COURSE STRUCTURE
AND
DETAILED SYLLABUS
(As per AICTE Model Curriculum)

For

M. Tech Two Year Degree Course

COMPUTER SCIENCE ENGINEERING

(2019-2020)

DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING
SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY
(An Autonomous Institution approved by UGC and affiliated to JNTUH)
Yamnampet, Ghatkesar Mandal, Hyderabad - 501 301.

ACADEMIC REGULATIONS
FOR
M. Tech (Full-Time) PROGRAMS - 2019-20 (A-19)

(Effective for the students admitted into first year from the academic year 2019-20 and onwards)

1.0 **Post-Graduate Degree Programmes in Engineering & Technology (PGP in E&T)** offered BY Sreenidhi Institute of Science And Technology is a **Two Year** (**Four Semesters**) full-time Master of Technology (M.Tech.) Post Graduate Programmes, under Choice Based Credit System (CBCS) and is affiliated to JNTUH.

2.0 ELIGIBILITY FOR ADMISSIONS:

2.1 Admission to the PGPs shall be made subject to eligibility, qualification and specializations prescribed by the University and as adopted by Sreenidhi Institute of Science and Technology from time to time, for each specialization under each M.Tech program.

2.2 Admission to the post graduate program shall be made on the basis of either the merit rank or Percentile obtained by the qualified student in the relevant qualifying GATE Examination / the merit rank obtained by the qualified student in an entrance test conducted by Telangana State Government (PGECET) for M.Tech programs, or on any other exams approved by the University, subject to reservations as laid down by the Government from time to time.

2.3 The medium of instruction for all PG Programs will be **ENGLISH** only.

3.0 M.Tech Programs Structure:

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

3.2 The student shall not take more than four academic years to fulfill all the academic requirements for the award of M.Tech degree from the date of commencement of first year first semester, failing which the student shall forfeit the seat in M.Tech program.

3.3 **UGC/AICTE** specified definitions / descriptions are adopted appropriately for various terms and abbreviations used in this PG academic regulations.

3.3.1 Semester Scheme:

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

3.3.2 Credit Courses:

All students 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:

3.3.2.1 One credit for every one hour of theoretical lectures undergone per week during the entire semester. In case of tutorials one credit for every one hour

of tutorials undergone per week during the entire semester. One credit for every two hours of laboratory practical, technical seminar, Comprehensive Viva Voce, Mini Project with seminar, Project phase – I with seminar, Project phase – II with seminar, for the instruction undergone per week during the entire semester.

3.3.2.2 Other student activities like guest lecture, conference / workshop participations, and technical paper presentations are not given any credits. However, if they produce evidence that they have attended such programs, attendance will be given for the respective subject periods shown as per the time table which are lost due to their participation elsewhere. For the mandatory courses, they have to put in attendance which will be added to the attendance to the other subjects and decide whether a student can be permitted to write the examinations or not. There will be no credits given for the mandatory and audit courses but their performance will be judged and graded as follows

Percentage of marks secured in a Audit course	**Grade**
Greater than or equal to 90%	Outstanding
80% and above but less than 90%	Excellent
70% and above but less than 80%	Very good
60% and above but less than 70%	Good
50% and above but less than 60%	Above Average
Less than 50%	Fail
Absent	Ab

3.3.3 **Additional Credits:**

In case of M.Tech programs, a student can register a minimum of 17 credits and maximum of 24 credits to complete theory courses to concentrate on Project work in the II year. However, he / she will be given provisional certificate only at the end of two years even if he / she has completed all the requirements before that. **The candidate has to complete the course within four academic years from the date of his / her admission**.

3.3.4 **Subject Course Classification:**

All subjects / courses offered for the Post-Graduate Programs of M. Tech are classified as follows. The Institution has followed the general guidelines issued by AICTE.

S.No.	Broad Course Classification	Course Group/ Category	Course Description
1	Core Courses (CoC)	PC - Professional Core	Includes subjects related to the parent Discipline / Department / Branch.
		Project Work	M.Tech Project or Mini - Project or Major-Project or as applicable.
		Seminar, Technical seminar	Seminar on core contents related to parent discipline / department / branch.
		Comprehensive Viva-Voce	Viva-voce covering all the PG subjects studied during the course work.

2	Elective Courses (Ele)	PE - Professional Electives	Includes elective subjects related to the parent discipline / department / branch
		OE - Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline / department /
3.	Audit course	AC - Audit courses	1. English for Research paper writing (Grade evaluation). 2.Ethics, Morals, Gender sensitization and
Total number of Credits – 68 for M.Tech			

4. M.TECH COURSES

Departments offering M.Tech. Programmes with specializations are noted below:

Sl. No.	Department	M.Tech Course
1	CSE	Computer Science
2	CSE	Computer Science and Engineering
3	EEE	Electrical Power Engineering
4	ECE	Digital Systems and Computer Electronics
5	ME	CAD / CAM
6	ME	Thermal Engineering
7	IT	Computer Networks and Information Security

5.0 Attendance Requirements:

5.1 A student shall be eligible to appear for the semester end examinations, if student acquires a minimum of 75% attendance in aggregate of all the subjects / lab subjects / seminars / Mini and major projects (excluding attendance in mandatory / audit courses, NCC / NSO and NSS) for that semester.

5.2 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the College Academic Committee on genuine and valid grounds, based on the student's representation with supporting evidence.

5.3 A stipulated fee shall be payable towards condoning of shortage of attendance.

5.4 Shortage of attendance below 65% in aggregate shall in **NO CASE** be condoned.

5.5 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 admission for that semester shall stand cancelled. They shall not be promoted to the next semester. They may seek re-admission in that semester in which student was detained as and when offered. In case, if there are any professional electives and / or open electives, the same may also be opted, 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.

5.6 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same semester.

6.0 Academic Requirements:

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

6.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject, if he / she secures not less than 40% of marks (30 out of 75 marks) in the End Semester Examination, and a minimum of 50% of marks in the sum total of CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades and this implies securing "B" Grade or above in a subject.

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

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

Note: (1) The SGPA will be computed and printed on the marks memo only if the candidate passes in all the subjects offered and gets minimum B grade in all the subjects.

(2) CGPA is calculated only when the candidate passes in all the subjects offered in all the semesters.

(3) The Institution will give grade card / marks memo at the end of each semester. In any semester in which a mandatory / audit course is offered the results of these subjects will be given in the letter grade as mentioned in item 10.2 given in latter sections of these regulations in the grade cards / marks memo of the corresponding semester.

6.4 Marks and Letter Grades obtained in all those subjects covering the above specified credits alone shall be considered for the calculation of final GPA, which will be indicated in the Grade Card /Marks Memo of second year second semester. In addition, the letter grades secured by the students in the mandatory / audit subjects will also be mentioned in the grade card / marks memo of II year II semester.

6.5 If a M.Tech student registers for extra subject(s) (in the parent department or other departments / branch) other than those listed subjects totaling to 68 credits respectively as specified in the course structure, the performance in extra subject(s) (although evaluated and graded using the same procedure as that of the required 68 credits) will not be taken into account while calculating the SGPA and CGPA. The extra subject(s) shall be from open elective / professional elective. Additional fee has to be paid for registering for extra subjects which are not required with regard to the credit requirements. For such extra subject(s) registered, percentage of marks and Letter Grade alone will be indicated in the Grade Card / Marks Memo, as a performance measure, subject to satisfying the attendance and academic requirements as stated in items 5 and 6.1 - 6.3.

6.6 When a student is detained due to shortage of attendance in any semester, no Grade allotment will be made. However, the student is eligible for re-admission in the subsequent semester(s), as and when next offered, with the academic regulations of the batch into which the student is re-admitted, by paying the prescribed fee as per the norms of Institution. In all these re-admitted cases, the student shall have to secure a fresh set of internal marks and Semester End Examination marks for performance evaluation and SGPA / CGPA calculations.

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

6. 8 A student can opt for one extra subject from II year I semester in M. Tech. I year I semester and also in I year II semester so that the student can complete all the subjects of II year I semester in advance and student can concentrate on Project work in the entire II year either in the institution or in the industry to complete quality work.

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

7.0 <u>EVALUATION</u>:

The performance of a student in each semester shall be evaluated subject- wise (irrespective of credits assigned) for a maximum of 100 marks. The M.Tech project work (major project) will also be evaluated for 100 (30 CIE and 70 SEE) marks.

7.1 Each subject / Lab will have total of 100 marks (30 CIE and 70 SEE). There shall be two midterm examinations in every theory subject. 23 marks are earmarked for each midterm examination. **The marks shall be awarded considering the average of two midterm examination marks in each subject.** If any candidate is absent or if he wishes to improve the sessional marks he can appear for third mid-term examination. The syllabus for the third Mid examination shall be the entire syllabus of the subject concerned, and conducted on the same day of main examination. **The result of third mid test will be treated equal to that of a mid test and average of the better two out of the three mid tests will be considered**.

Each mid test will have compulsory questions without choice and long answer questions as detailed in the following paragraphs.

- Separate registration for the third mid examination has to be done by the student for each of the subjects the student wishes to appear for. He has to pay an examination fee as prescribed by the college per subject from time to time.

- **The midterm examination** question paper shall be of three parts, i.e. Part 'A', Part 'B' and Part 'C'.

The following procedure is to be followed for internal evaluation as given in the below table

Item	Proposed Marks
a) Part – A of Mid Test	12 questions – Short type questions **6 marks**
b) Part – B of Mid Test will have 3 questions (1 from each unit) and student has to answer 2 questions	2 Questions out of 3 questions **14 marks**
c) Part – C Mid test	Question Paper will have 3 questions, one question from each unit will be chosen out of 3 questions given for assignment. Student has to answer any one question out of 3 questions. **3 marks**
d) Assignment	For assignment -1, three questions from each unit- total of 9 questions to be submitted before first mid test. Similarly assignment – II will be given to be submitted before II Mid test and average of two assignments will be considered. **2 marks**
e) Class room participation and	**3 marks**

attendance	
f) Class notes	**2 marks**
Total Marks	**30 Marks**

- Mid Exam – I – First three Units - Duration – 2 hours
- Mid Exam – II – Last three Units - Duration – 2 hours
- Mid Exam – III – All six units - Duration – 2 ½ hours

- Two assignments shall be given for a total weightage of 2 marks.

  - Assignment - I for 2 Marks is to be submitted at least one week before the first mid examinations.
  - Second assignment also will carry 2 marks for the remaining 3 units which is to be submitted at least one week before the second mid examination.

  - The average of the two assignments will be taken with a total weightage of 2 marks.

  - Students will have to be give back the assignment before each mid examination.

  - Besides this 2 marks are allotted for class notes which is to be signed by concerned teacher for every fortnight.

Three marks for each theory subject shall be given for the students based on class room participation and attendance which they have put in a graded manner as per the table given below:

S.No.	Attendance Range	Marks Awarded
1.	65 % and above but less than 75%	1
2.	75% and above but less than 85%	2
3	More than 85 %	3

- **Calculation of final sessional marks for each subject:**

Sl.No	The item of evaluation of sessional marks	Maximum marks	Total marks scored in the subject by the student
1	Mid sessional examinations	23	
2	Assignments	2	

3	Class room participation & Attendance	3	
4	Class notes	2	
Total marks		**30 marks**	

7.1.1 The external examination question paper shall be of two parts, Part 'A' and Part 'B'.

Pattern for External Examinations (70 marks):

1. <u>For Theory Subjects</u>

There shall be external examination in every theory subject and it consists of two parts (Part-A & Part-B). The total time duration will be 3 hours.

- Part - A will be of 20 marks, which will have 10 short questions, which is compulsory.

- Part-B will be of 50 marks, which will have subjective type questions and shall have 7 questions out of which 5 are to be answered. At least one question must appear from each unit such that not more than 2 questions from any unit. All the questions carry equal marks.

Pattern of Evaluation for Lab Subjects (100 marks):

It is decided to offer one lab subject in I semester and one lab subject in the II semester of I year for M.Tech courses. For practical subjects there shall be a continuous evaluation during the semester for 30 sessional marks and 70 marks for end examination.

Assessment of internal marks (30 marks) will be as follows:

1. Day-to-Day work - 05 marks
2. Final Record and viva - 05 marks
3. Average of two tests including viva - 10 marks
4. Lab based project report and viva - 05 marks
5. Lab Project demo - 05 marks

Total - 30 marks

<u>Pattern of end examinations:</u>

The end examination in each lab subject will be for 70 marks. The conduct of the end examination shall be the team consisting of an external examiner and an internal examiner appointed by the Chief Superintendent of Examinations of the college. The marks are distributed as follows:

1. Procedure of experiment and calculation - 10 marks
2. Conduct of experiment, observation, calculation - 20 marks
3. Results including graphs, discussions and conclusion - 20 marks
4. Viva voce and record - 20 marks

Total - 70 marks

In case of computer lab subjects the assessment will be as follows:

Assessment of sessional marks (30):

1. Flowchart and algorithms - 05 marks
2. Program writing and execution - 15 marks
3. Result and conclusions - 05 marks
4. Viva voce and record - 05 marks

Total - 30 marks

Assessment in the end semester examination (70 marks):

1. Program description - 10 marks
2. Program writing - 15 marks
3. Program Execution - 10 marks
4. Results and Conclusion - 20 marks
5. Viva Voce - 10 marks
6. Record and Observation - 05 marks

Total - 70 marks

For practical subjects there will be no recounting or re-valuation.

7.2 Each faculty member in-charge of the lab subject concerned must draw the normal distribution curve and submit to the HoD who in turn shall present the sessional marks analysis to the college academic committee. After discussion on the matter a decision will be taken by CAC whether to forward the entire material available with the teacher concerned for verification of the sessional marks awarded. A decision will be taken by the committee whether to moderate the marks awarded or not. The marks awarded by the committee shall be final and binding.

7.3 A candidate shall be deemed to have secured the minimum academic requirement in a theory subject / practical subject / other subjects if any which have both internal assessment and external assessment components, if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks allotted for that subject (internal marks and end semester exam marks put together). In case there is only internal assessment for a subject the marks secured in the sessional marks shall have to be at least 50%.

7.4 In case the candidate does not secure the minimum academic requirement in any subject in theory or practicals or others if any (as specified in 7.3) he/she has to reappear for the supplementary examination in that subject.

7.5. Distribution of marks for Seminars and Comprehensive Viva:

7.5.1 **Technical seminar for M.Tech courses :**

Technical seminar is divided into four parts one in each semester as stated below:

Semester	Subject	Credits	Internal marks	External marks
I year I semester	Technical seminar - I	1	100	-
I year II semester	Technical seminar – II	1	100	-

I year II semester	Mini project with seminar (Carried out in I year II semester and evaluated in II year I semester	3	30	70
I year II semester	Comprehensive Viva Voce	1	30	70
II year I semester	Project Phase – I and Seminar	5	30	70
II year II Semester	Project Phase – II and Seminar	6	30	70
II year II Semester	Dissertation and defense viva	7	30	70

There shall be technical seminar during I year I semester and I year II semester, comprehensive viva voce in I year II semester and Mini Project with seminar during I year II Semester. For technical seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee, which shall consist of the Head of the Department, a senior Faculty Member and the Supervisor and will jointly evaluate the report and presentation. For each Seminar there will be only internal evaluation of 100 marks. A candidate has to secure a minimum of 50% to be declared successful. The comprehensive Viva voce in the subjects of I year I semester and I year II semester put together will be conducted by the External examiner and it will be for 70 marks and internal evaluation will be for 30 marks (total 100 marks), will be conducted at the end of 1st year 2nd semester. A candidate has to secure a minimum of 50% to be declared successful.

In the First semester seminar report must be in the form of the review paper with a format used by IEEE / ASME etc. In the Second semester Mini project with seminar in the form of Independent Review Paper must be of high quality fit for publication in a reputed conference / journal.

The evaluation format for seminar is as follows:

Selection of topic, literature survey Review by the guide	10 marks
Final report and viva	10 marks
Level of content	15 marks
Presentation	20 marks
Discussion & Involvement	15 marks
Class notes	15 marks
Attendance	15 marks
Total	**100 Marks**

7.6 Comprehensive Viva-Voce:

There shall be a Comprehensive Viva-Voce Examination at the end of I year II semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and one Senior Faculty member of the Department and external examiner. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects, he / she studied during the M.Tech I year I semester and I year II semester. The Comprehensive viva voce is valued for 100 marks. There are 30 internal marks. For awarding these

marks internal viva-voce test must be conducted twice in the semester – one at the end of 7 weeks and the other one at the end of 14 weeks. The average of two internals will be considered for 30 marks. 70 marks are to be awarded for external examination for comprehensive viva voce and he / she has to secure 40% of the marks to be successful in the external. A candidate has to secure a minimum of 50 % of marks in the sum total of internal and external to be declared successful.

S. No.	Description	Marks
1	Average of First & Second Mid Sessional Viva (Internal)	30
2	Final Viva during practical examinations (External)	70
	Total	**100**

7.7 Project Seminars:

In II year I semester and II semester there will be Project Phase – I with seminar, Project Phase – II with seminar. It shall be conducted for 30 marks internal and 70 marks external. A candidate has to secure a minimum of 40% of marks in the external examination. The Internal evaluation for the project shall be done in 2 stages (not less than 4 weeks between two consecutive stages). A candidate shall secure a minimum 50% of marks in sum total of internal and external to be declared successful.

Project work Phase I and II:

The student shall submit a project status report at the end of II year I semester along with a review paper on the subject of the thesis and same shall be evaluated at the end of the semester by the Project Review Committee (PRC).

8.0 EVALUATION OF PROJECT / DISSERTATION WORK:

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

8.1 A Project Review Committee (PRC) shall be constituted with Head of the Department as Chairperson, Project Supervisor and one senior faculty member of the Department offering the M. Tech programs.

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

8.3 After satisfying 8.2, a candidate has to submit, in consultation with his Project Supervisor, the title, objective and plan of action of his project work to the PRC for approval. Only after obtaining the approval of the PRC the student can initiate the Project work.

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

8.5 A candidate shall submit his project status report in four stages at least with a gap of 4 weeks between two consecutive stages for M. Tech programs and shall submit his / her project status report in two stages at least with a gap of 4 weeks between two consecutive stages.

8.6 The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters for M. Tech program. A candidate is permitted to submit Project Thesis only after successful completion of all theory and practical courses (no backlogs) with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Head of the Department and make an oral presentation before the PRC.

8.7 After approval from the PRC, the soft copy of the thesis should be submitted to the College for ANTI-PLAGIARISM for the quality check and the plagiarism report should be included in the final thesis. If the copied information is less than 24%, then only thesis will be accepted for submission.

8.8 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College.

8.9 The thesis shall be evaluated by one examiner selected by the college. For this, the Head of the Department shall submit a panel of 5 examiners i.e., eminent persons with Ph. D or should have guided at least 5 M.Tech projects or should have been working in an R&D organization at the level of not less than Scientist-C, with the help of the guide concerned. The Principal will select one of the examiners and thesis will be sent for evaluation. If the report is favorable, the Head of the Department must organize for viva-voce examination.

8.10 If the report of the examiner is not favorable, the candidate shall revise and resubmit the Thesis, in the time frame as decided by the PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected. Then the candidate has to work on the thesis once again and shall submit to the PRC for its evaluation and further action on the matter.

8.11 For M.Tech Project Evaluation (Viva Voce) in II Year II Semester there are external marks of 70 and with 30 marks internal for 7 credits.

8.12 Project Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the Thesis. Candidate has to secure minimum of 50% marks in Project Evaluation (Viva-Voce) examination.

8.13 If the candidate fails to secure at least 40% in the external examination and 50% in the sum total of internal and external examinations candidate is declared to be failed and the candidate has to reappear for the Viva-Voce examination only after 3 months. In the reappeared examination also, the candidate fails to fulfill the minimum qualifying requirements, he / she will not be eligible for the award of the degree.

8.14 The Head of the Department shall coordinate and make arrangements for the conduct of Project Viva- Voce examination.

9.0 Re-Admission:

9.1 Re-Admission for Discontinued Student:
A student, who has discontinued the M.Tech degree program due to any reason whatsoever, may be considered for 'readmission' into the same degree program (with the same specialization) with the academic regulations of the batch into which he gets readmitted, with prior permission from the authorities concerned.

9.2 If a student is detained due to shortage of attendance in any semester, he / she may be permitted to re-register for the same semester(s).

9.3 A candidate shall be given one chance to re-register for a maximum of two subjects, if the internal marks secured by a candidate are less than 50% and failed in those subjects. A candidate must re-register for failed subjects within four weeks of commencement of the class work and secure the required minimum attendance. In the event of the student taking this chance, his Continuous Internal Evaluation (internal) marks and Semester End Examination marks obtained in the previous attempt stand cancelled.

10.0 Examinations and Assessment - The Grading System:

10.1 Grades will be awarded to indicate the performance of each student in each Theory Subject, or Lab / Practical, or Seminar, or Technical Paper Writing or Project, etc., based on the percentage of marks obtained in CIE + SEE (Continuous Internal Evaluation + Semester End Examination, both taken together) as specified in item 7 above, and a corresponding Letter Grade shall be given.

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

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

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

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

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

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

10.7 A student earns Grade Point (GP) in each Subject, on the basis of the Letter Grade obtained by him in that Subject / Course. The corresponding 'Credit Points' (CP) is computed by multiplying the Grade Point with Credits for that particular Subject / Course.

Credit Points (CP) = Grade Point (GP) x Credits …. For a Course

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

10.9 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of Credit Points (□CP) secured from ALL subjects / courses registered in a semester, by the total number of Credits registered during that semester. SGPA is rounded off to TWO decimal places. SGPA is thus computed as

$$SGPA = \sum_{i=1}^{n} C_i G_i / \sum_{i=1}^{n} C_i$$

$$CGPA = \sum_{j=1}^{n} C_j G_j / \sum_{j=1}^{n} C_j$$

For each Semester

where 'i' is the subject indicator index (taking into account all subjects in a semester), 'N' is the no. of subjects 'REGISTERED' for the semester (as specifically required and listed under the course structure of the parent Department), 'C_{i}' is the no. of Credits allotted to the i^{th} subject, and 'G_i' represents the Grade Points (GP) corresponding to the Letter Grade awarded for that i^{th} subject.

10.10 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered courses in ALL semesters, and the Total Number of Credits registered in ALL the semesters. CGPA is rounded off to TWO decimal places. CGPA is thus computed from the I Year second semester onwards, at the end of each semester, as per the formula

$CGPA = \{\sum_{j}^{M} =1 C_i G_i\} / \{\sum_{j}^{M} = C_i\}$ …… For all 'S' Semesters registered

(ie., upto and inclusive of 'S' Semesters, where S $\geq$2),

where 'M' is the TOTAL no. of subjects (as specifically required and listed under the course structure of the parent Department) the student has 'REGISTERED' for from the 1^{st} semester onwards upto and inclusive of the semester 'S' (obviously M > N), 'j' is the subject indicator index (taking into account all subjects from 1 to 'S' semesters), 'C_{i}' is the no. of credits allotted to the j^{th} subject, and 'G_j' represents the Grade Points (GP) corresponding to the Letter Grade awarded for that j^{th} subject. After registration and completion of I Year I Semester however, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA

Course/Subject	Credits	Letter Grade	Grade points	Credit Points
Course 1	4	A	8	4*8 = 32
Course 2	4	O	10	4*10 = 40

Course 3	4	B	6	4*6 = 24
Course 4	3	B	6	3*6 = 18
Course 5	3	A+	9	3*9 = 27
Course 6	3	B	6	3*6 = 18
	21			159

SGPA = 159/21 = 7.57

Illustration of calculation of CGPA

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

CGPA = 612/96 = 6.37

1. 11.0 Award of Degree and Class:

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

2. 11.2 Award of Class:

11.2.1 Award of degree marks equivalent to the computed final CGPA, the following **% of marks = (final CGPA – 0.5) x 10**

11.2.2 A student who registers for all specified subjects / courses as listed in the course structure and secures the total number of credits (with CGPA ≥ 6), within two academic years from the date of commencement of first academic year, shall be declared to have **qualified for the award of M. Tech. degree in the chosen branch of engineering as selected at the time of *admission.***

11.2.3 A student who qualifies for award of degree as listed in item 11.2.2 shall be placed in the following classes.

11.2.4 Students with final CGPA (at the end of PG program) 8.00 and above and fulfilling the following conditions.

i) Should have passed all the subjects /courses in "first appearance" within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

ii) Should have secured a CGPA 8.0 at the end of each of semesters, starting from first year first semester onwards.

iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in "FIRST CLASS WITH DISTINCTION", otherwise FIRST CLASS only.

11.3 Students with final CGPA (at the end of the under graduate programme), ≥ 6.75 but ≤ 8.00 shall be placed in **FIRST CLASS**.

11.4 Students with final CGPA (at the end of under graduate programme) ≥ 6 but ≤ 6.75 , shall be placed in **"SECOND CLASS"**.

11.5 Students fulfilling the conditions listed under item 11.2.4 alone will be eligible for award of **"University rank" and "gold medal".**

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

12.0 Withholding of Results:

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

13.0. Transitory Regulations:

13.1 A student who has been detained in any semester of I Year of A15 / A17 Regulations due to lack of attendance, shall be permitted to join the same semester of I Year of A19 Regulations and he is required to complete the study of M.Tech programme within the stipulated period of four academic years from the date of first admission in I Year I semester. The A19 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester.

13.2 The candidate who fails in any subject under A15 / A17 regulations will be given two chances to pass the same subject in the same regulations; otherwise, he has to identify an equivalent subject and fulfill the academic requirements of that subject as per A19 Academic Regulations.

13.3 For student readmitted to A19 Regulations, the maximum credits that a student acquires for the award of the degree, shall be the sum of the total number of credits secured in A15 / A17 regulations of his / her study including A19 Regulations.

13.4 If a student readmitted to A19 Regulations, has any subject with 80% of syllabus common with his / her previous regulations, that particular subject in A19 regulations will be substituted by another subject to be suggested by the concerned Chairman of the Board of Studies of the Department to which the student belongs to.

14.0 General:

14.1 **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work / field work per week.

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

14.3 Wherever the words "he", "him", "his", occur in the regulations, they shall include "she", "her".

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

14.5 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the **University / College Academic Council** is FINAL.

14.6 **The University / College Academic Council** may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the **University / College Academic Council.**

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.No	Nature of Malpractices/Improper Conduct	Punishment
	If the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject to the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. Incase of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject to the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.

3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.

6.	Refuses to obey the orders of the Chief Superintendent / Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	Incase of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester / year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any par there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester / year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	In case of student of the college, expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester / year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester / year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations.
12.	If any malpractice is detected which is not covered in the above clauses1to11shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators:

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
   - (i) A show cause notice shall be issued to the college.
   - (ii) Impose a suitable fine on the college.
   - (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year

Department of Computer Science and Engineering
M.Tech (Computer Science Engineering)
Course Structure and Syllabus
Course structure M.Tech(CSE) 2019-2020

I Year	**COURSE STRUCTURE**	**I Semester**

S. No.	**Subject Code**	**Program Core Subject Name**	**L**	**T**	**P**	**C**	**Marks**	
							CIE	**SEE**
1	**7P101**	Mathematical foundations of Computer Science	2	1	-	3	30	70
2	**7P102**	Advanced Data Structures	2	1	-	3	30	70
3	**7P103**	Distributed Systems	3	1	-	4	30	70
4	**7P104**	Python Programming	3	-	-	3	30	70
5		****Program Elective -I**	3	-	-	3	30	70
6	**7P150**	Research Methodology and IPR	2	-	-	2	30	70
7	**7HC18**	Audit Course-1 (English for Research Paper Writing) ***(Grade Evaluation)**	2	-	-	0	30	70
8	**7P151**	Advanced Data Structures Lab	-	-	4	2	30	70
10	**7P152**	Technical Seminar – I	-	-	2	1	100	-
		Total	**17**	**03**	**06**	**21**	**340**	**560**

	Program Elective I	
Sl No.	**Subject Code**	**Subject Name**
1	**7P153**	Digital Forensics
2	**7P154**	Wireless Sensor Networks
3	**7P160**	Data Mining
4	**7P156**	Data Science
5	**7P157**	Computer Vision

Department of Computer Science and Engineering
M.Tech (Computer Science Engineering)
Course Structure and Syllabus
Course structure M.Tech(CSE) 2019-2020

I Year	**COURSE STRUCTURE**	**II Semester**

S. No.	**Subject Code**	**Program Core Subject Name**	**L**	**T**	**P**	**C**	**Marks**	
							CIE	**SEE**
1	**7P201**	Advanced Algorithms	2	1	-	3	30	70
2	**7P202**	Network Security and Cryptography	3	1	-	4	30	70
3	**7HC19**	Audit Course 2 (Ethics,Moral,Gender sensitization and Yoga)	2	-	-	0	30	70
4	**7P203**	Cloud Computing	3	-	-	3	30	70
5		****Program Elective II**	3	-	-	3	30	70
6		****Program Elective III**	3	-	-	3	30	70
7	**7P250**	Information Security Lab	-	-	4	2	30	70
8	**7P251**	Technical Seminar – II	-	-	2	1	100	-
9	**7P252**	Comprehensive Viva Voce	-	-	2	1	30	70
10	**7P253**	Mini Project with Seminars	*Evaluation in II year I sem					
		Total	**16**	**2**	**8**	**20**	**340**	**560**

	Program Elective II		**Program Elective III**	
Sl.No.	**Subject Code**	**Subject Name**	**Subject Code**	**Subject Name**
1	**7P254**	Soft Computing	**7P259**	Secure Software Design and Enterprise Computing
2	**7P255**	Advanced Wireless and Mobile Networks	**7P260**	Semantic Web and Social Networking
3	**7P256**	Machine Learning	**7P261**	Artificial Intelligence and Deep Learning
4	**7P257**	Cyber Security and Cyber Laws	**7P262**	Internet of Things
5	**7P258**	Scripting Language	**7P263**	Mobile Applications and Services

Note: **** Any one of the Program Elective courses may be preferably offered through MOOCs**

Department of Computer Science and Engineering
M.Tech (Computer Science Engineering)
Course Structure and Syllabus
Course structure M.Tech(CSE) 2019-2020

II Year	**COURSE STRUCTURE**	**I Semester**

S. No.	**Subject Code**	**Program Core Subject Name**	**L**	**T**	**P**	**C**	**Marks**	
							CIE	**SEE**
1	**7P301**	Human Computer Interaction	3	-	-	3	30	70
2	**7P302**	**Open Elective**	3	-	-	3	30	70
3	**7P303**	Mini Project with Seminars (Project Conducted in summer)	-	-	6	3	30	70
4	**7P304**	Main Project Phase– I with Seminars	-	-	10	5	30	70
		Total	**6**	**0**	**16**	**14**	**120**	**280**

Sl .No	**Subject Code**	**Open Elective Subject Name**
1	**7ZC03**	**Banking Operations, Insurance and Risk Management**
2	**7T217**	**Embedded Systems**
3	**7WC18**	**Operations Research**
4	**7ZC28**	**Cost Management of Engineering Projects**
5	**7QC47**	**Bioinformatics**

II Year	**COURSE STRUCTURE**	**II Semester**

S. No.	**Subject Code**	**Program Core Subject Name**	**L**	**T**	**P**	**C**	**Marks**	
							CIE	**SEE**
1	7P401	Main Project Phase– II with Seminars	-	-	12	6	30	70
2	7P402	Dissertation and defense Viva	-	-	-	7	30	70
		Total	**-**	**-**	**12**	**13**	**60**	**140**

L - Lectures; T = Tutorial; P = Practical; C = Credits

CIE: Continuous Internal Evaluation

SEE: Semester End Exam

Elective Stream	Program Elective – I (pe1)		Program Elective – II (pe2)		Program Elective – III (pe3)	
	Code	**Subjects**	Code	**Subjects**	Code	**Subjects**
Security	**7P153**	Digital Forensics	**7P254**	Soft Computing	**7P259**	Secure Software Design and Enterprise Computing
Networks	**7P154**	Wireless Sensor Networks	**7P255**	Advanced Wireless and Mobile Networks	**7P260**	Semantic Web and Social Networking
Data Science	**7P160**	Data Mining	**7P256**	Machine Learning	**7P261**	Artificial Intelligence and Deep Learning
Advanced Technologies	**7P156**	Data Science	**7P257**	Cyber Security Cyber Laws	**7P262**	Internet of Things
Advanced Software Languages	**7P157**	Computer Vision	**7P258**	Scripting Language	**7P263**	Mobile Applications and Services

PEO AND PO

PROGRAMME EDUCATIONAL OUTCOMES (PEOs)

PEO- I: Analyze, design and develop software to carryout research on scientific and multidisciplinary engineering areas, by publishing technical papers.

PEO-II: Pursue a successful career in academia with master's degree in Computer Science and Engineering having in depth domain knowledge by using modern engineering techniques and tools for sustainable development through lifelong learning.

PEO-III: Will be able to practice professional ethics, financial aspects along with awareness of information security, legal aspects, gender sensitization, environmental and social needs for carrying project works.

PROGRAMME OUTCOMES (POs)

PO1: An ability to independently carry out research /investigation and development work to solve practical problems.

PO2: An ability to write and present a substantial technical report/document.

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

PO4: Apply modern engineering techniques, resources and IT tools available in Computer Science and Engineering to solve complex engineering problems and demonstrate the knowledge for sustainable development through life –long learning.

PO5: Become a complete professional with high integrity, ethics, , awareness of information security, associated IT act, gender sensitization becomes excellent professional and with empathy towards the environmental and social needs.

PO6: Understanding of engineering and management principles and application of these principles to finalize technical and financial aspects of a project in multi disciplinary areas.

PO/PEO	1	2	3	4	5	6
I	✓	✓				✓
II			✓	✓		
III					✓	✓

PO1	PO2	PO3	PO4	PO5	PO6
✓		✓	✓		

Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Mathematical Foundations of Computer Science

L	T	P/D	C
2	1	**-**	**3**

Code: 7P101

Course Objectives:

1. To understand the mathematical fundamentals that is prerequisites for a variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.

2. To develop the understanding of the mathematical and logical basis to many modern techniques in information technology like machine learning, programming language design, and concurrency.

3. To study various sampling and classification problems.

COURSE OUTCOMES

After completion of course, students would be able to:
1. To understand the basic notions of discrete and continuous probability.
2. To understand the methods of statistical inference, and the role that sampling distributions play in those methods.
3. To be able to perform correct and meaningful statistical analyses of simple to moderate complexity.

Unit I

The Foundations: Statements and Notations, Connectives – Negation, Conjunction, Disjunction, Statement Formulas and Truth Tables, Well-formed Formulas, Tautologies, Equivalence of Formulas, Duality, Tautological Implications. **Normal Forms** – DNF, CNF, PDNF and PCNF.

UNIT – II

Theory of Inference – Validity using truth tables, Rules of inference, Consistency of premises and indirect method of proof, Automatic theorem proving. **Predicate Calculus:** Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy. **Combinatorics –** Permutations, Combinations, Principle of inclusion and exclusion.

UNIT – III

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

Lattices – Properties of lattices, Lattices as algebraic systems, Sublattices, Direct product, homomorphism.

Unit IV

Algebraic Systems– Definition and examples.

Semigroups and Monoids–Definition and examples, homomorphism of semigroups and monoids, subsemigroups and submonoids. **Groups –** Definition and examples, Subgroups and homomorphisms, Cosets and Lagrange's theorem, Normal subgroups.

UNIT – V

Discrete Probability and Advanced Counting Techniques

An Introduction to Discrete Probability. Probability Theory, Bayes' Theorem, Expected Value and Variance. **Advanced Counting Techniques:** Recurrence Relations, Solving Linear Recurrence Relations-Definition, Homogeneous solution, Particular solution, Total solution, Generating Functions,

UNIT - VI

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

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

Text Books

1. Discrete Mathematics and Its Applications with Combinatorics and Graph Theory-Kenneth H Rosen, 7th Edition, TMH.
2. Joe L. Mott, Abraham Kandel, Theodore P. Baker, *Discrete Mathematics for Computer Scientists & Mathematicians*, Second Edition, PHI, 2005.
3. Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, *Discrete Mathematical Structures*, Fourth Edition, PHI, 2002.

Reference

1. Discrete Mathematical Structures with Applications to Computer Science-J.P.Tremblay and R. Manohar, TMH,
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Teodore P. Baker, 2nd ed. , Pearson Education.
3. Discrete Mathematics- Richard Johnsonbaugh, 7Th Edtn., Pearson Education.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition, Pearson Education.
6. Dr. D. S. Chandrasekharaiah, *Mathematical Foundations of Computer Science (Discrete Structures)*, Prism, 2006.
7. Ralph P. Grimaldi and B. V. Ramana, *Discrete and Combinatorial Mathematics – An Applied Introduction*, Fifth Edition, Pearson, 2006.

PO1	PO2	PO3	PO4	PO5	PO6
✓		✓	✓		

Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Advanced Data Structures

L	T	P/D	C
2	1	**-**	**3**

Code: 7P102

Pre-Requisites: UG level course in Data Structures

COURSE OBJECTIVE

1. The student should be able to choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
2. Students should be able to understand the necessary mathematical abstraction to solve problems.
3. To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
4. Student should be able to come up with analysis of efficiency and proofs of correctness.

COURSE OUTCOMES

After completion of course, students would be able to:

1. Understand the implementation of symbol table using hashing techniques.
2. Develop and analyze algorithms for red-black trees, B-trees and Splay trees.
3. Develop algorithms for text processing applications.
4. Identify suitable data structures and develop algorithms for digital search structures and heap structures, skip lists.

UNIT - I

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

UNIT - II

Hashing and Collision Resolution Techniques, Introduction, Hash Tables, Hash Function, Types of Hash Functions: Division Method, Multiplication Method, Mid-Square Method, Folding Method, Collision Resolution Techniques in Hashing: Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing and Extendible Hashing.

Unit - III

Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists.

UNIT - IV

Search Trees: Binary Search Trees, AVL trees, Red-Black trees, Splay trees. Multiway Search Trees: B- trees, 2-3 trees.

UNIT - V

Digital Search Structures: Digital Search trees, Binary tries, Multiway Tries, Suffix trees, Standard Tries, Compressed Tries.

UNIT - VI

Pattern matching: Introduction, Algorithms: Brute-Force, Boyer –Moore, Knuth-Morris-Pratt, Naïve, Horspool, Rabin-Karp.

Textbooks

1. Data Structures & Algorithms in JAVA, Michael T. Goodrich, Roberto Tamassia, John Wiley & Sons
2. Fundamentals of data structures, Sahni, Horowitz, Mehatha, Universities Press.
3. Introduction to Algorithms, TH Cormen, PHI

References

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

PO1	PO2	PO3	PO4	PO5	PO6
✓		✓	✓		

Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Distributed Systems
(PROGRAM ELECTIVE – I)

L	T	P/D	C
3	1	**-**	**4**

Code: 7P103
Course Objectives:

To understand the need for distributed systems and their applications, the concepts of Inter process Communication, remote procedure, distributed mutual exclusion and Flat and Nested Distributed Transaction.

Course Outcome: After completion of this course, student will be able to

1. Understand Distributed Systems and Its Implementation Through different model.
2. To understand the concept of Distributed Objects and Communication mechanisms between them.
3. Understand the concept of Distributed File Systems with Case Study.
4. Understand the Importance Of Coordination and Agreement, Transaction and Concurrency Control.
5. To know about the Distributed Transactions , Challenges and Recovery Procedures.
6. Understand Security Algorithms and techniques, Its Design and Implementation Issues through Case Studies.

UNIT I
Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models-Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication.
.

UNIT II
Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC,Events and notifications, Case study-Java RMI Operating System Support-Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture,

UNIT III
Distributed File Systems-Introduction, File Service architecture, case study- SUN network file systems. Name Services-Introduction, Name Services and the Domain Name System, Case study of the Global Name Service, Case study of the X.500 Directory Service. Peer to Peer Systems–Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, OceanStore, Time and Global States-Introduction, Clocks, events and Process states,

Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.

UNIT IV

Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems. Transactions and Concurrency control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

UNIT V

Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

UNIT VI

Security-Introduction, Overview of Security techniques, Cryptographic algorithms, Digital signatures, Case studies-Kerberos, TLS, 802.11 Wi-Fi. Distributed shared memory, Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study, Other consistency models, CORBA case study-Introduction, CORBA RMI, CORBA Services

TEXT BOOKS:

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

REFERENCES:

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

PO1	PO2	PO3	PO4	PO5	PO6
✓		✓	✓		

Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Python Programming

Code: 7P104

L	T	P/D	C
3	-	-	3

Course Objectives:

Use Python interactively, execute a Python script at the shell prompt, use Python types, expressions, and None,use string literals and string type, use Python statements (if...elif..else, for, pass, continue, . . .), understand the difference between expressions and statements, understand assignment semantics, write and call a simple function., utilize high-level data types such as lists and dictionaries, understand the difference between mutable and immutable types, write a simple class and access methods and attributes, import and utilize a module, read from and write to a text file.

Course Outcomes: After completing this course, students should able to

1. Gains exposure towards Python versions and their specifications.
2. Build programes using promitive data types.
3. Write applications that include functions, modules, packages along with respective exceptional handling mechism.
4. Writes applications using OO features of Python
5. Develops web based applications to deal with data communcation between client and server modules and also process data that is stored in possible databases.
6. Hands on exposure on SciPy/Tkinter/Plotpy modules.

Unit -I :
Introduction to Python: History, Features ,Setting up path ,Working with Python Basic Syntax , Variable and Data Types ,Operator. Conditional Statements(If ,If- else ,Nested if-else) Looping (for,While Nested loops) Control Statements(Break , Continue ,Pass)

Unit-II:
Functions: Defining a function ,Calling a function ,Types of functions ,Function Arguments ,Anonymous functions ,Global and local variables
String Manipulation: Accessing Strings, Basic Operations, String slices , Function and Methods
Lists : Accessing list ,Operations ,Working with lists Function and Methods
Tuple: Accessing tuples, Operations, Working .
Dictionaries: Accessing values in dictionaries, Working with dictionaries, Properties Functions and Methods.

Unit-III:
Modules :Importing module , Math module , Random module ,Packages , Composition
Input-Output : Printing on screen ,Reading data from keyboard ,Opening and closing file
Exception Handling : Exception,Exception Handling,Except clause ,Try ? finally clause User Defined Exceptions

Unit-IV: Advance Python- OOPs concept: Class and object ,Attributes ,Inheritance,Overloading Overriding ,Data hiding .
Regular expressions---Match function ,Search function ,Matching VS Searching,Modifiers Patterns.

Unit -V: CGI :Introduction , Architecture ,CGI environment variable, GET and POST methods Cookies ,File upload.
Python for Database: Introduction , Connections , Executing queries ,Transactions Handling error

Unit -VI: Working with NumPy/PlotPy/SciPy/GUI Programming, Introduction ,Tkinter programming ,Tkinter widgets

Text books:

1.Think Python: How to Think Like a Computer Scientist Allen B. Downey, O'Relly publications.
2. Learning with Python by Jeffrey Elkner, Chris Meyers Allen Downey, Dreamtech Press.

Reference books:

1. Introduction to Computation and Programming using Python, Revised and Expanded Edition,John V. Guttag, The MIT Press.
2. Programming Python,Fourth Edition by Mark Lutz, O'Relly
3. Python Programming using problem solving approach, Reema Thareja, Oxford Higher Education.

PO1	PO2	PO3	PO4	PO5	PO6
✓		✓	✓		

Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Digital Forensics
(PROGRAM ELECTIVE –I)

L	T	P/D	C
3	-	-	3

Code: 7P153

Objectives:
1. After going through this subject students can able to:
2. Know the history and evaluation of digital forensics
3. Describe various types of cyber crime
4. Understand benefits of forensics
5. Implement forensics readiness plan Outcomes:

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

UNIT - I
Computer Forensics Fundamentals: What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Backup and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.

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

UNIT - III

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project. Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case

UNIT - IV

Current Computer Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

UNIT - V

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

UNIT – VI

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

Text Books

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

Reference Books

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

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Wireless Sensor Networks
(PROGRAM ELECTIVE – I)

L	T	P/D	C
3	-	-	3

Code: 7P154

Course Objectives:

- Architect sensor networks for various application setups.
- Devise appropriate data dissemination protocols and model links cost.
- Understanding of the fundamental concepts of wireless sensor networks and has a basic knowledge of the various protocols at various layers.
- Evaluate the performance of sensor networks and identify bottlenecks.

COURSE OUTCOMES

After completion of course, students would be able to:

- Describe and explain radio standards and communication protocols for wireless sensor networks.
- Explain the function of the node architecture and use of sensors for various applications.
- Be familiar with architectures, functions and performance of wireless sensor networks systems and platforms.

Unit I

Introduction to Wireless Sensor Networks: Course Information, Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors

Network Architecture: Traditional layered stack, Cross-layer designs, Sensor Network Architecture

Hardware Platforms: Motes, Hardware parameters

Unit II

Introduction to ns-3: Introduction to Network Simulator 3 (ns-3), Description of the ns-3 core module and simulation example.

Unit III

Medium Access Control Protocol design: Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled

Introduction to Markov Chain: Discrete time Markov Chain definition, properties, classification and analysis

MAC Protocol Analysis: Asynchronous duty-cycled. X-MAC Analysis (Markov Chain)

Unit IV

Security: Possible attacks, countermeasures, SPINS, Static and dynamic key distribution

Unit V

Routing protocols: Introduction, MANET protocols

Routing protocols for WSN: Resource-aware routing, Data-centric, Geographic Routing, Broadcast, Multicast

Opportunistic Routing Analysis: Analysis of opportunistic routing (Markov Chain) Advanced topics in wireless sensor networks.

Unit VI

ADVANCED TOPICS

Recent development in WSN standards, software applications.

References:

1. W. Dargie and C. Poellabauer, "Fundamentals of Wireless Sensor Networks –Theory and Practice", Wiley 2010
2. KazemSohraby, Daniel Minoli and TaiebZnati, "wireless sensor networks -Technology, Protocols, and Applications", Wiley Interscience 2007
3. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless Sensor Network Technologies for the Information Explosion Era", springer 2010

PO1	PO2	PO3	PO4	PO5	PO6
✓		✓	✓		

Syllabus for M. Tech I Year I semester
Computer Science Engineering
Data Mining
(PROGRAM ELECTIVE –I)

L	T	P	C
3	-	-	3

Code : 7P160

Course Objectives:

The main objective is to introduce the student to data warehouse architecture and data mining techniques. Upon completion of this course the student will get an idea on creating architecture and analyze data. Understand the DMQL. Be capable of applying his knowledge to analyze for effective decision making. Be able to explain the role of analyzing architectures.

Course Outcome: After completion of this course, student will be able to

1. Design a data mart or data warehouse for any organization and Develop skills to write queries using DMQL
2. Extract knowledge using data mining techniques
   Adapt to new data mining tools
3. Explore recent trends in data mining such as web mining, spatial-temporal mining
4. Differentiate Online Transaction Processing and Online Analytical processing
   Learn Multidimensional schemas suitable for data warehousing
5. Understand various data mining functionalities
6. Inculcate knowledge on data mining query languages
   Know in detail about data mining algorithms, Be able to adapt to new data mining tools and techniques.

UNIT-I

Data mining Overview and Advanced Pattern Mining

Data mining tasks – mining frequent patterns, associations and correlations, classification and regression For predictive analysis, cluster analysis , outlier analysis; advanced pattern mining in multilevel, multidimensional space – mining multilevel associations, mining multidimensional associations, mining quantitative association rules, mining rare patterns and negative patterns.

UNIT-II

Advance Classification

Classification by back propagation, support vector machines, classification using frequent patterns, other classification methods – genetic algorithms, roughest approach, fuzz>set approach;

UNIT-III

Advance Clustering

Density - based methods –DBSCAN, OPTICS, DENCLUE; Grid-Based methods – STING, CLIQUE; Exception – maximization algorithm; clustering High- Dimensional Data; Clustering Graph and Network
Data.

UNIT-IV

Web and Text Mining

Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining – unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

UNIT-V

Temporal Data Mining

Introduction; Temporal Data Mining – Temporal Association Rules, Sequence Mining, GSP algorithm, SPADE, SPIRIT Episode Discovery, Time Series Analysis.

UNIT-VI

Spatial Data Mining

Spatial Mining – Spatial Mining Tasks, Spatial Clustering,. Data Mining Applications.

TEXT BOOKS:

1. Data Mining Concepts and Techniques, Jiawei Hang Micheline Kamber, Jian pei, Morgan Kaufmannn.
2. Data Mining Techniques – Arun K pujari, Universities Press.

REFERENCE BOOKS:

1. Introduction to Data Mining – Pang-Ning Tan, Vipin kumar, Michael Steinbach, Pearson.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B.Esware Reddy, Jagadish S Kalimani, Elsevier.

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Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Data Science

L	T	P/D	C
3	-	-	3

Code: 7P156
Course Objectives:

- Provide you with the knowledge and expertise to become a proficient data scientist.
- Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
- Produce Python code to statistically analyze a dataset;
- Critically evaluate data visualizations based on their design and use for communicating stories from data;

COURSE OUTCOMES
On completion of the course the student should be able to

- Explain how data is collected, managed and stored for data science;
- Understand the key concepts in data science, including their real-world applications and the
- Toolkit used by data scientists.
- Implement data collection and management scripts using MongoDB

Unit I
Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.

Unit II
Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources

Unit III
Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

Unit IV
Data visualization: Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

Unit V
Applications of Data Science, Technologies for visualization, Bokeh (Python)

Unit VI

Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science.

References:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly.
2. Jure Leskovek, AnandRajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press.

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Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Computer Vision
(PROGRAM ELECTIVE – I)

L	T	P/D	C
3	-	-	3

Code: 7P157

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

Outcomes Upon Completion of the course, the students will be able to
1. To implement fundamental image processing techniques required for computer vision
2. To perform shape analysis
3. To implement boundary tracking techniques
4. To apply chain codes and other region descriptors
5. To apply Hough Transform for line, circle, and ellipse detections
6. To apply 3D vision techniques
7. To implement motion related techniques 8. To develop applications using computer vision techniques

UNIT - I
IMAGE PROCESSING FOUNDATIONS Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.

UNIT - II
SHAPES AND REGIONS Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion –boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

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

UNIT - IV

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

UNIT - V

APPLICATIONS Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis.

UNIT - VI

Recent Trends and Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

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

REFERENCES:

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

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech I Year I Semester

Computer Science Engineering

Research Methodology and IPR

L	T	P/D	C
2	-	-	2

Code: 7P150

Course Outcomes:

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

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- 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.
- Understand that IPR 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

1. Research Methodology: An Introduction

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 Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India,

UNIT-II

2. Research Problem and Research Design

What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration, Conclusion . Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Developing a Research Plan, Conclusion.

UNIT-III

Sampling Design and Methods of Data Collection

Implications, Steps in Sample Design, Criteria Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample, Random Sample from an Infinite Universe, Complex Random Sampling Designs, **Methods of Data Collection**

UNIT-IV

Concept of Hypothesis and Testing

What is a Hypothesis? Basic Concepts Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Tests of Hypotheses. Important Parametric Tests, Hypothesis Testing of Correlation Coefficients, Limitations of the Tests of Hypotheses, Chi-square as a Test for Comparing Variance, Chi-square as a Non-parametric Test, Conditions for the Application of $\chi 2$ Test, Steps Involved in Applying Chi-square Test.

UNIT-V

Introduction: Discovery, Creativity, Innovation, Invention, Need for IPR, Types of IPR, Genesis & development of IPR in India, **Patents**: Definition, Scope, Protection, Patentability Criteria, Types of Patents (Process, Product & Utility Models), Case studies on Patents (Basmati Rice, Turmeric, Neem), Software Patenting.

UNIT-VI

Types of IPR-I: Copyrights – Definition, granting, infringement, searching & filing, distinction between copy rights and related rights;

Types of IPR-II: Trade Secrets, Unfair competition; Industrial Designs – Scope, protection, filing, infringement; Semiconductors, Integrated Circuits & Layout design; Geographical Indications & Appellations of Origin; Case Studies. **International and National Conventions & Treaties:** Overview.

Text Book:

1. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006
2. Donald H.McBurney, Research Methods, 6th Edition, Thomson Learning, ISBN:81- 16-0047-0,2006
3. Deborah E. Bouchoux, Intellectual Property for Paralegals – The law of Trademarks, Copyrights, Patents & Trade secrets, 3rd Edition, Cengage learning, 2012
4.N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property, Eastern Book Company, Lucknow, 2009.

References:

1. M. M. S. Karki , Intellectual Property Rights: Basic Concepts, Atlantic Publishers, 2009
2. Neeraj Pandey & Khushdeep Dharni, Intellectual Property Rights, Phi Learning Pvt. Ltd
3. Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd, 2006.
4. B. L. Wadehra. Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000.
5. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Audit Course-1 (English for Research Paper Writing) *(Grade Evaluation)

L	T	P/D	C
2	-	-	0

Code: 7HC18

Course objectives: Students will be able to:
1. Understand how to improve writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission Syllabus

CONTENTS
Unit I Planning and Preparation
a. Word Order and Breaking up long sentences
b. Structuring Paragraphs and Sentences
c. Being Concise and Removing Redundancy
d. Avoiding Ambiguity and Vaguencess

Unit II Clarifying Who did What
a. Highlighting your Findings
b. Hedging and Criticizing
c. Paraphrasing and Plagiarism
d. Sections of a Paper
e. Abstracts Introduction

Unit III Review of Literature
a. Methods
b. Results
c. Discussion
d. Conclusions
e. The Final Check

Unit IV Key skills needed when writing a Title
a. Key skills needed when writing an Abstract
b. Key skills needed when writing an Introduction
c. Skills needed when writing a Review of Literature

Unit V Skills needed when writing the Methods
a. Skills needed when writing the Results
b. Skills needed when writing the Discussion
c. Skills needed when writing the Conclusion

Unit VI Useful phrases

a. How to ensure paper as good as it could possibly be for the first – time submission

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Writeand Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Advanced Data Structures Lab

Code: 7P151

L	T	P	C
-	-	4	2

Prerequisites
1. A course on Java Programing.

Objectives
1. Introduces the basic concepts of Abstract Data Types.
2. Reviews the data structures such as heaps and hash tables.
3. Introduces a variety of data structures such as search trees, tries.
4. Introduces different pattern mat
ching algorithms

Outcomes
1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for pattern matching.
4. Design programs using a variety of data structures for heaps, hash tables, search trees, tries.

List of Programs

1. Write a JAVA program to perform the following operations:
   a) Insert an element into a Min-Max heap
   b) Delete an element from a Min-Max heap
   c) Search for a key element in a Min-Max heap

2. Write a JAVA program to perform the following operations:
   a) Insert an element into a Leftist tree
   b) Delete an element from a Leftist tree
   c) Search for a key element in a Leftist tree

3. Write a JAVA program to perform the following operations:
   a) Insert an element into a binomial heap
   b) Delete an element from a binomial heap.
   c) Search for a key element in a binomial heap

4. Write a JAVA program for implementing the following collision resolution techniques:
    a) Separate Chaining b) Linear probing c) Double hashing

5. Write a JAVA program to perform the following operations:
    a) Insert an element into a binary search tree.
    b) Delete an element from a binary search tree.
    c) Search for a key element in a binary search tree.

6. Write a JAVA program to perform the following operations:
    a) Insert an element into an AVL tree.
    b) Delete an element from an AVL search tree.
    c) Search for a key element in an AVL search tree.

7. Write a JAVA program to perform the following operations:
    a) Insert an element into a Red-Black tree.
    b) Delete an element from a Red-Black tree.
    c) Search for a key element in a Red-Black tree.

8. Write a JAVA program to perform the following operations:
    a) Insert an element into a B- tree.
    b) Delete an element from a B- tree.
    c) Search for a key element in a B- tree.

9. Write a JAVA program to implement all the functions of a dictionary using hashing.
10. Write a JAVA program for implementing Knuth-Morris-Pratt pattern matching algorithm.
11. Write a JAVA program for implementing Brute Force pattern matching algorithm.
12. Write a JAVA program for implementing Boyer pattern matching algorithm.

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Syllabus for M. Tech I Year I Semester
Computer Science Engineering
Technical Seminar - I

Code: 7P152

L	T	P	C
-	-	2	1

Max. Marks: 100

Course Outcomes:

After studying this course, the students will be able to

1. Identify a research topic
2. Collect literature
3. Present seminar
4. Discuss the queries

There shall be three seminar presentations during I year I semester and I year II Semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee, which shall consist of the Head of the Department, a senior Faculty Member and the Supervisor and will jointly evaluate the report and presentation. For each Seminar there will be only internal evaluation of 25 marks. A candidate has to secure a minimum of 50% to be declared successful.

In the First semester the report must be in the form of the review paper with a format used by IEEE / ASME etc. In the Second semester Technical Seminar in the form of Independent Review Paper must be of high quality fit for publication in a reputed conference / journal.

The evaluation format for seminar is as follows:

- Day to day evaluation by the Supervisor : 20 marks
- Final Report : 20 marks
- Presentation : 60 marks (20 Abstract seminar +40 Final Presentation)

The presentation includes content (5) + Participation (5) + Presentation (10) for a total of 20 marks and double for 40 marks for final presentation.

A Student has to concentrate on the following sections while writing technical paper or presenting seminar.

Contents

- Identification of specific topic
- Analysis
- Organization of modules
- Naming Conventions
- Writing style
- Figures
- Feedback
- Miscellaneous

REFERENCES:

Teach Technical Writing in Two Hours per Week by Norman Ramsey

For Technical Seminar the student must learn few tips from sample seminars and correcting himself, which is continues learning process

REFERENCE LINKS:

I. http://www.cs.dartmouth.edu/~scot/givingTalks/sld001.htm
II. http://www.cse.psu.edu/~yuanxie/advice.htm
III. http://www.eng.unt.edu/ian/guides/postscript/speaker.pdf

NOTE: A student can use any references for this process, but must be shared in classroom.

PO1	PO2	PO3	PO4	PO5	PO6
✓		✓	✓		

Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Advanced Algorithms

L	T	P/D	C
2	1	**-**	**3**

Code: 7P201

Prerequisites:
1. A course on "Algorithm Design and analysis"
2. A course on "Advanced Data Structures & Algorithms"

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

COURSE OUTCOMES
After completion of course, students would be able to:

1. Ability to analyze the performance of algorithms.
2. Ability to choose appropriate data structures and algorithm design methods for a specified application.
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs..

UNIT - I
Classification of algorithms, Algorithm Specifications, Mathematical analysis of Recursive Algorithms: – Introduction to recurrence equations, formulation of recurrence equations, Techniques for solving recurrence equations, Solving recurrence equations, Solving Recurrence Equations using polynomial reduction, Divide and conquer recurrences.

UNIT - II
Graphs:– Graph representations, Graph traversals Brute Force Approaches:- Computational Geometry Problems-Closest pair problem, Convex Hull Problem, Exhaustive Searching-Magic Squares problem, Container Loading problem, Knapsack Problem, Assignment Problem.

UNIT – III

Divide and Conquer approach Multiplication of long integers, Strassen's matrix multiplication, Fourier Transform Greedy algorithms:- Coin change problem, Scheduling problems, knapsack problem, optimal storage on tapes, optimal tree problems, optimal graph problems.

UNIT - IV

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

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

UNIT – V

String algorithms Basic string algorithms, Longest Common Subsequences. Linear programming, Graphical method for solving LPP, Simplex method, Minimization problems, Principle of Duality, Max Flow problem.

UNIT-VI

NP-HARD and NP-completeness cooks theorem, Examples, proof of NP-hardness and NP-completeness. One or more of the following topics based on time and interest Approximation algorithms.

Text Books

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

References

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

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Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Network Security and Cryptography

L	T	P/D	C
3	1	**-**	**4**

Code: 7P202

Prerequisites

1. A Course on "Computer Networks

Course Objectives:

Understand various cryptographic. Algorithms, Authentication techniques, Email security Network layer security issues, SET, Firewalls, intruder detection, virus related threats

Course Outcome: After completion of this course, student will be able to

1 .List the basic categories of security attacks, services, understand the model of network security, different techniques and operations involved in encryption and decryption
2 Implement different symmetric and asymmetric encryption algorithm, key distribution and cryptanalysis
3 Understand the requirements of authentication and implement different authentication technique and its applications
4 Understand the Email security, IP security and its associated protocols and headers
5 Describe the Secure Socket Layer, distinguish between SSL and TLS, Firewall design principles
6 Understand SET, intrusion techniques and virus related threats

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

UNIT II
Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES,Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution
Asymmetric key Ciphers: Principles of public key cryptosystems, Algorithms(RSA, Diffie-Hellman,ECC), Key Distribution.

UNIT III

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication

UNIT IV

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, key management

UNIT V

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Firewalls:, Countermeasures, Firewall design principles, Types of firewalls

UNIT VI

Secure Electronic transaction, Intruders, Intrusion detection, password Management, Virus and related threats

TEXT BOOKS:

1. Cryptography and Network Security : William Stallings, Pearson Education,5th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 2nd Edition.
3. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

REFERENCES BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2nd Edition
3. Information Security, Principles and Practice : Mark Stamp, Wiley India.
4. Principles of Computer Sceurity: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Principles of Information security by Michael E Whitman and Herbert J.Mattord.

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Syllabus for M. Tech I Year II Semester
Computer Science Engineering

Audit Course 2 (Ethics, Moral, Gender sensitization and Yoga)

L	T	P/D	C
2	-	-	0

Code: 7HC19

COURSE OBJECTIVES

Students will be able to

- develop students' sensibility with regards to issues of gender in contemporary India and to help the students appreciate between 'values and 'skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- provide a critical perspective on the socialization of men, women and transgender and to have a wider understanding of Ethics.
- acknowledge women's role at home and at work.

Course outcome

- help students reflect critically on gender violence, understand engineering ethics and an engineer's responsibility for safety.
- perceive gender literacy and understand the importance of gender perspective.
- understand rules and principles set by the society in a customary way.
- understand and appreciate the importance of personality development through yoga for a holistic life.

UNIT I: UNDERSTANDING GENDER AND VALUES

Importance of gender sensitization
Socialization: Being modern in thought, yet rooted in one's culture
Just Relationships: Healthy relationship between men and women
Importance of Value Education, Understanding Social Factors, Morals, Values ,Family Values-Harmony, Respect, Caring; Sharing; Integrity; Honesty; Courage; Cooperation; Commitment; Empathy; Self Confidence; Character; Accountability; Loyalty; Confidentiality; and Attitude

UNIT II: GENDER SPECTRUM, LABOUR AND ETHICS

Beyond the Binary, Gender Imbalance and its Consequences
Decline in Women population (Medico-legal concerns- PC and PNDT Act 1994)
Social consequences of skewed gender ratio, Demographic Consequences
Housework: the invisible Labour
Women's Work: Its Politics and Economic
Unrecognized and Unaccounted Work. Wages and Conditions of Work

Ethics and Ethical Principles, Ethical Theories, and their uses

UNIT III: ISSUES OF VIOLENCE AND ENGINEERING ETHICS

Domestic Violence: Physical abuse, Mental abuse and Emotional disturbance
Consequences of domestic violence and legal Implications (Domestic Violence Act 2005- 498A)
Professional Ethics, Engineering Ethics, Code of Ethics, Moral Autonomy of Engineers, Engineer's Responsibility for safety and Risk

UNIT IV: GENDER STUDIES

Knowledge: Through the Lens of Gender
Unacknowledged Women and Men in Indian History- Women Scientist (Rupabai Furdoonji), Early Aviators (Babur Mirza and Pingle Madhusudhan Reddy), and Women Leader (T N Sadalakshmi)

Life Sketches: Mary Kom, Chanda Kochar, Mother Tesera, and Durga Bai Deshmukh

UNIT V: GLOBAL PERSPECTIVE

Distinguish between Bribes and Gifts; Occupational Crimes; Globalization- Cross-Cultural Issues; Environmental Ethics; Internet and Computer Codes of Ethics
Case Study:
Ethics in Military and Weapons Development-Ethics in Research work

UNIT VI: PERSONALITY DEVELOPMENT

Spirituality, Personality and Our Identity, Understanding Self, Happiness, Positive Thinking, Understanding responsibility towards Society.

Introduction to Yoga in India; Origin and Development; Theoretical understanding of yoga; Stress Management : Modern and Yogic perspectives; Tackling ill-effects of Frustration, Anxiety and Conflict through modern and Yogic methods; Meditation Techniques; Suryanamaskar; Pranayama.

TEXT BOOKS:

1. Indian Culture Values And Professional Ethics(For Professional Students) by Prof.P.S.R.Murthy ; B.S.Publications.
2. Professional Ethics and Human Values by M. Jayakumar, Published by University Science Press,
3. Telugu Academy, Hyderabad, 2015, Towards A World of Equals, A Bilingual Text Book on Gender.

REFERENCE BOOKS:

1. **The Yoga Sutras of Patanjali** by Swami Satchitananda
2. **The Secret Power of Yoga** by Nischala Joy Devi
3. **Light on Pranayama** by B.K.S. Iyengar
4. **Books on the Art of Living** by Poojya Sri Sri Ravi Shanker
5. **Making It Relevant: Mapping the meaning of women's studies in Tamilnadu** by Anandi S and Swamynathan P
6. **Feminism is for Everybody; Passionate Politics** by Bell Hooks
7. **Gender** by Geetha V
8. **"Growing up Male" in what is worth teaching** by K Kumar
9. **The Lenses of Gender: Transforming the Debate on Sexual Inequality** - Sandra Lipsitz Bem
10. **The Lenses Of Gender** - by ANNE MURPHY

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Cloud Computing
(PROGRAM ELECTIVE – II)

Code:7P203

L	T	P	C
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Course Objectives :

Understand various distributed computing architectures. Comprehend Cloud computing features, services and security challenges along with the standards useful for the development of cloud based applications.

Course Outcomes: After undergoing the course, Students should be able to understand

1 Explain Distributed, Parallel , Vector, multi processing and grid Computing Architectures. Describe Virtualization and usage of Virtual machine.
2 Define basic terms of Cloud and cloud computing along with benefits/ challenges and explain differences between Grid Computing and Cloud Computing.
3 Describe and use concepts of IaaS, PaaS and SaaS. Explain cloud development process and role of cloud data center using SOA.
4 Apply and explain Privacy in the Cloud along with the cloud security challenges.
5 Explain Common Standards and role of open cloud consortium for application developers and apply standards for messaging.
6 Explain Mobile internet devices along with virtualization , Map Reduce and HDFS.

UNIT - I
Introductory Concepts & overview: Distributed Systems - Parallel Computing Architectures: Vector Processing, Symmetric Multi Processing and Massively parallel processing systems - Grid Computing - Service Oriented Architecture Overview - Virtualization.

UNIT - II
Overview of Cloud Computing : Meaning of the terms Cloud and cloud computing - cloud based service offerings - Grid Computing Vs Cloud Computing - Benefits of Cloud Model - limitations - legal issues - key characteristics of cloud computing - challenges for the cloud - the evolution of cloud computing.

UNIT - III
Web services delivered from the cloud: Infrastructure as a service - platform as a service - software as a service. Building Cloud networks: Evolution from the MSP model to cloud computing and software as a service - the cloud data center - SOA as step toward cloud computing - basic approach to a data center based SOA.

UNIT - IV

Federation Presence, Identity & Privacy in the Cloud: Federation in the cloud - presence in the cloud - privacy in the cloud - Privacy and its relation to cloud based information system. security in the cloud: cloud security challenges - software as a service security.

UNIT - V

Common Standards in cloud computing: the open cloud consortium - the distributed management task force - standards for application developers -standards for messaging - standards for security.

UNIT - VI

Mobile internet devices and the cloud: smartphone - mobile operating systems for smartphones - mobile platform virtualization - Collaboration Applications for mobile platforms - future trends.
Casestudies:MapReduce,HDFS.

TEXT BOOKS:

1. Cloud Computing Implementation, Management and Security by John W. Rittinghouse, James F. Ransome, CRC Press, Taylor & Francis group, 2010.
2. Cloud Computing a practical approach by Anthony T. Velte, Toby J. velte Robert Elsenpeter, Tata McGrawHill edition, 2010.

REFERENCES:

1. Cloud Application Architectures by George Reese, Oreilly publishers.
2. Cloud Computing and SOA convergence in your enterprise, David S. Linthicum, Addison- Wesley.
3. George Coulouris, JeanDollimore and Tim Kindberg. Distributed Systems:Concepts and Design (Edition 3).Addison-Wesley2001

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Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Soft Computing
(PROGRAM ELECTIVE – II)

L	T	P/D	C
3	-	-	3

Code: 7P254

COURSE OBJECTIVES

1. To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
2. To provide the students with the knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.
3. To apply soft-computing techniques and find solutions to real-world problems
4. To provide the students with the knowledge of the recent advances in soft-computing

COURSE OUTCOMES

After completion of course, students would be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines
2. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems
3. Apply genetic algorithms to combinatorial optimization problems
4. Evaluate and compare solutions by various soft computing approaches for a given problem.

LECTURE WITH BREAKUP NO. OF LECTURES

Unit I

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS: Evolution of Computing, "Soft" computing versus "Hard" computing, Characteristics of Soft computing, Soft Computing Constituents, From Conventional AI to Computational Intelligence, Basics of Machine Learning.

Unit II

FUZZY LOGIC: Introduction to Fuzzy logic, Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making, Defuzzification techniques, Some applications of Fuzzy logic.

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Unit III

NEURAL NETWORKS-1: Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Machine Learning Using Artificial Neural Network (ANN), Activation Functions, Artificial Neural Network Architectures: Single Layer and Multilayer Feed Forward

Networks, Recurrent Networks, Training Techniques for ANNs, Perception and Convergence Rule, Auto-Associative and Hetro-Associative Memory.

Unit IV

NEURAL NETWORKS-2: Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks: Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks, Applications of ANNs in solving real life problems

Unit V

GENETIC ALGORITHMS: Introduction to Genetic Algorithms (GA), Concepts of "Genetics" and "Evolution", Basic GA framework, Different GA Architectures, GA operators, Applications of GA in Machine Learning, Solving single-objective optimization problems using GAs.

Unit VI

RECENT TRENDS: Recent Trends in: Deep learning, Classifiers, Neural Networks, Genetic Algorithms, Implementation of recently proposed soft computing techniques.

Text/Reference Books:

1. Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, *Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani,* Pearson Education, 2015
2. Fuzzy Logic: A Practical Approach, F. Martin McNeill, and Ellen Thro, AP Professional, 2000.
3. Fuzzy Sets and Fuzzy Logic: Theory and Applications, *George J. Klir and Bo Yuan*, Pearson, 2015
4. Neural Networks and Learning Machines, 3rd Edition, *Simon Haykin*, PHI Learning, 2011.
5. An Introduction to Genetic Algorithms, *Melanie Mitchell*, MIT Press, 2000.
6. Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, *S. Rajasekaran and G.A. Vijayalakshmi Pai*, Prentice Hall of India, 2007

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Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Advanced Wireless and Mobile Networks
(PROGRAM ELECTIVE – II)

L	T	P/D	C
3	-	-	3

Code:7P255

Course Objectives:

- The students should get familiar with the wireless/mobile market and the future needs and challenges.
- To get familiar with key concepts of wireless networks, standards, technologies and their basic operations
- To learn how to design and analyse various medium access
- To learn how to evaluate MAC and network protocols using network simulation software tools.
- The students should get familiar with the wireless/mobile market and the future needs and challenges.

COURSE OUTCOMES

After completion of course, students would be able to:

- Demonstrate advanced knowledge of networking and wireless networking and understand various types of wireless networks, standards, operations and use cases.
- Be able to design WLAN, WPAN, WWAN, Cellular based upon underlying propagation and performance analysis.
- Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks.
- Design wireless networks exploring trade-offs between wire line and wireless links.
- Develop mobile applications to solve some of the real world problems.

Unit I

INTRODUCTION:

Wireless Networking Trends, Key Wireless Physical Layer Concepts, Multiple Access Technologies -CDMA, FDMA, TDMA, Spread Spectrum technologies, Frequency reuse, Radio Propagation and Modelling, Challenges in Mobile Computing: Resource poorness, Bandwidth, energy etc.

WIRELESS LOCAL AREA NETWORKS:

IEEE 802.11 Wireless LANs Physical & MAC layer, 802.11 MAC Modes (DCF & PCF) IEEE 802.11 standards, Architecture & protocols, Infrastructure vs. Adhoc Modes, Hidden Node & Exposed Terminal Problem, Problems, Fading Effects in Indoor and outdoor WLANs, WLAN Deployment issues

Unit II

WIRELESS CELLULAR NETWORKS:

1G and 2G, 2.5G, 3G, and 4G, Mobile IPv4, Mobile IPv6, TCP over Wireless Networks, Cellular architecture, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Improving coverage and capacity in cellular systems, Spread spectrum Technologies.

Unit III

WiMAX (Physical layer, Media access control, Mobility and Networking), IEEE 802.22 Wireless Regional Area Networks, IEEE 802.21 Media Independent Handover Overview

WIRELESS SENSOR NETWORKS

Introduction, Application, Physical, MAC layer and Network Layer, Power Management, Tiny OS Overview.

Unit IV

WIRELESS PANs

Bluetooth AND Zigbee, Introduction to Wireless Sensors.

Unit V

SECURITY

Security in wireless Networks Vulnerabilities, Security techniques, Wi-Fi Security, DoS in wireless communication.

Unit VI

ADVANCED TOPICS

IEEE 802.11x and IEEE 802.11i standards, Introduction to Vehicular Adhoc Networks

References:

1. Schiller J., Mobile Communications, Addison Wesley 2000
2. Stallings W., Wireless Communications and Networks, Pearson Education 2005
3. Stojmenic Ivan, Handbook of Wireless Networks and Mobile Computing, John Wiley and Sons Inc 2002
4. Yi Bing Lin and Imrich Chlamtac, Wireless and Mobile Network Architectures, John Wiley and Sons Inc 2000
5. Pandya Raj, Mobile and Personal Communications Systems and Services, PHI

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Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Machine learning

L	T	P/D	C
3	-	-	3

Code: 7P256
COURSE OBJECTIVES

- To identify the most appropriate machine learning algorithm to be chosen for a given task
- To be able to solve problems involving classification and regression
- To design and analyse various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
- Explore supervised and unsupervised learning paradigms of machine learning

COURSE OUTCOMES

After completion of course, students would be able to:

- Extract features that can be used for a particular machine learning approach in various IOT applications.
- To compare and contrast pros and cons of various machine learning techniques and to get
  an insight of when to apply a particular machine learning approach.
- To mathematically analyze various machine learning approaches and paradigms.

Unit – I
Introduction : Designing a Learning system – Perspectives and Issues in Machine Learning **Concept Learning:** Version spaces - Inductive Bias - Active queries - Mistake bound/ PAC model.

Unit – II

Supervised Learning, Decision Tree Learning – Representation – Hypothesis Space Search in Decision Trees – Issues in Decision tree learning, Linear Models for Regression – Linear Basis Function Models – The Bias – Variance Decomposition – Bayesian, Linear Regression – Bayesian Model Comparison - Linear Models for Classification

Unit – III
Unsupervised Learning
PCA – VC Dimension - K-means – Mixtures of Gaussians –EM Algorithm – Mixtures of Latent Variable Models – Supervised Learning after clustering – Spectral – Hierarchical clustering –
Non parametric methods – Density estimation – kernel estimator – k-nearest neighbor estimator – Condensed Nearest neighbor – Smoothing models

Unit – IV
Evaluation
Evaluating Machine Learning algorithms and Model Selection - Introduction to Statistical Learning Theory, Ensemble Methods - Boosting – Ada Boost - Bagging - Random Forests

Unit – V
Genetic Algorithms
Motivation – Operators – Illustrative examples – Genetic Programming – Lamarckian and Baldwinian models of Evolution – Parallelising Genetic Algorithms – Hidden Markov Models

Unit – VI
Analytical Learning
Analysis with Perfect Domain Theories – Inductive Analytical approaches to learning – KBANN algorithm – TangentProp Algorithm – FOCL algorithm, Application of machine Learning techniques for IoT applications.

Text Books:

1. Machine Learning, Tom M. Mitchell, McGraw Hill, first edition, 1997.
2. Information Theory, Inference, and Learning Algorithms, David J.C. MacKay, first edition, 2005

References:

1. Tom Michel, Machine Learning. Mc Graw Hill. 1997
2. Chris Bishop, Neural Network for, Pattern Recognition, Oxford University Press. 1995
3. Ethem Alpaydin, Introduction to Machine Learning", MIT Press, Prentice Hall of India, 2005.
4. Trevor Hustie, Robert Tibshirani & Jerome Friedman, The Elements of Statically Learning, Springer Verilag 2009

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Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Cyber Security And Cyber Laws
(Professional Elective – II)

Code: 7P257

L	T	P/D	C
3	-	-	3

Course Objectives:

- To learn fundamentals of cryptography and its application to network security, network security threats, security services, and countermeasures.
- To learn computer security, Internet, E-commerce and E-governance with reference to Free Market Economy
- To learn International Efforts relating to Cyberspace laws and Cyber crimes
- To learn Law relating to electronic records and intellectual property rights in India
- To understand ethical laws of computer for different countries, Penalties, Compensation and Offences under the Cyberspace and Internet in India
- To learn Miscellaneous provisions of IT Act and Conclusions

Course Outcomes: After completing this course, student shall be able to

- Students should realize the importance of cyber security and various forms of cyber attacks and countermeasures.
- Students must be familiar to E-Commerce frame work and the various model of E-Commerce, security threats to cyberspace and E-Commerce and the basic laws associated with it.
- To understand the role of electronic signatures in E-Commerce and the role of certifying authority in regulating license with the various laws relating to it.
- To enable the students to understand the various laws related to trades and WTO, council of Europe related to cyber crimes and have awareness with the various penalty and compensation in failure to protect data.
- To be familiar with obscenity and pornography in cyber space and understand the violation of Right of privacy on Internet.
- To understand the various chapters of the IT Act 2008, power of Central and State Government to make rules under IT Act 2008.

UNIT-I

Introduction to cyber Security, cryptography, Types of Attacks, Secrete Key Cryptography

Introduction: Cyber attacks, Defense Strategies and Techniques Mathematical background for Cryptography: Modulo arithmetic, The greatest common divisor, Useful Algebraic Structures, Chinese Remainder Theorem Basics of Cryptography: Secret versus Public key Cryptography, Types of attacks, Elementary substitution Ciphers, Elementary Transposition Ciphers, Other Cipher Properties Secrete Key Cryptography: Product Ciphers, DES Construction, Modes of Operation, MAC and other Applications, Attacks, Linear Crypt analysis.

UNIT-II

Introduction to Computer Security, Internet, E-commerce and E-governance with reference to Free Market Economy

Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity, Conceptual Framework of E-commerce: governance, the role of Electronic Signatures in E-commerce with Reference to Free Market Economy in India.

UNIT-III

Law relating to electronic records and intellectual property rights in India

Legal aspects of Electronic records / Digital signatures, Cyber laws, The roles and regulations of Certifying Authorities in India, Protection of Intellectual Property Rights in Cyberspace in India.

UNIT-IV

International Efforts relating to Cyberspace laws and Cyber crimes

International efforts related to Cyber laws, Council of Europe (COE) convention on Cyber Crimes.

UNIT-V

Penalties, Compensation

Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000 and judicial review.

UNIT-VI

Offences under the Cyberspace, Internet in India and Miscellaneous provisions of IT Act and Conclusions

Some important offences under the Cyberspace law and the Internet in India, Other offences under the Information Technology Act in India, The role of Electronic Evidence and miscellaneous provisions of the IT Act.

TEXT BOOK:

1. Network security and Cryptography by Bernard Menezes CENGAGE Learning Publications, 2010.
2. Cyber Laws and IT Protection, Harish Chander, PHI, 2012

REFERENCE BOOKS:

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2ndEdition, O' Reilly Media, 2006.
2. Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, New Delhi, 2006.
3. Cyberspace and Cybersecurity, George Kostopoulos, Auerbach Publications, 2012.
4. Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, Second Edition, Albert Marcella, Jr., Doug Menendez, Auerbach Publications, 2007

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Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Scripting Languages
(PROGRAM ELECTIVE –II)

L	T	P/D	C
3	-	-	3

Code: 7P258

Course Objective:

The primary goal of SCRIPTING LANGUAGES(PHP) is to give students

a) Develops skills to create server-side scripts using PHP
b) a basic introduction to Object Oriented programming,using PHP.
c) Introduces server-side programming concepts and terminology. Explores a variety of server-side techniques and MySQL database manipulation.
d) a basic introduction of JQuery and AJAX

Course Outcomes:

1. Explore PHP basics, variables and Control structures.
2. Explore functions, arrays and File handling.
3. Create the applications using advanced OO-PHP. Exception handling.
4. Use Connect to databases to fetch, store, and update persistent information. Avoid SQL injection attacks using parameter binding and input sanitization.
5. Understanding POST and GET in form submission and session tracking.
6. Explore JQuery and AJAX basics.

UNIT I

Introduction to PHP: History of PHP, General Language Features, Installation and configuring Apache and PHP. PHP Basics: Styles of PHP Tags, Comments, Output functions , Datatypes, Identifiers. Variables: Declarations, Scope, Superglobal Variables, Variable Variables, Constants, Expressions, Operators, String Interpolation, Control Structures.

UNIT II

Functions: Invoking and Creating Functions, Passing Arguments by Value and Reference, Default Argument Values, Recursive Functions, Function Libraries.
Arrays: What is an Array? , How to create an Array, Types of Arrays and Array Functions.
File handling: Opening, Reading, Writing and Closing a file. File related functions.

UNIT III

Introduction to OOPS: Introduction, Objects, Declaring a class, new keyword and constructor, Destructor, Access method and properties using $this variable, Public ,private, protected properties and methods, Static properties and method, Class constant, Inheritance & code reusability, Polymorphism, Parent:: & self:: keyword, Instanceof operator, Abstract method and class, Interface, Final.
Exception Handling: Understanding Exception and error Try, catch, throw

UNIT IV

PHP and Web Forms: Working with HTML Forms, Pass data from a form to a PHP Script, Validate form data. Work with multivalued form components.

Database Connectivity with MySql: Introduction to Mysql, Connection with MySql Database, Performing basic database operation (DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query. SQL Injection, PHP Authentication.

UNIT V

Multiple Database Handling**,** upload and retrieve images to database, Registration and Login forms with validations, Sending an email, Multipart Message, Session Tracking using PHP

UNIT VI

JQuery: Introduction to JQuery, Validation using JQuery, JQuery Forms, JQuery Examples. AJAX Introduction to AJAX, PHP with AJAX, Working with database

TEXT BOOK

1. Beginning PHP and MySQL From Novice to Professional Fourth Edition by W. Jason Gilmore, Apress.

REFERENCES

1. PHP: The Complete Reference by Steven Holzner, Mc Graw Hill.

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Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Secure Software Design and Enterprise Computing
(PROGRAM ELECTIVE – III)

L	T	P/D	C
3	-	-	3

Code: 7P259

Course Objectives:

- To fix software flaws and bugs in various software.
- To make students aware of various issues like weak random number generation, information leakage, poor usability, and weak or no encryption on data traffic
- Techniques for successfully implementing and supporting network services on an enterprise scale and heterogeneous systems environment.
- Methodologies and tools to design and develop secure software containing minimum vulnerabilities and flaws.

COURSE OUTCOMES

After completion of course, students would be able to:

- Differentiate between various software vulnerabilities.
- Software process vulnerabilities for an organization.
- Monitor resources consumption in a software.
- Interrelate security and software development process.

Unit I

Secure Software Design

Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts, Perform security testing and quality assurance.

Unit II

Enterprise Application Development

Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an enterprise system, Design and develop a multi-tier solution to a problem using technologies used in enterprise system, Present software solution.

Unit III

Enterprise Systems Administration

Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, Monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email).

Unit IV

Obtain the ability to manage and troubleshoot a network running multiple services, Understand the requirements of an enterprise network and how to go about managing them.

Unit V

Handle insecure exceptions and command/SQL injection, Defend web and mobile applications against attackers, software containing minimum vulnerabilities and flaws.

Unit VI

Case study of DNS server, DHCP configuration and SQL injection attack.

References:

1. Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett
2. Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, Enterprise Software Security,Addison Wesley.

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Semantic Web And Social Networking
(PROGRAM ELECTIVE – III)

L	T	P/D	C
3	-	-	3

Code: 7P260

Course objectives:

Understand the newer technologies used in the World Wide Web and their significance over the conventional technologies. Appriase the usage of RDF, OWL and UML/ XML Schema in the semantic web development. Learn and understand the ontology concepts and tools used to develop them in web applications.

Course Outcome: After completion of this course, student will be able to

1. Describe role of Web, its need and Intelligence.
2. Explain Machine Intelligence Ontology, Inference engines, Software Agents, Berners-Lee www and Semantic Road Map.
3. Describe Knowledge Representation for the Semantic Web with Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML and XML Schema.
4. Apply Ontology Engineering using Ontology Development Tools/ Methods, Ontology Libraries, Ontology Mapping, Logic and Inference Engines.
5. Explain Semantic Web Applications, Services and Technology.
6. Apply Social Network Analysis, Semantic web networks analysis and describe Building of Semantic Web Applications with social network features.

Unit I

Web Intelligence: Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web

Unit II

Machine Intelligence: Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

Unit III

Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML, XML/XML Schema.

Unit IV

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

Unit V

Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

Unit VI

Social Network Analysis and Semantic web: What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

REFERENCE BOOKS:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies,Rudi Studer,Paul Warren,JohnWiley&Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers (Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD A Semantic Web Primer, G. Antoniou and V. Harmelen, PHI.

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Artificial Intelligence and Deep Learning
(PROGRAM ELECTIVE –III)

Code: 7P261	**L**	**T**	**P**	**C**
	3	**-**	**-**	**3**

COURSE OBJECTIVES

- To understand the different types of AI agents
- Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)
- To understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving
- Know how to build simple knowledge-based systems
- Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information
- Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems
- Ability to carry out independent (or in a small group) research and communicate it effectively in a seminar setting.
- Ability to apply concepts of convolutional networks in day to day applications.

Course Outcome: After completion of this course, student will be able to

1. Identify different types of agents and their relationships with the environment.
2. Demonstrate the application of agents handling applications dealing with conflict resolution
3. Represent knowledge in logical level and also be able to convert it to a form suitable for implementation.
4. Derive inferences applying rules of First Order Logic
5. Formulate an approach for applications involving complete and incomplete Planning
6. Choose the appropriate learning strategy needed for solving a given problem.

UNIT I

Introduction: AI problems, Intelligent agents: Agents and Environments, Rationality, Nature of environments, Structure of agents, Problem solving agents, Problem formulation – Planning Application – Classical Planning problem

UNIT II

Searching and Game Theory: Searching for solutions, Searching with partial information (Heuristic search), Greedy best first search, A* search Constraint Satisfaction problem - Game Playing: Adversarial search : Games, Minimax algorithm, Optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions. **Case studies:** Tic-tac-toe game

UNIT III

Knowledge Representation and Reasoning : Logical Agents, Knowledge Based Agents, Wumpus world, Propositional logic, Resolution patterns in propositional Logic, First order logic, Inference in first order logic, propositional vs. First order inference, Unification and Lifting, Forward chaining, Backward chaining, Resolution

UNIT IV

Uncertain Knowledge and Reasoning : Bayes Rule, Concepts of Time and Uncertainty, Utility Functions, Value of Information, Value iteration, Policy iteration, Partially Observable MDP

UNIT – V

BASICS OF DEEP LEARNING

Deep learning architectures: Convolutional Neural Networks : Neurons in Human Vision-The Shortcomings of Feature Selection - Full Description of the Convolutional Layer - Max Pooling-Full Architectural Description of Convolution Networks - Closing the Loop on MNIST with Convolutional Networks- -Building a Convolutional Network for CIFAR-10 - Visualizing Learning in Convolutional Networks- Leveraging Convolutional Filters to Replicate Artistic Styles-Learning Convolutional Filters for Other Problem Domains-Training algorithms.

UNIT VI

DEEP REINFORCEMENT LEARNING:

Deep Reinforcement Learning Masters Atari Games - Reinforcement Learning-Markov Decision Processes (MDP)-Explore Versus Exploit - Pole-Cart with Policy Gradients-Q-Learning and Deep Q-Networks-Improving and Moving Beyond DQN.

TEXT BOOKS

1 S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, Third Edition, 2009.
2. Artificial Intelligence, 3rd Edition, Patrick Henry Winston, Pearson Education, 1992.
3. Nikhil Buduma, Nicholas Locascio, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", O'Reilly Media, 2017.
4. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning (Adaptive Computation and Machine Learning series", MIT Press, 2017.

REFERENCE BOOKS

1. M. Tim Jones, ―Artificial Intelligence: A Systems Approach(Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, ―The Quest for Artificial Intelligence, Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.
4. Gerhard Weiss, ―Multi Agent Systems, Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
6. I. Bratko, ―Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Internet of Things
(PROGRAM ELECTIVE –III)

L	T	P/D	C
3	-	-	3

Code: 7P262

Course Objectives:

Learn Terminology, technology and applications, IoT system management using M2M (machine to machine) with necessary protocols, Python Scripting Language preferred for many IoT applications Raspberry PI as a hardware platform for IoT sensor interfacing

Course Outcomes: After completing this course, student shall be able to

1. Identify the implementation layers of an IoT application system
2. Describe the management of an IoT system using necessary protocols
3. Design, Develop and Illustrate IoT applications using Raspberry PI platform and Python Scripting
4. Implement web based services on IoT devices
5. Raspberry PI as a hardware platform for IoT sensor interfacing
6. Implementation of web based services for IoT with case studies

Unit I

Introduction to Internet of Things: Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates.
Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

Unit VI

Case Studies Illustrating IoT Design: Home Automation – Smart Lighting, Home intrusion detection, **Cities** – Smart parking, **Environment** – Weather monitoring system, Weather reporting bot, Air pollution monitoring, Forest fire detection, **Agriculture** – Smart irrigation, **Productivity applications** – IoT printer.

TEXT BOOKS:

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

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Mobile Applications and Services
(PROFESSIONAL ELECTIVE –III)

L	T	P/D	C
3	-	-	3

Code: 7P263

Course Objectives:

1. This course presents the three main mobile platforms and their ecosystems, namely Android, iOS, and PhoneGap/WebOS.
2. It explores emerging technologies and tools used to design and implement feature-rich mobile applications for smart phones and tablets
3. It also take into account both the technical constraints relative to storage capacity, processing capacity, display screen, communication interfaces, and the user interface, context and profile

COURSE OUTCOMES
After completion of course, students would be able to:

1. Identify the target platform and users and be able to define and sketch a mobile application
2. understand the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and PhoneGap
3. Design and develop a mobile application prototype in one of the platform (challenge project)

Unit I
Introduction: Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User

Unit II
More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider

Unit III
Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms:Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics

Unit IV

Putting It All Together: Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android
Multimedia: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia

Unit V

Platforms and Additional Issues: Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing, Security and Hacking , Active Transactions, More on Security, Hacking Android

Unit VI

Recent trends in Communication protocols for IOT nodes, mobile computing techniques in IOT, agents based communications in IOT

References:

1. Wei-Meng Lee, Beginning Android™ 4 Application Development, 2012 by John Wiley & Sons

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Information Security Lab

Code:7P250

L	T	P	C
-	-	4	2

Objective:

The student can able to attain knowledge in advance algorithms.

Outcomes

The student can able to analyze the performance of algorithms

1 Implement RSA algorithm
   (A) Generate Public key and Private key pair
   (B) Generate Ciphertext for the Plaintext
   (C) Obtain the Plaintext from the Ciphertext
2 Implement DES
   (A) Generate Cipher text for the given Plaintext
   (B) Retrieve the Plaintext from the given Ciphertext
3 Implement Diffie Hell man Algorithm and generate Secret Key
4 Implement Hash Algorithm
5 Generate Digital Signature
6 i Gital Envelope

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech I Year II Semester
Computer Science Engineering
Technical Seminar-II

Code: 7P251

L	T	P	C
-	-	2	1

Max. Marks: 100

Course outcomes

After studying this course, the students will be able to

1. Identify a research topic
2. Collect literature
3. Present seminar
4. Discuss the queries

There shall be three seminar presentations during I year I semester and I year II Semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee, which shall consist of the Head of the Department, a senior Faculty Member and the Supervisor and will jointly evaluate the report and presentation. For each Seminar there will be only internal evaluation of 25 marks. A candidate has to secure a minimum of 50% to be declared successful.

In the First semester the report must be in the form of the review paper with a format used by IEEE / ASME etc. In the Second semester Technical Seminar in the form of Independent Review Paper must be of high quality fit for publication in a reputed conference / journal.

The evaluation format for seminar is as follows:

- Day to day evaluation by the Supervisor : 20 marks
- Final Report : 20 marks
- Presentation : 60 marks (20 Abstract seminar +40 Final Presentation)

The presentation includes content (5) + Participation (5) + Presentation (10) for a total of 20 marks and double for 40 marks for final presentation.

A Student has to concentrate on the following sections while writing technical paper or presenting seminar.

Contents

- Identification of specific topic
- Analysis
- Organization of modules
- Naming Conventions
- Writing style
- Figures
- Feedback
- Miscellaneous

REFERENCES:

Teach Technical Writing in Two Hours per Week by Norman Ramsey

For Technical Seminar the student must learn few tips from sample seminars and correcting himself, which is continues learning process

REFERENCE LINKS:

IV. http://www.cs.dartmouth.edu/~scot/givingTalks/sld001.htm
V. http://www.cse.psu.edu/~yuanxie/advice.htm
VI. http://www.eng.unt.edu/ian/guides/postscript/speaker.pdf

NOTE: A student can use any references for this process, but must be shared in classroom.

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech I Year II semester
Computer Science Engineering
Comprehensive Viva Voce

Code: 7P252

L	T	P	C
-	-	2	1

Max. Marks: 100

Course Objective :
Evaluate, comprehend and assess of the concepts and the knowledge gained in the core courses of the first and the second year.

Course Outcomes :
At the end of this course, the student will be able to
1. Comprehend the concepts in the core and elective courses.
2. Exhibit technical knowlegde to face interviews.
3. Exhibit life long Learning skills for higher education and to persue Professional practice.

There will be 100 marks in total with 25 marks of internal evaluation and 75marks of external evaluation.

Internal:

Comprehensive Viva Voce is Conducted once in a semester and evaluated for 25 marks.

End examination : 75 Marks.

The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor. A candidate shall secure a minimum of 50% to be declared successful.

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech I Year II semester
Computer Science Engineering
Mini Project With Seminar

Code: 7P253

Course out come

After studying this course, the students will be able to

1. Identify a research topic
2. Collect literature
3. Present seminar
4. Discuss the queries

In I year II semester, student will do project during summer vacation and evaluation of same shall evaluated in II year –I semester.

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech II Year I semester
Computer Science Engineering
Human and Computer Interaction

L	T	P/D	C
3	-	-	3

Code: 7P301
Course Objectives:

- Learn the foundations of Human Computer Interaction
- Be familiar with the design technologies for individuals and persons with disabilities
- Be aware of mobile Human Computer interaction.
- Learn the guidelines for user interface.

COURSE OUTCOMES
After completion of course, students would be able to:

- Understand the structure of models and theories of human computer interaction and vision.
- Design an interactive web interface on the basis of models studied.

Unit I
Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

Unit II
Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

Unit III
Cognitive models –Socio-Organizational issues and stake holder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.

Unit IV
Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

Unit V
Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

Unit VI
Recent Trends: Speech Recognition and Translation, Multimodal System

References:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004 (UNIT I , II & III)

2. Brian Fling, “Mobile Design and Development”, First Edition , O□Reilly Media Inc., 2009

3. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O□Reilly, 2009.

PO1	PO2	PO3	PO4	PO5	PO6
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Syllabus for M. Tech II Year I Semester
Computer Science Engineering
(OPEN ELECTIVE-I)

Banking Operations, Insurance and Risk Management

Code: 7ZC03

L	T	P/D	C
3	-	-	3

Course Objectives: To make the students understand the concepts and principles of Indian Banking Business, Insurance Business and Capital market business products and services, which facilitate them to understand the nature of market.

Course Outcomes:

1. Describe the new dimensions and products served by the banking system in INDIA.
2. Explain the credit control system and create awareness on NPA's
3. Apply the knowledge of Insurance concepts in real life scenarios
4. Recognize the importance of regulatory and legal frame work of IRDA
5. Identify the risk management process and methods.
6. Calculate the diversity of risk and return

UNIT I

INTRODUCTION TO BANKING BUSINESS: Introduction to financial services - History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank. KYC norms, New Dimensions and products- E-Banking: Mobile-Banking, Net Banking, Digital Banking, Negotiable Instruments: Cheque system.

UNIT II

BANKING SYSTEMS AND ITS REGULATION: Banking Systems: Branch Banking, Unit Banking, Correspondent Banking, Group Banking, Deposit Banking, Mixed Banking and Investment Banking - Banking Sector Reforms with special reference to Prudential Norms, Capital Adequacy Norms, Classification of Assets and NPA's, Functions of RBI, Role of RBI in regulating Indian Banking. Banking Ombudsman scheme.

UNIT III

INTRODUCTION TO INSURANCE: Introduction to insurance, Need and importance of Insurance, principles of Insurance, characteristics of insurance contract, branches of insurance and types of insurance: Life insurance and its products, General Insurance and its variants.

UNIT IV

INSURANCE BUSINESS ENVIRONMENT: Procedure for issuing an insurance policy – Nomination - Surrender Value - Policy Loans – Assignment - Revivals and Claim Settlement; Insurance as a tax mitigation tool, Role of IRDA in Insurance Regulation.

UNIT V

FINANCIAL MARKETS AND RISK MANAGEMENT: Introduction to Financial Markets: Money Market – Capital market; Introduction to Risk Management, meaning and classification of risks, Risk management process, Risk Management Approaches and Techniques.

UNIT VI

DERIVATIVES AS A RISK MANAGEMENT TOOL: Introduction to Financial Derivatives, Advantages of Derivatives - types of Derivative Contracts - Forwards, Futures, Options and Swaps - Differences among Forwards, Futures and Option Contracts.

References:

1. Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
2. General Principles of Insurance Harding and Evantly
3. Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.
4. Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
5. Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
6. G. Koteshwar: Risk Management Insurance and Derivatives, Himalaya, 2008.

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech II year I semester
Computer Science Engineering
Embedded Systems
Open Elective – I

Code: 7T217

L	T	P/D	C
3	-	-	3

Course objective : Undersstand embedded system concepts and architecture and programming of 8051 micro controller.

On completion of this course you should be able to:
1. Understand the basics of Embedded design process
2. Explore the architecture of 8051 microcontrolle .

Course Outcomes:
1. Understand assembly language programming concepts of 8051 microcontroller.
2. Explore interfacing of 8051
3. Understand the concepts of RTOS .
4. Explore thebasic design of rtos.

UNIT-1
Introduction to Embedded Systems : Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design. (Chapter I from Text Book 1, Wolf).

Unit – II
8051 Micro controller : Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts. (Chapter 3 from Text Book 2, Ayala).

UNIT-III
Basic Assembly Language Programming Concepts : The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instruction.
(Chapters 4,5,6,7 and 8 from Text Book 2, Ayala).

UNIT –IV
8051 Interfacing : Interfacing with Keyboards, Displays, D/A and A/D Converters, Programming multiple Interrupts, Serial Data Communication. (Chapter 10 and 11 from Text Book 2, Ayala).

UNIT – V
Introduction to Real – Time Operating Systems : Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management.
(Chapter 6 and 7 from Text Book 3, Simon).

UNIT – VI

Basic Design Using a Real-Time Operating System : Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS uC-OS / Vx-Works / RT Linux; Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine. (Chapter 8,9,10 & 11 from Text Book 3, Simon).

TEXT BOOKS :

1. Computers and Components, Wayne Wolf, Elseveir.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
3. An Embedded Software Primer, David E. Simon, Pearson Education.

REFERENCES :

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓			✓	✓

Syllabus for M. Tech II Year I Semester
Computer Science Engineering
Operations Research
(OPEN ELECTIVE-I)

Code: 7WC18

L	T	P/D	C
3	-	--	3

Course Objective:
Identify and develop operational research models from the verbal description of the real system. Understand the mathematical tools that are needed to solve optimization problems.

Course Outcomes:

After completing the subject, students will be able to:

- understand the application & techniques of OR & Formulate & Obtain solution problems using linear programming (LP) by different methods
- understand the transportation problem their formulation and solution, understand the job sequencing under different condition
- understand the significance of replacement and the techniques of replacement of various types of items
- understand the Game theory concept & solutions and its industrial significance
- understand the importance of queue system and various possible configuration of queues, concept of inventory system, various inventory models
- concept of stage wise optimization and its implications, concept of simulation and its uses

UNIT – I
INTRODUCTION: Definition, Characteristics and Phases (or steps) of OR method, Types of models, applications.
LINEAR PROGRAMMING PROBLEM- Formulation – Graphical solution, Simplex method-Types of variables, Unbounded solution Artificial variables techniques -Two–phase method, Big-M method -Degeneracy, Duality Principle-examples

UNIT – II
TRANSPORTATION PROBLEM – Formulation – methods of finding initial solution, Optimal solution-MODI method, Special cases in TP: unbalanced, maximization case, Degeneracy.
ASSIGNMENT PROBLEM – Formulation – Optimal solution - Variants of Assignment Problem-Unbalanced, Maximization, Traveling Salesman problem.

UNIT – III
SEQUENCING – Introduction – Terminology, Assumptions, Johnson's procedure-Processing n jobs through two machines – Processing n jobs through three machines – Processing two jobs through 'm' machines.

REPLACEMENT: Introduction – Types of failure, Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, Group replacement.

UNIT – IV

THEORY OF GAMES: Introduction, Definitions, Pure strategies-Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Mixed Strategies- Rectangular games without saddle points- Dominance principle – 2 X 2 games , m X 2 & 2 X n games -Graphical method.

UNIT – V

WAITING LINES: Introduction, Terminology, Structure of a queue, Calling population characteristics-size, behavior, pattern of arrivals, Kendall-Lee notation, Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

INVENTORY : Introduction, Inventory costs, Concept of EOQ, Single item Deterministic models without shortages and with shortages, Single item inventory models with one price break and multiple price breaks, Stochastic models – Instantaneous demand and no set up cost.

UNIT – VI

SIMULATION: Definition – Types of simulation – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages

DYNAMIC PROGRAMMING: Introduction – Bellman's Principle of optimality – Applications of dynamic programming- shortest path problem -capital budgeting problem — linear programming problem.

TEXT BOOKS:

1. Operations research / Hira & Gupta
2. Operation Research /J.K.Sharma/MacMilan publishers.

REFERENCES:

1. Operations research/V.K.Kapoor

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech II Year I Semester
Computer Science Engineering
Cost Management of Engineering Projects
(OPEN ELECTIVE-I)

Code: 7ZC28

L	T	P	C
3	-	-	3

Course objective: To provide the insights of various project management and cost control techniques for successful implementation and completion of the project.

Course out come:

- understand the solution to different using project management
- understand the cost control techniques for successful implementation,
- understand completion of the project

UNIT I

INTRODUCTION AND OVERVIEW OF THE STRATEGIC COST MANAGEMENT PROCESS: Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

UNIT II

COST BEHAVIOR AND PROFIT PLANNING MARGINAL COSTING; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis (Theory). Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector.

UNIT III

BUDGETARY CONTROL: Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing

UNIT IV

PROJECT MANAGEMENT TECHNIQUES: Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.

UNIT V

PROJECT EVALUATION:. Meaning of Project, Detailed Engineering activities. Pre project execution main clearances and documents Project team : Role of Project Manager. Importance Project site. Project execution Project cost control. Bar charts and Network diagram.

UNIT VI

QUANTITATIVE TECHNIQUES: For cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

Text Books:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting

References:

1. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
2. Ashish K. Bhattacharya, Principles & Practices of CostAccounting A. H. Wheeler publisher
3. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech II year I semester
Computer Science Engineering
Bioinformatics
(Open Elective – I)

Code: 7QC47

L	T	P/D	C
3	-	-	3

Course Objective:
To impart knowledge on basic techniques of Bioinformatics and to provide a practical description of the tools and current trends in the field including its impact on biology, computer science engineering and information technology

Course Outcomes:

CO:1	Demonstrate knowledge and understanding of interdisciplinary nature of computer science , Information technology and biotechnology
CO:2	Analyze and interpret homology by using basic bioinformatics problems and their solutions
CO:3	Demonstrate the ability to solve biological problems using basic computer science Programming tools and software
CO:4	Develop the ability to identify computational problems within the living systems at molecular level
CO:5	Develop the ability to evaluate the evolutionary relationships among various organisms using Computational methods.
CO:6	Gain an understanding of working in interdisciplinary teams of biologists, biochemists, medical researchers, geneticists, and allied engineering branches.

UNIT I : SCOPE OF BIOINFORMATICS and BIOLOGICAL DATABASES
History, definition, importance and applications of bioinformatics in information technology, Introduction to biological data, Organization and management of databases, Nucleotide databases (Genbank), Protein Databases(UNI PROT)

UNIT II: SEQUENCE ALIGNMENT Database searching, Basic concepts of sequence homology Dynamic Programming, Dot Matrix analysis, Smith-Waterman Algorithm, Neddleman-Wunsch Algorithm, Scoring matrices: PAM and BLOSUM matrices

UNIT III: **SEQUENCE-BASED DATABASE SEARCHES** BLAST and FASTA algorithms, various versions of basic BLAST and FASTA, Use of these methods for sequence analysis including the on-line use of the tools and interpretation of results.

UNIT IV: MULTIPLE SEQUENCE ALIGNMENT Basic concepts of various approaches for MSA algorithms (e,g. progressive, hierarchical etc.). Algorithm of CLUSTALW and its application

UNIT V: PHYLOGENETIC ANALYSIS Definition and description of phylogenetic trees. Distance based and character based algorithms of phylogenetic analysis

UNIT VI: GENE AND PROTEIN STRUCTURE PREDICTION Introduction to Next Gen sequencing ,Biological sequence/structure, Human Genome Project, Gene structure and DNA sequences, Pattern recognition and prediction, Protein Secondary structure prediction methods, Algorithms of Chou Fasman, GOR methods. Protein homology modeling.

TEXT BOOKS:

1. Bioinformatics. David Mount, 2000. CSH Publications

REFERENCES:

1. Bioinformatics: A Machine Learning Approach P. Baldi. S. Brunak, MIT Press 1988.
2. Genomics and Proteomics-Functional and Computational aspects. Springer Publications. Editior-Sandor Suhai.
3. Bioinformatics- Methods and Protocols-Human Press. Stephen Misener, Stephen A. Krawetz.
4. Bioinformatics – A Practical guide to the Analysis of Genes and Proteins – Andreas D.Baxevanis, B.F. Francis Ouellette

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech II Year I semester
Computer Science Engineering
Mini Project with Seminars

L	T	P	C
-	-	6	3

Code: 7P303

Max. Marks: 100

In II year I semester, a project work review shall be done by Internal and External for 100 marks and for 3 credits (there is external evaluation) in the semester. The evaluation for the project reviews shall be done in 2 stages (not less than 4 weeks between two consecutive stages) each stage internal marks 25 and average of two internal marks end semester evaluation.

External examiner project review marks and the end semester review shall carry 75 marks (50% by PRC and 50% by supervisor). The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey and design in Project Review- I. A candidate shall secure a minimum of 50% to be declared successful in Project Review- I. If candidate fails to fulfill minimum marks, he has to reappear during the supplementary examination.

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech II Year I semester
Computer Science Engineering
Main Project Phase-1 with Seminars

L	T	P	C
-	-	10	5

Code: 7P304 **Max. Marks: 100**

In II year I semester, a project work review shall be done by PRC for 100 marks and for 5 credits (there is external evaluation) in each of the semester. The evaluation for the project reviews shall be done in 2 stages (not less than 4 weeks between two consecutive stages) each stage internal marks 25 and average of two internal marks end semester evaluation.

External examiner project review marks and the end semester review shall carry 75 marks (50% by PRC and 50% by supervisor). The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey and design in Project Review- I. A candidate shall secure a minimum of 50% to be declared successful in Project Review- I. If candidate fails to fulfill minimum marks, he has to reappear during the supplementary examination.

PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech II Year II semester
Computer Science Engineering
Main Project Phase- Ii with Seminars

Code: 7P401

L	T	P	C
-	-	12	6

Max. Marks: 100

In II year II semester, a project work review shall be done by PRC for 25 marks and for 6 credits (there is external evaluation) in the semester. The evaluation for the project reviews shall be done in 2stages (not less than 4 weeks between two consecutive stages) each stage internal marks 25 and average of two internal marks including end semester evaluation. External examiner project review and the end semester review shall carry 75 marks (50% by PRC and 50% by supervisor). In the case of Project Review II, the Supervisor and PRC will examine implementation, testing and final execution of the project. A candidate shall secure a minimum of 50% to be declared successful in Project review II. If candidate fails to fulfill minimum marks, he has to reappear during the supplementary examination.

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PO1	PO2	PO3	PO4	PO5	PO6
✓	✓	✓			

Syllabus for M. Tech II Year II semester
Computer Science Engineering
DISSERTATION AND DEFENSE VIVA

Code: 7P402

L	T	P	C
-	-	-	7

Max Marks 200

Course Outcome: By the end of this course, students will be able to

1. Critically and theoretically analyze the systems/products they are going to design or develop.
2. Apply the theoretical knowledge gained to bring out innovative products.
3. Effectively communicate in a variety of forms including written, visual, verbal, online and technical literacy.
4. Work and participate as effective members in a group within a professional environment.
5. Develop an ongoing critical awareness of learning needs in the application of appropriate technologies.
6. Gain as much knowledge and experience in areas of the area of Digital Systems and Computer Electronics

EVALUATION OF PROJECT/DISSERTATION WORK

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

1. A Project Review Committee (PRC) shall be constituted with Head of the Department as Chairperson, Project Supervisor and one senior faculty member of the Departments offering the M. Tech. Programme.
2 Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects, both theory and practical.
3. After satisfying 2, a candidate has to submit, in consultation with his Project Supervisor, the title, objective and plan of action of his project work to the PRC for approval. Only after obtaining the approval of the PRC the student can initiate the Project work.
4. If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the PRC. However, the PRC shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.
5. A candidate shall submit his project status report in four stages at least with a gap of 4 weeks between two consecutive stages.
6. The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of all theory and practical courses (no backlogs) with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit

the draft copy of thesis to the Head of the Department and make an oral presentation before the PRC.

7. After approval from the PRC, the soft copy of the thesis should be submitted to the College for ANTI-PLAGIARISM for the quality check and the plagiarism report should be included in the final thesis. If the copied information is less than 24%, then only thesis will be accepted for submission.

8 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College.

9 In II year I semester and II semester, a project work review I and II shall be done by PRC for 100 marks and for 12 credits (there is no external evaluation) in each of the semester. The evaluation for the project reviews shall be done in 4 stages (not less than 4 weeks between two consecutive stages) including end semester evaluation. Each stage project review shall carry 20 marks and the end semester review shall carry 40 marks (50% by PRC and 50% by supervisor). The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey and design in Project Review I. In the case of Project Review II, the Supervisor and PRC will examine implementation, testing and final execution of the project. A candidate shall secure a minimum of 50% to be declared successful in Project review I and II. If candidate fails to fulfill minimum marks, he has to reappear during the supplementary examination.

10. For Project Evaluation (Viva Voce) in II Year II Sem. there are external marks of 200 for 7 credits (50 marks from Internal and 150 from External). HoD shall submit a panel of 3 examiners, eminent in that field. Principal will appoint one of them as examiner.

11. The thesis shall be adjudicated by examiner selected by the College. If the report of the examiner is not favourable, the candidate shall revise and resubmit the Thesis. If the report of the examiner is unfavourable again, the thesis shall be summarily rejected.

12. If the report of the examiner is favourable, Project Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the Thesis. Candidate has to secure minimum of 50% marks in Project Evaluation (Viva-Voce) examination.

13. If he fails to fulfill as specified in 12, he will reappear for the Viva-Voce examination only after three months. In the reappeared examination also, fails to fulfill, he will not be eligible for the award of the degree.

14. The Head of the Department shall coordinate and make arrangements for the conduct of Project Viva- Voce examination.