjaliinstitutions.com/engineering/coursefiles/downloads/cse/wt.pdf
4. https://lecturenotes.in/notes/4624-notes-for-internet-and-web-technologies-iwt-by-rahul-ranjan

E-Text Books:

1. https://ndl.iitkgp.ac.in/

Outcomes:

At the end of the course students will be able to

1. Understand the need for XHTML 1.0.
2. Write validated XHTML 1.0.
3. Apply sound, non-browser specific web design principles.
4. Use Java script to access the DOM to reference web document object CSS properties.
5. Understand the application of XHTML for document structure and content.
6. Apply Java script, CSS & XHTML to create dynamic XHTML.

SERVICE ORIENTED ARCHITECTURE
(Elective – V)

M.Tech III Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE305	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes:**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Understand basic concepts, theories, and techniques for service-oriented computing, standards related to Web services, approaches for the description, discovery, and composition of Web services
2. Know introduction of techniques for information and process semantics, specifically, conceptual modeling, ontologies, matchmaking, messaging, transactions, and processes
3. Formulate the foundational concepts of services, to evaluate existing approaches
4. Present existing techniques from other areas that can be adopted for services

UNIT-I	SOA and Web Services Fundamentals	Classes:12

SOA and Web Services Fundamentals: Introducing SOA- Fundamental SOA, Common Characteristics of Contemporary SOA, Common tangible benefits of SOA, Common pitfalls of adopting SOA. The Evolution of SOA – An SOA timeline, The continuing evolution of SOA, The roots of SOA. Web Services and primitive SOA-The Web Services frame work, Services, Service descriptions, Messaging. **Web Services and Contemporary SOA** (Part I-Activity management and Composition) Message exchange patterns, Service Activity Coordination, Atomic transactions, Business Activities, Orchestration, Choreography.

UNIT-II	Web Services and Contemporary SOA	Classes:12

Web Services and Contemporary SOA: (Part-II-Advanced Messaging, Metadata , and Security) Addressing , Reliable messaging, Correlation, Policies, Metadata exchange, Security, Notification and eventing. **Principles of Service-Orientation:** Service – Orientation and the enterprise, Anatomy of SOA, Common Principles of Service – Orientation, interrelation between Principles of Service-Orientation, Service Orientation and Object Orientation, Native Web Services support for Principles of Service- Orientation.

UNIT-III	Service Layers, Building SOA (Planning and Analysis)	Classes:12

Service Layers: Service-Orientation and Contemporary SOA, Service Layer abstraction, Application Service Layer , Business Service Layer, Orchestration Service Layer, Agnostic Services, Service Layer Configuration Scenarios.

Building SOA (Planning and Analysis): SOA Delivery Strategies-SOA delivery lifecycle phases, the top-down strategy, the bottom-up strategy, the agile strategy. Service Oriented Analysis (Part I- Introduction)-Introduction to Service Oriented Analysis, Benefits of a Business Centric SOA, Deriving Business Services. Service Oriented Analysis (Part-II-Service Modeling)-Service Modeling, Service Modeling guidelines, Classifying Service model logic, Contrasting Service modeling approaches.

UNIT-IV	Building SOA (Technology and Design)	Classes:12

Building SOA (Technology and Design): Service Oriented Design (Part I-Introduction)-Introduction to Service-Oriented design, WSDL related XML Schema language basics, WSDL language basics, Service interface design tools. Service Oriented Design (Part II-SOA Composition Guidelines)-SOA Composing steps, Considerations for choosing service layers, Considerations for positioning core SOA standards, Considerations for choosing SOA extensions.

UNIT-V	Service Oriented Design (Part III- Service Design)	Classes:12

Service Oriented Design (Part III- Service Design): Service Design overview, Entity-centric business Service Design, Application Service Design, Task-centric business Service Design, Service Design guidelines.

Text Books:

1. Thomas Erl, Service-Oriented Architecture-Concepts, Technology, and Design, Pearson Education.
2. Eric Newcomer, Greg Lomow, Understanding SOA with Web Services, Pearson Education.

Reference Books:

1. Jeff Davies & others, The Definitive guide to SOA, Apress, Dreamtech. E.Hewitt, Java SOA Cook book, SPD.
2. M.Rosen and others, Applied SOA, Wiley India pvt. Ltd.
3. J.Mc Govern, and others, Java Web Services Architecture, Morgan Kaufmann
4. Publishers, Elsevier.
5. Shankar.K, SOA for Enterprise Applications, Wiley India Edition.
6. W.Roshen, SOA-Based Enterprise Integration, TMH.

Web References:

1. https://www.smartzworld.com/notes/service-oriented-architecture-pdf-notes-soa-pdf-notes/
2. https://www.vidyarthiplus.com/vp/Thread-IT2401-Service-Oriented-Architecture-Lecture-Notes-Scan-and-Type-Version#.XQHc_NIzbIU

E-Text Books:

1. https://ndl.iitkgp.ac.in/

Outcomes:

At the end of the course students will be able to

1. Learn standards related to Web services: Web Services Description Language (WSDL), Simple Object Access Protocol (SOAP), and Universal Description, Discovery and Integration (UDDI).
2. Learn basic principles of Service-Oriented Architecture and apply these concepts to develop a sample application
3. Conceptually model Web services and formulate specifications of them in the Resource Description Framework (RDF) and the Web Ontology Language (OWL).
4. Evaluate emerging and proposed standards for the main components of Web services architectures
5. Design, develop and test Web services.

MACHINE LEARNING
(Elective – V)

M.Tech III Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
18SE306	**Core**	4	0	0	4	40	60	100
Contact Classes:60	**Tutorial Classes:**		**Practical Classes: Nil**			**Total Classes:60**		

OBJECTIVES:

The course should enable the students to:

1. Introduce to the central approaches of machine learning
2. Define a class of problems that encompasses interesting forms of learning
3. Explore algorithms that solve such problems
4. Provide understanding of the fundamental structure of learning problems and processes

UNIT-I	INTRODUCTION, THE CONCEPT LEARNING TASK	Classes:12

INTRODUCTION : Well defined learning problems, Designing a Learning System, Issues in Machine Learning.

THE CONCEPT LEARNING TASK: General-to-specific ordering of hypotheses, Find-S, List then eliminate algorithm, Candidate elimination algorithm, Inductive bias.

UNIT-II	DECISION TREE LEARNING, ARTIFICIAL NEURAL NETWORKS	Classes:12

DECISION TREE LEARNING : Decision tree learning algorithm, Inductive bias, Issues in Decision tree learning.

ARTIFICIAL NEURAL NETWORKS : Perceptrons, Gradient descent and the Delta rule, Adaline, Multilayer networks, Derivation of back propagation rule Back propagation Algorithm- Convergence, Generalization.

UNIT-III	EVALUATING HYPOTHESES, BAYESIAN LEARNING	Classes:12

EVALUATING HYPOTHESES: Estimating Hypotheses Accuracy, Basics of sampling Theory, Comparing Learning Algorithms.

BAYESIAN LEARNING : Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm.

UNIT-IV	COMPUTATIONAL LEARNING THEORY	Classes:12

COMPUTATIONAL LEARNING THEORY: Sample Complexity for Finite Hypothesis spaces, Sample Complexity for Infinite Hypothesis spaces, The Mistake Bound Model of Learning.

UNIT-V	INSTANCE-BASED LEARNING	Classes:12

INSTANCE-BASED LEARNING : k-Nearest Neighbor Learning, Locally Weighted Regression, Radial basis function networks, Case-based learning

Text Books:

1. Thomas Erl, Service-Oriented Architecture-Concepts, Technology, and Design, Pearson Education.
2. Eric Newcomer, Greg Lomow, Understanding SOA with Web Services, Pearson Education.

Reference Books:

1. Jeff Davies & others, The Definitive guide to SOA, Apress, Dreamtech. E.Hewitt, Java SOA Cook book, SPD.
2. M.Rosen and others, Applied SOA, Wiley India pvt. Ltd.
3. J.Mc Govern, and others, Java Web Services Architecture, Morgan Kaufmann

4. Publishers, Elsevier.
5. Shankar.K, SOA for Enterprise Applications, Wiley India Edition.
6. W.Roshen, SOA-Based Enterprise Integration, TMH.

Web References:

1. http://www.cs.cmu.edu/~yandongl/mlnotes.html
2. http://faculty.ucmerced.edu/mcarreira-perpinan/teaching/CSE176/lecturenotes.pdf

E-Text Books:

1. https://ndl.iitkgp.ac.in/

Outcomes:

At the end of the course students will be able to

1. Identify instance based learning algorithms
2. Design neural network to solve classification and function approximation problems
3. Build optimal classifiers using genetic algorithms
4. Analyze probabilistic methods for learning

PROJECT WORK PHASE – I

M.Tech III Semester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE307	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		0	0	20	10	Grade		
Contact Classes:-	**Tutorial Classes: -**		**Practical Classes: 40**			**Total Classes:40**		

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the college/ concerned department.

- **Registration of Project work**: A candidate is permitted to register for the project work phase-I after satisfying the attendance requirement of all the courses (theory and practical courses of I & II Semesters).
- An Internal Departmental Committee (I.D.C) consisting of HOD, Supervisor/ Guide and one Internal senior expert shall monitor the progress of the project work.
- The work on the project work phase-I shall be initiated in the III semester and continued in the final semester. The candidate can submit Project work phase-I dissertation with the approval of I.D.C. after 18 weeks from the date of registration at the earliest from the date of registration for the project work phase-I.

- The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C before submission of the Project Report.
- Three copies of the Dissertation certified in the prescribed form by the supervisor and HOD shall be submitted to the HOD.
- The semester end examination for project work phase-I done during III Semester, shall be conducted by a Project Review Committee (PRC). The evaluation of project work shall be conducted at the end of the III Semester.
- The PRC comprises of an External examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor to adjudicate the dissertation. The PRC shall jointly evaluate candidates work and award grades as given below.

S.No	Description	Grade	Grade Point (GP) Assigned
1	Very Good	Grade A	10
2	Good	Grade B	9
3	Satisfactory	Grade C	8
4	Not satisfactory	Grade D	0

If the report of the viva-voce is not satisfactory (Grade D) 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 dissertation.

PROJECT WORK PHASE – II

M.Tech IVSemester: Software Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
18SE401	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		0	0	32	16	Grade		
Contact Classes:-	**Tutorial Classes: -**	**Practical Classes: 60**				**Total Classes:60**		

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the college/ concerned department.

- **Registration of Project work**: A candidate is permitted to register for the project work phase-I after satisfying the attendance requirement of all the courses (theory and practical courses of I & II Semesters)
- An Internal Departmental Committee (I.D.C) consisting of HOD, Supervisor/ Guide and one Internal senior expert shall monitor the progress of the project work.
- The work on the project work phase-II shall be initiated in the IV semester. The candidate can submit Project work phase-II dissertation with the approval of I.D.C. after 18 weeks from the date of registration at the earliest from the date of registration for the project work phase-I.

- The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C before submission of the Project Report.
- Three copies of the Dissertation certified in the prescribed form by the supervisor and HOD shall be submitted to the HOD.
- The semester end examination for project work phase-I done during III Semester, shall be conducted by a Project Review Committee (PRC). The evaluation of project work shall be conducted at the end of the IV Semester.
- The PRC comprises of an External examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor to adjudicate the dissertation. The PRC shall jointly evaluate candidates work and award grades as given below

S.No	Description	Grade	Grade Point (GP) Assigned
1	Very Good	Grade A	10
2	Good	Grade B	9
3	Satisfactory	Grade C	8
4	Not satisfactory	Grade D	0

If the report of the viva-voce is not satisfactory (Grade D) 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 dissertation.