Study
&
Evaluation Scheme
of
M. Tech(Computer Science & Engineering)

[Effective from Academic Session 2019 -2020]

I.E.C. UNIVERSITY

Baddi, Solan

Himachal Pradesh

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Programme Objectives

- The objective of this discipline is to train the manpower required (a) to meet the industry needs of the country, (b) to pursue research in specialized areas, and (c) to meet the growing needs of engineering colleges for trained faculty in Computer Science and Engineering. The programme includes courses covering the core of Computer Science and Engineering discipline and several electives in areas of Intelligent Systems and Knowledge Engineering, Human Computer Interaction, Theoretical Computer Science, Networks and Distributed Systems and Hardware Systems.
- To provide the highest level of education in technology and science and to produce competent, creative and imaginative engineers and scientists
- To be a role model of educational institutions in the Country
- To promote a spirit of free and objective enquiry in different fields of knowledge
- To make a significant contribution towards the development of skilled technical manpower, and
- To create an intellectual reservoir to meet the growing demands of the nation
- Facilitate to work in IT company in functional/ Domain areas
- To build technological base in Computer Science and Engineering

- To analyze, design, develop and evaluate high-end computing systems
- To undertake challenging projects and carry out research
- To identify new trends and evaluate emerging technologies

Programme Outcomes

Program will demonstrate

a. An ability to apply knowledge of computing, mathematical foundations, algorithmic principles, and computer science and engineering theory in the modeling and design of computer-based systems to real-world problems (fundamental engineering analysis skills).

b. An ability to design and conduct experiments, as well as to analyze and interpret data (information retrieval skills).

c. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs, within realistic constraints such as economic, environmental, social, political, health and safety, manufacturability, and sustainability (creative skills).

d. An ability to function effectively on multi-disciplinary teams (teamwork).

e. An ability to analyze a problem, and identify, formulate and use the appropriate computing and engineering requirements for obtaining its solution (engineering problem solving skills).

f. An understanding of professional, ethical, legal, security and social issues and responsibilities (professional integrity).

g. An ability to communicate effectively, both in writing and orally (speaking / writing skills).

h. The broad education necessary to analyze the local and global impact of computing and engineering solutions on individuals, organizations, and society (engineering impact assessment skills).

i. Recognition of the need for, and an ability to engage in continuing professional development and life-long learning (continuing education awareness).

j. A knowledge of contemporary issues (social awareness).

k. An ability to use current techniques, skills, and tools necessary for computing and engineering practice (practical engineering analysis skills).

l. An ability to apply design and development principles in the construction of software and hardware systems of varying complexity (software hardware interface).

Infrastructure Facilities:

This division will offer exposure to the front end & back end technologies in the field of Computer science & engineering through an elaborate setup of laboratories consisting of the following:

- IBM-RAD lab.
- IBM-RFT lab.
- $EMC^{2\ DB2}$ lab.
- CN lab.
- DAA/OS lab.
- Data Structure lab.
- DBMS lab.
- Distributed System lab.
- E-Communication lab.
- Logic design lab.
- OOPS lab.
- Server Room lab.
- WT lab.
- Operating System Lab
- Computer Graphics Lab
- Cryptography and Network Security Lab
- SPM Lab
- ACA Lab
- Project Lab
- Artificial Intelligence Lab

Career & Scope of Employment:

- Computer Security Analysts.
- Computer Engineer.
- Consulting Engineer.
- Research, Development & Design of Computer & Software.
- Computer Operations Manager.
- Customer Engineer.
- Computer Network Manager.

- As developers and specialists in high-end services and IT product companies
- Begin as development engineers and move-up as architects, technical leads and managers
- As academicians and researchers in India and abroad

- As consultants, solutions developers and entrepreneurs
- World-wide demand for computing specialists in research labs and technology providers

IEC UNIVERSITY ADVANTAGE

Syllabus for the course has been created in relevance to the industrial standards and leads to specialization in technology, awareness and innovation. On completion of the course, professionals fit perfect into the niche segment of engineers with a strong technical background as they carry the capability of bringing a liaison between two radically different sections of a company, i.e. Management and Technology.

- Varied choices of programs.
- Excellence in Teaching.
- Active Research.
- Campus Placement.
- Industrial knowledge.
- Strategic Location.
- Equal Opportunities.
- Scholarships Scheme.
- Personality Development.

ACADEMIC REGULATIONS

PREAMBLE

- M.Tech programme under Flexible Credit System Based (FCBS) shall adopt a Semester system. There will be two semesters in an academic year. Normally the

ODD semester will be from July to December & Even Semester from December to May.

- As part of our objective of providing quality education & making the post-graduates employable, IEC University is taking up the step in this direction by introducing the Flexible Credit Based System (FCBS).
- Thus, the students can register courses of their choice & alter the pace of learning within the broad framework of academic programmes & credit requirements.
- Students can register courses according to their interest & academic ability in completing them.
- FCBS allows students in deciding their academic plan & permits students to alter it as they progress during the programme.
- The academic counsellor helps the students in identifying the courses based on programme requirement, course pre requisite, students' ability & interest in various academic disciplines.
- The extract of PG Academic regulations given hereunder is for general information, & the students are advised to go through the detailed regulations of the programme in which he/she is admitted.

ELIGIBILITY CRITERIA FOR ADMISSION

Qualification	• Minimum 50% aggregate in BE/B.Tech/MCA/B.Sc Engineering /M.Sc. (CS/IT/MATH) • (45% in case of candidate belonging to reserved category) The candidate should also satisfy the conditions regarding minimum marks, the number of attempts in the qualifying examination & age as prescribed by the AICTE/UGC from time to time & physical fitness as may be prescribed by the Academic Council of the University.

Eligibility criteria for admission to Foreign Nationals (FN)/ Person Of Indian Origin(PIO)/ Children Of Indian Workers In Gulf Countries (CIWGC) In PG/ Integrated Programmes

- The FN/ PIO/ CIWGC students shall meet the eligibility conditions outlined above.

- The qualifying examinations passed by FN/ PIO/ CIWGC students should be considered equivalent to eligibility examinations by the Association of Indian Universities/ Academic council.
- The candidate should also satisfy other conditions as prescribed by the AICTE/UGC from time to time, & physical fitness as may be prescribed by the Academic Council of the University.

Note: The candidates appearing in the qualifying examinations are also eligible to apply, subject to the condition that they must fulfil the eligibility criteria as given above at the time of registration in the programme.

MEDIUM OF INTRUCTION AND EXAMINATIONS

The medium of instructions and examination shall be English.

UNIVERSITY FEE

Every student has to deposit his total Fee, other charges and dues, if any, in the beginning of the semester at the time of Registration, failing which he will not be permitted for registration in the programme.

(i)A reasonable and rational fee structure shall be established consistent with the objectives of the University.

(ii)The course and the examination fees chargeable from students for various programmes

Of studies shall be proposed by a Fee Committee constituted by the Board of management

The Recommendations of the Fee Committee shall be considered and approved by the Board of management.

(iii)The University Fee Committee may review the escalation and the levels of fees and when

Required basis and if necessary may recommend any change in the fee structure as it may consider appropriate for forwarding to HP Government Fee Committee.

FELLOWSHIPS, SCHOLARSHIPS, STIPENDS, MEDALS AND PRIZES

Fellowships, Scholarships, Stipends, Medals and Prizes may be instituted by the University and awarded as per rules.

REGISTRATION

- Every Student will register every semester for courses that he wishes to pursue in that semester.
- A non-registered student will not be allowed to attend classes and take examination even if he has paid the fees.
- The late registration of a freshman who is admitted after the start of the semester may be done at the time of admission by the authorized official.

Adding and Dropping of Courses

- A student may be permitted to add or drop course(s) within two weeks of the beginning of the semester.
- In case a student has been allowed to change the course or programme during the current semester by the University, the classes attended in the previous course may also be considered in calculation of attendance to determine the eligibility for appearing in ESE.

MID – TERM MIGRATION OF STUDENTS

- Inter-university migration shall not be allowed in normal circumstances.
- Under exceptional circumstances, mid-term transfer of a student from any other University to IEC University may be permitted on a case to case basis. In all such cases, the approval on the transfer of relevant credits the student has already earned in that University may be granted by the Academic Council.

TRANSFER OF PROGRAMME

A student once admitted and registered in a programme will not be allowed to change the programme under any circumstances.

ACADEMIC SYSTEM

- The University will follow semester system in all of its PG/ Integrated programmes.

Summer Semester

- The Vice Chancellor may decide to hold a Summer semester on the recommendation of the Academic Advisory Committee.

- Summer semester is a special privilege to be offered at the discretion of the University, and the University will not be under any obligation to offer summer semester every year.
- Summer semester, if offered, may be allowed only for students who are not on disciplinary probation.
- A list of courses to be offered in the summer semester is brought out during the even semester before the ESE. Only a few selected courses as decided by the University may be offered during the summer semester.
- A course may be offered in the summer semester if there are a minimum of ten students registering for it.
- Unless prescribed otherwise in the Regulations of any specific programme, the Summer semester is a fast-paced semester where all the rules for the normal semester shall apply but the registration shall be limited to three courses having total credits not exceeding 12.
- The Summer semester may be of about seven to eight weeks duration and each course may run on about two times the normal load, thus imparting equivalent to about 16 weeks of teaching, but at an accelerated pace.
- Whenever possible, the deficient students may be allowed to register for backlog courses and/ or marginal courses (in which they have obtained D grade) in the summer semesters on payment of necessary fees per course.
- A student can normally register only for backlog or marginal courses for the summer semester.
- In view of the short duration of the Summer semester, late registration and adding and dropping of courses are not permitted beyond three days of the start of classes

Academic Counsellor

- Upon joining the University, each student will be assigned an Academic Counsellor.
- The Academic Counsellor will discuss with the student his academic performance in previous semester(s) and suggest the number and nature of courses the student should register during the ensuing semester, within the framework of that Programme curriculum.
- The Academic Counsellor may advice students having many backlog courses to register for lesser number of credits (subject to the minimum credits specifications) and prepare a revised plan of study for the student with a slower pace.

Curriculum

- Each programme contains a prescribed course structure which is generally called Curriculum.
- These courses will be offered to a student in a pre determined manner in each semester.
- Students are expected to take course in each semester & clear them to various conditions prescribed in this regulation.

Syllabus

- A course syllabus is a document that explains what a student is going to study in that course.
- Each course will have a course code, course title, Lecture- Tutorial- Practical- Credit (LTPC) distribution indicating the weightage of the course, version of syllabus revision, course pre-requisites/ anti-requisites/ co-requisites (if any), course objectives, expected outcome, short and detailed description of the topics, suggested text and reference books, the mode of evaluation adopted, the effective date of application of the revised version of the syllabus.

Course Plan

- A course plan consists of a list of lectures/ experiments carried out in each instructional class/ lab by the course teacher during the semester as per the LTPC of the course, with details like mode of delivery, reference material used, etc.
- One hour of lecture/ tutorial classes or two hours of laboratory work/ seminar/ practical/ group discussion per week constitutes ONE credit for the course. Separate course plans need to be prepared for the theory and laboratory portions of any course, if the course has an embedded lab component.

Example:

An LTPC of 2-1-2-4 means 2 hour of class room lecture; one hour of tutorial and one hour of laboratory, all delivered within a calendar week. This course will have 4 credits.

Credits:

Maximum Credits: 90

Project/ Thesis/ Dissertation:

- Wherever required in the PG/ Integrated programme, all students of that programmes should successfully complete Project/ Thesis/ Dissertation work.
- A student has to select a thesis supervisor at the beginning of the last year of the programme, if not done earlier.
- A student shall not normally have more than two supervisors at any given time.
- Thesis supervisor(s) of a student will normally be appointed from amongst the faculty members of the University using modalities decided by the departments.
- A student can have a co-supervisor from outside the University on the recommendation of the Supervisor and with approval of the Director of the Institute.
- In case there has been a change/addition in the supervisor(s), the thesis will not be submitted earlier than three months from the date of such change.
- Normally, a faculty member shall not supervise more than five individual PG candidates. However the department may evolve a transparent policy for the distribution of PG students amongst the faculty members in the department.
- In case a faculty member is suspended / debarred for indulging in lowering the prestige of the University in any manner, he shall cease to be a thesis supervisor.
- Submitting a thesis that was bought (purchased)/ borrowed/ thesis submitted in another University/ Institution shall be considered as examination malpractice and will be awarded an 'F' grade.
- Students have the responsibility to decide on the specific thesis area and title, and carry out substantial portion of the literature survey at the beginning of their final year.

Industrial/Practical Training

- Wherever required in the programme, all the students of that programme should undergo industrial/ practical training in a reputed industry in, anytime after one year of study. This is listed in course structure.

- Students who have completed their training are required to register for industrial/ practical training in the following semester for award of the grades.

Minimum/ Maximum Credit Limits for Course Registration

- The Average Academic Load in a regular semester will be of 23 credits.
- However, a fast pace student can register for a maximum of 28 credits.
- Similarly a slow pace student can register for a minimum of 16 credits in a regular semester (other than during summer semester).
- Under no circumstances, a student will be permitted to cross these limits.
- A student carrying out the last registration of his Programme will be permitted to register less than 16 credits if the minimum credit requirements for the completion of Programme so require.
- The average number of credits a student can register during a summer semester shall be between 6 and 8, or 2 courses.
- However, in special cases, the student may be permitted to register a maximum of 12 credits during a summer semester.
- There is no minimum number of credits fixed for course registration during summer semester.

Course Prerequisites / Anti-requisites/ C-requisites

- Some courses may have specific prerequisites to be met before a student can register for the course in the current semester.
- Students who had received an 'F' grade in a prerequisite course are also permitted to register the next level course by assuming that they had attained the required 'exposure' by attending that course.
- This stand is adopted so that the student can make further progress towards earning credits and his progress need not be pulled down by backlog courses. Thus, concurrent registration of a prerequisite and next level course becomes a possibility.
- Similarly, a course may have an anti-requisite and/ or co-requisite.
- When two courses having almost similar/ same course contents and considered as equivalent are made available to a student to choose within a group, and to prevent students crediting both the courses, the anti-requisite option can be used.
- Similarly, an independent laboratory course can be coupled with a theory alone course through a co-requisite thereby forcing a student to register both the courses together.

Vice Chancellor's List

- Students who maintain a CGPA of 9.50 and above, starting from the beginning of 3rd semester results and subsequently, having no 'F' grade to their credit, having never debarred for lack of attendance in any ESE or indiscipline, will be placed on Vice Chancellor's List for their meritorious performance.
- Their name will be removed from the Vice Chancellor's List if their CGPA falls below 9.50 or they receive an 'F' grade or are debarred due to lack of attendance in any ESE or an act of indiscipline subsequently.
- Such students will be accorded benefits/ recognition as per rules.

Conversion Factor for Converting CGPA into Marks Equivalent

If a conversion to marks is required, the following formula may be used to calculate the same:

The Equivalent Percentage of Marks = CGPA* 9.0 + 5

ATTENDANCE REQUIREMENTS

- A student must have 75% or more attendance in aggregate of delivered classes, in all registered courses of theory (lectures plus tutorial) and practicals (including workshops training, seminar, projects, industrial training etc.) of the concerned semester.
- Only such students who fulfilled the above 75% attendance criteria will be permitted to appear in End Semester Examination (ESE).
- The cases of students having attendance less than 75% but more than or equal to 60% shall be reviewed by the University on a case to case basis as per the Ordinance.
- If a student's attendance falls below 60%, for any reason including medical, he will not be allowed to appear in the ESE of any course registered in the semester. He will be awarded 'F' grades in all the courses of that semester.
- Calculation of attendance for determining the eligibility to appear in ESE will be based on the date of actual registration of the candidate, if late registration is permitted by the University.

COMPONENTS OF EVALUATION The components of Evaluation for each course will be as under:

For Non-Practical Subjects:

(a) Continuous Assessment (CA), -- 20 Marks in the form of:
  (i) Assignments (15 Marks)
  (ii) Attendance (05 Marks),

(b) Mid-Term Exams (MSE), ---------40 Marks
  (i) First MSE to be held after completion of 35% - 40% course coverage,
  (ii) Second MSE to be held after completion of 70% - 80% course coverage

(c) End- semester Exams (ESE), ------ 40 Marks

For Practical Subjects:

(a) Continuous Assessment (CA), -- 15 Marks in the form of:
  (i) Assignments (10 Marks)
  (ii) Attendance (05 Marks),

(b) Mid-Term Exams (MSE), ---------30 Marks
  (i) First MSE to be held after completion of 35% - 40% course coverage,
  (ii) Second MSE to be held after completion of 70% - 80% course coverage

(c) End- semester Exams (ESE), ------ 30 Marks

(d) Practical(Internal-15,External-10)---- 25 Marks

SYSTEM OF EVALUATION BASED ON BROAD BAND GRADES

- The University shall follow the Broad-band Grades systems for various PG programmes as specified in the respective Programme detail.
- The course credit (C), number of lectures, tutorials, practicals (L), (T), (P) in a course are related as $C = (L + T + 0.5\ P)$
- The students will be awarded grades using relative grading in a course and result cards will show individual course grades, the course credits and the overall weighted performance indices such as SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
- The following broadband letter grades will be used to report a student's performance on a 10-point scale.
- The letter grades and their numerical equivalents on a 10-point scale (called Grade Points) are as follows:

Letter Grade	A+	A	B+	B	C+	C	D	F

Grade Points	10	9	8	7	6	5	4	0

- In addition to the above, there are three letter grades viz., I, S, and X which stands for Incomplete, Satisfactory, and Unsatisfactory, respectively.
- For courses with zero weightage (audit) only satisfactory (S)/ Unsatisfactory (X) grades are awarded.
- No student shall be awarded 'A' grade in any course unless he has secured a minimum of 80% marks in the total of all components of evaluation in that course.
- No students shall be awarded 'F' grade in any course if he has secured a Minimum of 40% marks in the total of all components of evaluation in that course.
- In case a student repeats a particular course during summer semester along with his juniors, he will be awarded only up to a maximum of A grade based on his current performance and the grade he obtained earlier.

- If the number of students appearing in any course is less than 60, the grades in that course will be awarded in the following manner :

Marks Obtained in a course out of 100 (M)	Letter Grade
85 <= M <= 100	A+

75 <= M <= 84	A
65 <= M <= 74	B+
55 <= M <= 64	B
50 <= M <= 54	C+
45 <= M <= 49	C
40 <= M <= 44	D
M <= 39	F
Incomplete	I

- A student may be awarded the grade 'I' (Incomplete) in a course if he has missed the ESE for a genuine reason.
- This grade must, however, be converted by the Faculty-In-Charge into an appropriate letter grade within ten days from the completion of ESE.
- Any 'I' grade still outstanding two days after the prescribed last date, shall be automatically be converted into 'F' grade.
- The course(s) in which a student has earned 'F' grade will be termed as back-log course(s), which he has to improve by repeating/ replacing the course(s) as per the rules.
- 'F' grade is also awarded to a student who is not allowed to/ do not appear in ESE in a particular subject due to shortage of attendance, though he might have undergone other components such as MSE, assignments, class tests, projects, etc.
- Such a student will be required to repeat the course in the Summer semester in which he has secured 'F' grade.
- The Semester Grade Point Average is a weighted average of the grade points earned by a student in all the courses credited and describes his academic performance in a Semester. If the grade point associated with the letter grades awarded to a student are say, g1, g2, g3,……. and the corresponding weightage is (credits) are say, w1, w2, w3,……. the SGPA is given by:

- The Cumulative Grade Point Average indicates overall academic performance of a student in all the courses registered up to and including the latest completed Semester. It is computed in the same manner as SGPA, considering all the courses (say, n), and is given by:

CGPA=∑ {credit of semester*SGPA of semester}/total credits

- The minimum CGPA requirement for the award of an Post Graduate degree/ diploma/ certificate will be 5.5 subject to getting 'D' or above grade in each of the courses individually.
- A minimum of 4.5 SGPA in a PG programme is required in each semester for moving to the higher semester.
- A student will not be allowed to move to higher Semester without clearing the backlog courses so as to obtaining the required minimum SGPA and/ or CGPA.
- A student will be required to get grade 'D' or above in a course for passing in the course.
- A student will be issued a Cumulative Grade Card at the end of each semester indicating the grades secured for all the registered courses up to and including the last semester.

EXAMINATION

- The period of Examination(s) (Mid semester and End semester) shall be as specified in the Academic Calendar.
- All students who have registered for a particular course are eligible to write the ESE of that course, except if he is declared ineligible due to one or more of reasons listed below.
    1. Shortage of attendance
    2. Acts of indiscipline
    3. Withdrawal of a course from Registration
- Make-up examinations are special examinations conducted for students who could not take regularly scheduled examination and have been awarded the 'I' grade or 'Incomplete' result.

- Make–up examination is a special privilege to be offered at the discretion of the University and the University will not be under any obligation to allow a student a make-up examination. The student(s) shall have no right to cite the non-availability of this facility as an excuse for his/ their poor performance.

- Make-up Examination for MSE and/ or ESE may not be allowed to students on disciplinary probation

- A student, who has missed one or more papers in a regular examination because of a genuine medical reason, may be permitted in Make-up Examination as per rules.

- A student appearing in a make up examination for ESE and/ or MSE in any course shall not be awarded 'A' grade in that course.

- After valuation of MSE answer scripts, they will be handed over to students.

- Recounting of ESE answer scripts is permitted.
- There is no provision of re-evaluation of ESE answer scripts.

TERMINATION OF THE PROGRAMME

A student will be declared "Not Fit for the Programme (NFP)" and shall have to discontinue if he does not satisfy following conditions:

- After the completion of the First Year the student should have passed a minimum of forty percent (40%) courses prescribed in the first year to be calculated after the summer semester, if any.
- Second Year onwards, the academic performance of a student is reviewed at the end of every semester by the Academic Advisory Committee, and the decision is taken on a case to case basis as per rules..

MAXIMUM DURATION FOR THE COMPLETION OF THE PROGRAMME

The maximum duration for completion of the degree/ diploma/ certificate, for the completion of the course, subject to other conditions, shall be as follows:

Normal Duration	Maximum Duration Allowed
2 Years	4 Years

RESULT AND DIVISION

- A student will be issued a Cumulative Grade Card at the end of each semester indicating the grades secured for all the registered courses up to and including the last semester.
- The minimum CGPA requirement for the award of an Post Graduate degree/ diploma/ certificate/ integrated programme will be 5.5 subject to getting 'D' or above grade in each of the courses individually.
- The result of a student may be withheld if,
  (1) he has not paid all the dues, or
  (2) if there is a case of indiscipline or use of unfair means or of academic misconduct pending against him, or
  (3) for any other reason as deemed fit by the University.

- Four divisions as defined below shall be awarded:

Division	CGPA
First with Honors and Certificate of Merit	> = 9.0
First with Honours	> = 8.0 < 9.0
First	> = 6.5 < 8.0
Second	> = 5.0 < 6.5

- For securing degree/ diploma/ certificate in First Division with Honors and First Division with Honors and certificate of Merit , a student shall have passed all the

courses (Theory and Practical) of the programme in the first attempt, i.e., without ever being awarded a Re-appear or a Fail.

MAINTENANCE OF DISCIPLINE AMONG STUDENTS

- All powers relating to maintenance and enforcement of discipline in the University and taking disciplinary action against the students and employees of the University shall vest in the Vice-Chancellor, which he may delegate as he deems proper.
- All acts given in details in Ordinance shall amount to acts of indiscipline or misconduct or ragging on the part of a student of the University and colleges / institutions.
- The University Authority in the exercise of the powers, order or direct that any student –

(a) be expelled from the University, college or institution, or

(b) be, for a stated period, rusticated or

(c) be not, for a stated period, admitted to a course or courses of study of the University; or

(d) be imposed with the fine of a specified amount of money;

(e) be debarred from taking a University examination or examinations for one or more years.

ACADEMIC MISCONDUCT AND USE OF UNFAIR MEANS

- Plagiarism, collusion and cheating are all forms of academic misconduct and use of unfair means as defined in the Examination Ordinances.
- In case the student has come to examination under the influence of any intoxicating material, misbehaves with one or more members of the supervisory staff, it will also be treated as an act of Unfair Means and academic misconduct.
- In relation to continuous assessment, Academic misconduct and use of Unfair Means is classified as Major Misconduct or Minor Misconduct as described below:

(1) Major Misconduct: Where plagiarism, collusion or cheating is detected in Thesis, Dissertation or Major Project of a programme.

(2) Minor Misconduct: All other academic misconduct excluding those defined in major misconduct will be regarded as a minor misconduct and will be dealt accordingly.

- If the Unfair Means Board (UFMB) finds the student guilty, one of the following actions may be taken:

  (1) The student may be disqualified for one or more semester, or

  (2) The student may be rusticated for one or more semester, or

  (3) The academic programme of the student may be terminated.

  (4) Any other action as deemed fit by the UMB.

RESIDUAL PROVISION

In case of any dispute/ difference of interpretation of provisions made in the Ordinances and Regulations, the decision of the Chancellor shall be final.

IEC University, Baddi

SCHEME OF STUDY & EVALUATION FOR

M. TECH. PROGRAM FIRST YEAR

SEMESTER I

Course			Periods			Evaluation Scheme					Course Total	
Sr. No	Course Code	Title	L	T	P	Sessional				Exam	Marks	Credits
						MSE	CA	P	Total	ESE		
(Theory)												
1	MTCSE-101	Software Engineering Concepts & Methodologies	4	0	0	40	20	0	60	40	100	4
2	MTCSE-102	Advanced Data Structures and algorithms	4	0	0	40	20	0	60	40	100	4
3	MTCSE-103	Advanced DBMS	4	0	0	40	20	0	60	40	100	4
4	MTCSE-104	Parallel and distributed computing	4	0	0	40	20	0	60	40	100	4
5	MTCSE-105	Advanced Computer Architecture	4	0	0	40	20	0	60	40	100	4
(Practical/Training/Project)												
1	MTCSE-151	Advanced DBMS Lab	0	0	2			30	30	20	50	1
2	MTCSE-152	Advanced Data Structures and algorithms Lab	0	0	2			30	30	20	50	1
Total			**20**	**0**	**4**	**200**	**100**	**60**	**360**	**240**	**600**	**22**

IEC University, Baddi

SCHEME OF STUDY & EVALUATION FOR

M. TECH. PROGRAM FIRST YEAR

SEMESTER II

Course			Periods			Evaluation Scheme					Course Total	
Sr. No	Course Code	Title	L	T	P	Sessional				Exam	Marks	Credits
						MSE	CA	P	Total	ESE		
(Theory)												
1	MTCSE-201	Advanced Operating System	4	0	0	40	20	0	60	40	100	4
2	MTCSE-202	Software Verification, Validation & Testing	4	0	0	40	20	0	60	40	100	4
3	MTCSE-203	Wireless Networks	4	0	0	40	20	0	60	40	100	4
4	MTCSE-204	Soft Computing	4	0	0	40	20	0	60	40	100	4
5	MTCSE-205	Research Methodology	4	0	0	40	20	0	60	40	100	4
(Practical/Training/Project)												
1	MTCSE-251	Advanced Operating System Lab	0	0	2			30	30	20	50	1
2	MTCSE-252	Software Verification, Validation & Testing Lab	0	0	2			30	30	20	50	1
Total			**20**	**0**	**4**	**200**	**100**	**60**	**360**	**240**	**600**	**22**

IEC University, Baddi

SCHEME OF STUDY & EVALUATION FOR

M. TECH. PROGRAM SECOND YEAR

SEMESTER III

Course			Periods			Evaluation Scheme					Course Total	
Sr. No	Course Code	Subject	L	T	P	Sessional				Exam	Marks	Credits
						MSE	CA	P	Total	ESE		
(Theory)												
1	MTCSE -301	Cryptography: Network Security	4	0	0	40	20	0	60	40	100	4
2	MTCSE -302	Artificial Intelligence	4	0	0	40	20	0	60	40	100	4
3		Elective 1	4	0	0	40	20	0	60	40	100	4
4		Elective 2	4	0	0	40	20	0	60	40	100	4
(Practical/Training/Project)												
1	MTCSE -351	Cryptography: Network Security Lab	0	0	2			30	30	20	50	1
2	MTCSE -352	Artificial Intelligence Lab	0	0	2			30	30	20	50	1
3	MTCSE -353	Seminar	0	0	4			50	50	-	50	2
4	MTCSE -354	Dissertation Phase-I	0	0	-			120	120	80	200	6
Total			**16**	**0**	**8**	**160**	**80**	**230**	**470**	**280**	**750**	**26**

Semester IV											Marks	Credits
1	MTCSE-451	Dissertation Phase-II	0	0	-			300		200	500	20
Total			**0**	**0**	**-**			**300**		**200**	**500**	**20**

List of Electives for 3rd Sem

Elective-1

MTCSE-303- Advanced Computer Networks

MTCSE-304- Software Metrics

MTCSE-305- Real Time Software and Systems

MTCSE-306– Grid Computing

MTCSE-307-Internet Technologies

Elective-1l

MTCSE-308- Cloud Computing

MTCSE-309- Fault Tolerant Systems

MTCSE-310- Data warehousing & Data mining

MTCSE-311– High Performance Computing

MTCSE-312-Multimedia Communications & Systems

DETAILED SYLLABUS

Semester-I

Software Engineering Concepts & Methodologies

Course Code: MTCSE-101	L	T	P
	4	0	0

SECTION-A

Principles and Motivations: History; definitions; why engineered approach to software development; Software development process models from the points of view of technical development and project management: waterfall, rapid prototyping, incremental development, spiral models, Agile Software Development, Emphasis on computer-assisted environments. Selection of appropriate development process.

SECTION-B

Software Development Methods: Formal, semi-formal and informal methods; Requirements elicitation, requirements specification; Data, function, and event-based modeling; Some of the popular methodologies such as Yourdons SAD, SSADM etc; CASE tools-classification, features, strengths and weaknesses; ICASE; CASE standards.

Software Project Management: Principles of software projects management; Organizational and team structure; Project planning; Project initiation and Project termination; Technical, quality, and management plans; Project control; Cost estimation methods: Function points and COCOMO.

SECTION-C

Software Quality Management: Quality control, quality assurance and quality standards with emphasis on ISO 9000; Functions of software QA organization does in a project; interactions with developers; Quality plans, quality assurance towards quality improvement; Role of independent verification & validation; Total quality management; SEI maturity model; Software metrics.

SECTION-D

Configuration Management: Need for configuration management; Configuration management functions and activities; Configuration management techniques; Examples and case studies.
Software Testing Fundamentals: Basic Terminology, Testing Techniques and strategies.
Brief introduction to various standards related to Software Engineering.

Recommended Books:

1. Pressman, Roger, Software Engineering - A Practitioners Approach, McGraw Hill (2008) 6th ed.
2. Sommerville, Ian, Software Engineering, Addison-Wesley Publishing Company, (2006) 8th ed.
3. Peter, James F., Software Engineering - An Engineering Approach, John Wiley (2004).
4. Jalote, Pankaj, An integrated Approach to Software Engineering, Narosa (2005).

DETAILED SYLLABUS

Semester-I

Advanced Data Structures and algorithms

Course Code: MTCSE-102	L	T	P
	4	0	0

SECTION-A

Review of Elementary Data Structures: Arrays, linked lists, stacks, queues, binary trees, hashing, graphs, sorting & searching techniques.

Sparse Matrices: Properties of sparse matrices, Linked list representation of sparse matrices.

Threaded Trees: Properties of threaded trees, insertion, deletion and traversal.

SECTION-B

AVL Trees: Properties of AVL trees, rotations, insertion and deletion.

Red-Black Trees: Properties of red-black trees, rotations, insertion and deletion.

B-Trees: Definition of B-trees, basic operations on B-trees, deleting a key from a B-tree.

SECTION-C

Heaps: Properties of Min-max heaps, building a heap, basic operations on heaps, application of min-max heaps.

Binomial heaps: Binomial tress and binomial heaps, operations on binomial.
Fibonacci heaps: Structure of Fibonacci heaps, merge able heap operations, decreasing a key and deleting a node, bounding a maximum degree.

Data Structures for Disjoint Sets: Disjoint set operations, linked list representation of disjoint sets, disjoint set forests.

SECTION-D

Graph Algorithms: Topological sort, minimum Spanning tree, single-source shortest paths, all-pairs shortest paths, bi-connected components, strongly connected components, cycles, articulation points, bridges.

String Matching: - string-matching algorithm, Rabin-Karp algorithm, String matching with automata, Knuth-Morris-Pratt algorithm, Boyer-Moore algorithm.

Recommended Books:

1. Thomas Coremen, Introduction to Algorithms, Second edition, Prentice Hall of India (2007) 2nd ed.
2. Mark Allen Weiss, Data Structures & Algorithm analysis in C, Dorling Kingsley (2002) 3rd ed.
3. Tannenbaum, Augenstein and Langsam, Data Structures using C and C++, Dorling Kingsley (2008) 3rd ed.

DETAILED SYLLABUS

Semester-I

Advanced DBMS

Course Code: MTCSE-103	L	T	P
	4	0	0

SECTION-A

Relational Data Base Design and Architecture: DBMS Architecture, Data base models, Normal Forms Based on Primary Keys, (1NF, 2NF, 3NF & BCNF), Lossless Join and Dependency Preserving Decomposition. Multivalued and Join Dependencies, Template Dependency, Inclusion and Generalized Functional Dependency.

SQL–A Relational Database Language, Data Definition in SQL, View and Queries in SQL, Specifying Constraints ,Indexes, Triggers in SQL.

SECTION-B

Concurrency control & Recovery: Transaction Concept and State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, **Concurrency Control Techniques**, Lock-Based Protocols, Timestamp-based Protocols, Validation – based Protocols, Multiversion Schemes, Deadlock Handling, **Recovery System**, Failure Classification, Storage Structure, Recovery and Atomicity, Log-based Recovery, Shadow Paging, Recovery with Concurrent Transactions.

SECTION-C

Distributed Data Bases: Distributed database concept, An over view of Client/Server Architecture, Database security, issues, GIS, Mobile databases, overview of Object oriented database & temporal databases.

SECTION-D

Data Warehousing & Data mining: The Evolution of Data Warehousing, Today's Development Environment, Types of Data and their Uses, Conceptual Data Architecture, Design Techniques, Logical Architecture.

Data Mining: Introduction, data mining, kind of data, Functionalities, interesting patterns, Classification of data mining systems, Major issues. **Data Warehouse and OLAP Technology for Data Mining:** data warehouse, operational database systems and data warehouses, Architecture, Implementation, development of data cube technology.

Recommended Books:

1. Korth, Silberschatz, Database System Concepts , 4th Ed., TMH, 2000.
2. Date C. J., An Introduction to Database Systems , 7th Ed., Narosa Publishing, 2004
3. Data Mining, Adriaans, Addison-Wesley Longman.
4. Alex Berson, Stephen Smith, Korth Theorling, Data Mining, TMH.
5. Anahory, Addison-Wesley Longman, Data Warehousing in the Real World

DETAILED SYLLABUS

Semester-I

Parallel and distributed computing

Course Code: MTCSE-104	L	T	P
	4	0	0

SECTION-A

Introduction: Scope and issues of parallel and distributed computing.

Models Of Parallel Computing: Taxonomy of parallel structures, Control mechanism, Address-Space Organization, Interconnection connection networks: Static and Dynamic interconnection networks, evaluating static interconnection networks, embedding other networks (Linear Array, Mesh, Binary Tree) into a hypercube; Routing mechanisms for static interconnection networks: Store and Forward (SF) Routing; Cut - Theory (CT) Routing; Cost-Performance trade-off; Architectural Models for Parallel Algorithm design.

SECTION-B

Basic Communication Operation: Simple message transfer between two processors; One-to-all broadcast; All-to-all broadcast; Reduction and prefix sums; One-to-all personalized communication; All-to-all personalized communication; circular shift. **Performance And Scalability Of Parallel Systems**: Performance matrices for Parallel systems: Run time, Speed up, Efficiency and Cost; The effect of granularity and data mapping on performance; Scalability of parallel systems; Iso-efficiency metric of scalability;

SECTION-C

Models Of Distributed Computing: Mini computer model; Workstation pool model; Client-server model; Pool of processors model; Hybrid model. **Networking And Internetworking**: Network technologies and Protocols.

SECTION-D

Inter process Communication And Remote Procedure Calling: Building blocks; Client-server communication; group communication; Case study: Inter processor communication in UNIX; Design issues in Remote procedure calling; Implementation; **Case Studies**: SUN and ANSA;

Parallel Computing Algorithms: Various sorting and searching algorithms, performance metrics for parallel algorithm implementations

Recommended Books:

1. Vipin Kumar, Ananth Grama, Anshul Gupta and George Karypis Introduction to Parallel Computing, Addison Wesley (2003) 2nd ed.
2. George Coulouris, Jean Dollimore and Tim Kindberg; Distributed Systems Concepts and Design, Addison-Wesley (2000) 3rd ed.
3. S G Akl, The Decision and Analysis of Parallel Algorithms, Prentice Hall (1989).
4. Hwang, Kai, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw Hill (1992).
5. J Jaja, An Introduction to Parallel Algorithms, Addison Wesley (1992).

DETAILED SYLLABUS

Semester-I

Advanced Computer Architecture

Course Code: MTCSE-105	L	T	P
	4	0	0

SECTION-A

Overview of von Neumann architecture: Instruction set architecture; The Arithmetic and Logic Unit, The Control Unit, Memory and I/O devices and their interfacing to the CPU; Measuring and reporting performance; CISC and RISC processors.

Pipelining: Basic concepts of pipelining, A Pipelined Data path, data hazards, control hazards, and structural hazards; Techniques for reducing the effects of various hazards.

SECTION-B

Hierarchical Memory Technology: Inclusion, Coherence and locality properties; write policies, Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies.

SECTION-C

Instruction-level parallelism: Concepts of instruction-level parallelism (ILP), Techniques for increasing ILP; Superscalar, super pipelined and VLIW processor architectures; Vector and symbolic processors.

SECTION-D

Multiprocessor Architecture: Taxonomy of parallel architectures; Centralized shared-memory architecture, synchronization, memory consistency, interconnection networks; Distributed shared-memory architecture, Cluster computers.

Non von Neumann Architectures: Data flow Computers, Systolic Architectures.

Recommended Books:

1. W. Stallings, Computer Organization and Architecture: Designing for performance, 4th Ed. PHI, 1996.
2. J. H. Hennessy and D. A. Patterson, Computer Architecture: A Quantitative Approach, 2nd Ed., Morgan Kaufmann, 1996.
3. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability and Programmability, McGraw-Hill Inc, 1993.
4. D. E. Culler, J. Pal Singh, and A. Gupta, Parallel Computer Architecture: A Hardware/Software Approach, Harcourt Asia Pvt. Ltd., 1999.
5. J. P. Hayes, Computer Architecture and Organization, McGraw Hill.
6. Harvey G. Cragon, Memory Systems and Pipelined Processors, Narosa Publication.
7. V. Rajaraman & C.S.R. Murthy, Parallel Computers, PHI.

DETAILED SYLLABUS

Semester-II

Advanced Operating Systems

Course Code: MTCSE-201	L	T	P
	4	0	0

SECTION-A

Review of Operating Systems principles, Synchronization mechanisms, Process deadlocks, Architecture of Distributed Operating system: Motivation, System Architecture types, issues in distributed operating system, Communication primitives.

SECTION-B

Inherent limitations of distributed operating systems. Event ordering. Timestamps. Distributed mutual exclusion. Token and non-token based algorithms. Comparative performance analysis.

SECTION-C

Distributed deadlock detection: Deadlock handling strategies, issues in deadlock detection & reevaluation, Control Organization: Centralized distributed & Hierarchical detection algorithms.

SECTION-D

Concurrency control. Shared Memory. File Systems. Agreement protocols for handling processor failures. Coordination of processes and related algorithms, Interprocess Communications, Failure handling and recovery mechanisms.

Recommended Books:

1. Peterson, J.L. & Silbersehatz, A: Operating System Concepts, Addison, Wesley-Reading. . .
2. Brineh, Hansen: Operating System Principles, Prentice Hall of India.
3. Haberman, A.N: Introduction to Operating System Design Galgotia Publication, New Delhi.
4. Hansen, P.B: Architecture of Concurrent Programs, PHI.
5. Shaw, A.C: Logic Design of Operating Systems, PHI.
6. Mukesh Singhal & N.G. Shivaratri: Advanced concepts in operating systems, TMH 2001.
7. A S Tanenbaum : Modern Operating Systems, PHI.

DETAILED SYLLABUS

Semester-II

Software Verification, Validation & Testing

Course Code: MTCSE-202	L	T	P
	4	0	0

SECTION-A

Introduction: What is software testing and why it is so hard?, Error, Fault, Failure, Incident, Test Cases, Testing Process, Limitations of Testing, No absolute proof of correctness, Overview of Graph Theory.

Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.

SECTION-B

Structural Testing: Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.

Testing Activities: Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, Domain Testing.

SECTION-C

Reducing the number of test cases: Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing, and Slice based testing

Object Oriented Testing: Issues in Object Oriented Testing, Class Testing, GUI Testing, Object Oriented Integration and System Testing.

SECTION-D

Testing Tools: Static Testing Tools, Dynamic Testing Tools, and Characteristics of Modern Tools and Implementation with example.Advanced topics in software testing: web based testing, Client server testing, Automated test cases generation, Regular expression and FSM based testing.

Recommended Books:

1. William Perry, Effective Methods for Software Testing , John Wiley & Sons, New York, 1995.
2. Cem Kaner, Jack Falk, Nguyen Quoc, Testing Computer Software , Second Edition, Van Nostrand Reinhold, New York, 1993.
3. Boris Beizer, Software Testing Techniques , Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
4. Louise Tamres, Software Testing , Pearson Education Asia, 2002
5. Roger S. Pressman, Software Engineering – A Practitioner's Approach , Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.

DETAILED SYLLABUS

Semester-II

Wireless Networks

Course Code: MTCSE-203

L	T	P
4	0	0

SECTION-A

PHYSICAL AND WIRELESS MAC LAYER ALTERNATIVES
Wired transmission techniques: design of wireless modems, power efficiency, out of band radiation, applied wireless transmission techniques, short distance base band transmission, VWB pulse transmission, broad Modems for higher speeds, diversity and smart receiving techniques, random access for data oriented networks, integration of voice and data traffic.

SECTION-B

WIRELESS NETWORK PLANNING AND OPERATION
Wireless networks topologies, cellular topology, cell fundamentals signal to interference ratio calculation, capacity expansion techniques, cell splitting, use of directional antennas for cell sectoring, micro cell method, overload cells, channels allocation techniques and capacity expansion FCA, channel borrowing techniques, DCA, mobility management, radio resources and power management securities in wireless networks.

SECTION-C

WIRELESS WAN
Mechanism to support a mobile environment, communication in the infrastructure, IS-95 CDMA forward channel, IS – 95 CDMA reverse channel, pallert and frame formats in IS – 95, IMT – 2000; forward channel in W-CDMA and CDMA 2000, reverse channels in W-CDMA and CDMA-2000, GPRS and higher data rates, short messaging service in GPRS mobile application protocols.

SECTION-D

WIRELESS LAN
Historical overviews of the LAN industry, evolution of the WLAN industry, wireless home networking, IEEE 802.11. The PHY Layer, MAC Layer, wireless ATM, HYPER LAN, HYPER LAN – 2.

WPAN ANDGEOLOCATION SYSTEMS
IEEE 802.15 WPAN, Home RF, Bluetooth, interface between Bluetooth and 802.11, wireless geolocation technologies for wireless geolocation, geolocation standards for E.911 service

Recommended Books:

1. Kaveh Pahlavan, Prashant Krishnamoorthy, Principles of Wireless Networks, - A united approach - Pearson Education, 2002.
2. Jochen Schiller, Mobile Communications, Person Education – 2003, 2nd Edn.
3. X.Wang and H.V.Poor, Wireless Communication Systems, Pearson education
4. M.Mallick, Mobile and Wireless design essentials, Wiley Publishing Inc.

DETAILED SYLLABUS

Semester-II

Soft Computing

Course Code: MTCSE-204	L	T	P
	4	0	0

SECTION-A

Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

SECTION-B

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.
Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations,Aggregation Operations

SECTION-C

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.
Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks.

SECTION-D

Application of Fuzzy Logic: Medicine, Economics etc.
Genetic Algorithm: An Overview of GA, GA operators, GA in problem solving, Implementation of GA.

Recommended Books:

1. Klir and Yuan, Fuzzy Systems, Prentice Hall (2001).
2. Vijay Lakshmi, Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, Soft Computing Paradigms, Prentice Hall of India (2008).
3. Timothy Ross, Fuzzy Logic, Wiley India (2007) 2nd ed.

DETAILED SYLLABUS

Semester-II

Design of Experiments and Research Methodology

Course Code: MTCSE-205	L	T	P
	4	0	0

SECTION-A

Basic principles of design of experiment, Error analysis in experiments Classification of experimental designs, Design and analysis of one factor experiments - Completely randomized and randomized complete block designs, Analysis of variance.

SECTION-B

Estimation of parameters, Residual analysis and model checking, Sample size problem. Design with two blocking variables, Latin squares, Analysis of data from a Latin square. Experiment with two factors- Introduction, Main effects and interactions, Two-factor analysis of variance, Graphic analysis, Choice of sample size.

SECTION-C

Design of Experiments with the help of orthogonal arrays, Taguchi's Robust parameter design, Analysis, Noise factors, Tolerance on control factors

SECTION-D

Research Methodology – Nature and objective of research, Research topic, Literature review, Formulation of problem, Research design, Sampling techniques, Data collection, Statistical and sensitive analysis of data, Interpretation of result and report writing.

Recommended Books:

1. Probability and Statistics for Engineers and scientists, Walpole, Myers, Myers and Ye, 7th ed, 2002, Pearson Education.
2. Statistics in Research, Bernand Ostle and Richard N.Mensing 3rd ed, 1975, Oxford & IBH Pub Co.
3. Probability and Statistics in Engineering, Hines, Montgomery, Goldsman and Borror, 4th ed, 2003, John Wiley & Sons.
4. Experimental design, Theory & application, Federer, 1955, Oxford & IBH pub Co.

DETAILED SYLLABUS

Semester-III

Cryptography Network Security

Course Code: MTCSE-301	L	T	P
	4	0	0

SECTION-A

ENCRYPTION AND DECRYPTION : Attackers and Types of Threats, challenges for information security, Encryption Techniques, Classical Cryptographic Algorithms: Monoalphabetic Substitutions such as the Caesar Cipher, Cryptanalysis of Monoalphabetic ciphers, Polyalphabetic Ciphers such as Vigenere, Vernam Cipher, Stream and Block Ciphers.

SECTION-B

SYMMETRIC KEY SYSTEMS : The Data encryption Standard (DES), Analyzing and Strengthening of DES, TDES, Advance Encryption Standard (AES)

KEY MANAGEMENT PROTOCOLS
Solving Key Distribution Problem, Diffie-Hellman Algorithm, Key Exchange with Public Key Crypotography.

SECTION-C

PUBLIC KEY ENCRYPTION SYSTEMS Concept and Characteristics of Public Key Encryption system, Introduction to Merkle-Hellman Knapsacks, Rivets – Shamir-Adlman (RSA) Encryption, introduction to Digital Signature Algorithms, The Digital Signature Standard (DSA)

HASH ALGORITHMS
Hash concept, description of Hash Algorithms, Message Digest Algorithms such as MD4 and MD5, Secure Hash Algorithms such as SHA1 and SHA2.

SECTION-D

NETWORK SECURITY
Network Security Issues such as Impersonation, Message Confidentiality, Message Integrity, Code Integrity, Denial of Service Attacks, Securing Switches and Routers, Firewalls, DMZs, Virtual Private Networks, Network Monitoring and Diagnostic Devices, Virtual LANs, IPSec Secure Communication Mechanism, PKI based authentication and Kerberos.
WEB SECURITY
Secure socket Layer Protocol, Pretty Good Privacy, Public Key Cryptography Standards.

Recommended Books:

1. Principles of Cryptography, William Stallings, Pearson Education.
2. "Security in Computing (Second Edition)" , Charles P.Pfleeger, 1996, Prentice Hall Internation, Inc.
3. Cryptography & Network Security, Atul Kahate, TMH
4. Applied Cryptography: Protocols, Algorithms, and Source Code in C, Bruce Schneier, John Willey and Sons.
5. Firewalls and Internet Security, Bill Cheswick and Steve Bellovin, Addison-Wesley
6. "Security Technologies for the world wide web", Rolf Oppliger, Artech House, Inc.
7. "Digital Certificates Applied Internet Security", Jalal Feghhi and Peter Williams, Addison Wesley Longman, Inc.

8. Experimental design, Theory & application, Federer, 1955, Oxford & IBH pub Co.

DETAILED SYLLABUS

Semester-III

Artificial Intelligence

Course Code: MTCSE-302	L	T	P
	4	0	0

SECTION-A

Introduction to Artificial intelligence: Scope, history & applications: AI as representation and search the predicate calculus inference rules. Logic based financial advisor, structures and strategies for state space search graph theory, strategies for space search, using state space to represent reasoning with the predicate calculus.

Heuristic Search: An algorithm for heuristic search, admissibility monotonicity and informed ness heuristics in games, complexity issues, control and implementation of state space search recursion based search, pattern directed search. Production systems, predicate calculus and planning the black board architecture for problems solving.

SECTION-B

LISP and PROLOG: Knowledge representation languages issues in knowledge representation, network representation language, structured representations, introduction to LISP, Search in LISP: a functional approach to the farmer, Wolf, Goat and cabbage problem, higher order functions & procedural abstraction, search strategies in LIPS.

SECTION-C

Expert systems: Introduction, History basic concepts, structure of expert systems, the human element in ES how ES works, problem areas addressed by ES, ES success factors, types of expert systems, ES and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, knowledge acquisition form multiple experts validation and verification of the knowledge base, analyzing coding, documenting & diagramming.

SECTION-D

Expert systems- II, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based rezoning, explanation & meta knowledge inference with uncertainty representing uncertainty probabilities and related approaches, theory of certainty (certainty factors) Qualitative reasoning, the development life cycle, phases I, II, III, IV, V, VI the future of expert system development process societal impacts.

Recommended Books:

1. Efrain Turban and Jay E Aranson: Decision support systems & intelligent systems (5th Edn.) Prentice hall, 1998.
2. Donald A Waterman: A Guide to expert Systems, Addison -Wesley 1995
3. G.F. Luger & W.A Stubble Field -Artificial Intelligence structures and Strategies for complex problem solving, 3 rd Edn. Addision Wesley 1998.

4. E.Rich and Knight, Artificial Intelligence, Second Edn, Tata Mc. Graw Hill Publishing, 1981.

DETAILED SYLLABUS

Semester-III

Advanced Computer Networks

Course Code: MTCSE-303	L	T	P
	4	0	0

SECTION-A

Introduction to Models and Protocols: Identify and describe the protocol data units, networking, LAN Switching, Routing devices, and purpose of the seven layers of the OSI model and compare that with the TCP/IP protocol stack.

SECTION-B

Routing and Packet Forwarding: Static and Dynamic routing protocols. Routing tables
Routing Protocols: Link State and Distance Vector, RIP, OSPF, VLSM, CIDR

SECTION-C

Client-Server and Peer-To-Peer Application Communication: Protocols on the transport layer, reliable communication. Routing packets through a LAN and WAN.

SECTION-D

Comparison: Compare and contrast different data-link protocols including Ethernet, Token Ring and Wireless (802.11).

Recommended Books:

1 James F. Kuros and Keith W. Ross. Computer Networking: A Top-Down Approach (2002).

2 Featuring the Internet, Addison Wesley (2001) 3rd ed.

DETAILED SYLLABUS

Semester-III

Software Metrics

Course Code: MTCSE-304	L	T	P
	4	0	0

SECTION-A

Basics of measurement: Measurement in everyday life, measurement in software engineering, scope of software metrics, representational theory of measurement, measurement and models, measurement scales, meaningfulness in measurement, goal based framework for software measurement, classifying software measures, determining what to measure, software measurement validation, empirical investigation, types of investigation, planning and conducting investigations.

SECTION-B

Software: Metrics data collection and analysis: What is good data, how to define the data, how to collect the data, how to store and extract data, analyzing software-measurement data, frequency distributions, various statistical techniques.

Measuring internal product attributes: Measuring size, aspects of software size, length, functionality and complexity, measuring structure, types of structural measures, control-flow structure, modularity and information flow attributes, data structures.

SECTION-C

Measuring external product attributes: Modeling software quality, measuring aspects of software quality, software reliability, basics of software reliability, software reliability problem, parametric reliability growth models, predictive accuracy, recalibration of software-reliability growth predictions, importance of operational environment, wider aspects of software reliability.

Metrics for object-oriented systems: The intent of object-oriented metrics, distinguishing characteristics of object-oriented metrics, various object-oriented metric suites LK suite, CK suite and MOOD metrics.

SECTION-D

Dynamic Metrics: Runtime Software Metrics, Extent of Class Usage, Dynamic Coupling, Dynamic Cohesion, and Data Structure Metrics.
Metrics for component-based systems: The intent of component-based metrics, distinguishing characteristics of component-based metrics, various component-based metrics.
Resource measurement: Measuring productivity, teams, tools, and methods.

Recommended Books:

1. Software Metrics: A rigorous and Practical Approach by Norman E. Fenton and Shari Lawrence Pfleeger, International Thomson Computer Press (1997) 2nd ed.
2. Applied Software Measurement by Capers Jones, McGraw Hill (2008).
3. Object-Oriented Software Metrics by Mark Lorenz, Jeff Kidd, Prentice Hall (1994).

DETAILED SYLLABUS

Semester-III

Real Time Software and Systems

Course Code: MTCSE-305 **L T P**

4 0 0

SECTION-A

Introduction:

RTS, Characteristics of RTS, RTOS, Types of RTOS, Characteristics of RTOS, Processors and micro controllers of RTS, Skill set required for various types of RTS.

SECTION-B

S/W Engg Involved: SDLC for RTS, Process models for RTS-SPIRAL, incremental Xtreame, prototyping, RAD, Risk & Failure Analysis.

Requirement Analysis: RT requirement eliciation and analysis using structured and object-oriented approach, Applications of formal methods for requirement specification.

SECTION-C

Architecture & Design: Architecture properties, RT Architecture, design temporal & non temporal,. Techniques, scheduling- (Tasks, T&S, RM scheduling).

Testing of RTS: verification& validation, test strategy, RTS test techniques.

SECTION-D

Languages& Tools: Introduction to languages used for development of RTS, Introduction to Tools

Recommended Books:

1. 1 Alan C Shaw: Real-Time Systems and software, John Wiely and Sons (2001).
2. Philip Laplante: Real-Time Systems and design and analysis, an engineer's handbook, IEEE computer society press (2004) 3rd ed.
3. J. E .Cooling:Software design for Real-Time Systems, Chapman and Hall(1991).
4. Krishna M Kavi, Real-Time Systems, abstraction, languages and design methodologies, IEEE Computer Society press (1998).

DETAILED SYLLABUS

Semester-III

Grid Computing

Course Code: MTCSE-306	L	T	P
	4	0	0

SECTION-A

Introduction: Definition of Grid, history and evolution of Grid Computing, Virtual Organizations, Computational Grid projects around the world, Grid challenges, Grid organizations, Service Oriented Architecture (SOA), Issues in Management of Grid Models.

Architecture: Components of Layered Grid Architecture, Open Grid Services Architecture (OGSA), Grid architecture models, Grid Resource Information Service (GRIS). Resource infrastructure

SECTION-B

Grid Middleware: Globus: Overview, resource specification language, information services, Globus Resource Allocation Manager (GRAM), job submission with managed-job-globusrun, security, scheduling, Grid FTP protocol, overview of other middleware like Condor, Condor-G.

Resource Management and Scheduling: Resource Discovery and Information Services, Information directory services, schedulers and resource brokers, Characterization of resource management problems based on job requirements, algorithms, tools and sample resource management systems, Monitoring, Scheduling, Performance tuning, Debugging and performance diagnostic issues

SECTION-C

Grid Security: Grid security demands and solutions; authentication, authority, assurance, accounting, trust, group communication for large-scale, dynamic, multi-organization environments.

Grid Portals: Functionality and underlying infrastructure for sample general and application specific portals.

SECTION-D

Data Management: Key issues for data management in Grids, including file transfer, data replication, data caching issues, catalog issues.

Case Studies: Topics from Seti project, Sun Grid engine, EuroGrid and some other national grid projects.

Advanced Topics: Overview of: Grid simulation, Grid Economy, Semantic Grid, Autonomic Grid, Cloud Computing.

Recommended Books:

1. Foster, I. and Kesselman, C. (eds.). The Grid: Blueprint for a New Computing Infrastructure. Morgan Kaufmann Publishers, (1999).

2. Luis Ferreira et al., Grid Computing in Research and Education, ibm.com/redbooks, (September 2003).

DETAILED SYLLABUS

Semester-III

Internet Technologies

Course Code: MTCSE-307	L	T	P
	4	0	0

SECTION-A

Binding Protocol Address- Address Resolution Protocol & RARP, ARP & RARP, packet format, Encapsulation. Internet protocol: Introduction, Ipv4 header, Ipv4Datagrams, Encapsulation, Fragmentation and Reassembly, IP routing, Subnet addressing, Subnet mask, Supernetting- special case of IP addresses IPv6-Motivation, frame format and addressing, comparison of IPv4 and IPv6.

SECTION-B

ICMP: Introduction, ICMP Header, ICMP message types, ICMP timestamp request and reply, trace route, ping program. Intra & inter domain routing-distance vector routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP. Unicast Routing protocols. IGMP message, operation, encapsulation.

SECTION-C

Basic Networking Issues, Network Interoperability and Standards, TCP/IP, connections, sockets, and client/server structures. TCP: Introduction, services, headers, connection establishment and termination, timeout of connection establishment, maximum segment size-half, close, state transition diagram, port no. and socket addresses , TCP timers UDP: Introduction, UDP header, UDP checksum, UDP operations, encapsulation & decapsulation, queuing, SCTP-Services, transmission sequence number, stream identifier, stream sequence number, packet format.

BOOTP:-operation, packet format. DHCP:-Address allocation, configuration & packet Format, DNS: Distribution of name spaces, DNS in the Internet.

SECTION-D

The World Wide Web, HTML, HTTP, and server side programming with CGI and servlets. Standards, network effects and inertia, spam, security and privacy. FTP:-Connection, Communication, command processing, TFTP. E-Mail:-SMTP, POP & IMAP. SNMP:-Management components, SMI, MIB, Internet Search Engines and client side applets

Recommended Books:

1. Deitel, Deitel, and Nieto, Internet & World Wide Web How to Program", Third Edition
2. Preston Gralla, How the Internet Works, Que, Paperback, 8th edition, ISBN 0789736260

1. Douglas E.Comer, Computer Networks and Internets with Internet Applications 3rd Edition, Prentice Hall, 2001, ISBN: 0-13-091449-5
2. Elizabeth Castro, HTML for the World Wide Web with XHTML and CSS: Visual QuickStart Guide, 5th Edition, Peachpit Press, ISBN: 0321130073
3. Robert W. Sebesta, Programming the World Wide Web, 2/e, Addison-Wesley, ISBN: 0-321-14945-9

DETAILED SYLLABUS

Semester-III

Cloud Computing

Course Code: MTCSE-308

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4	0	0

SECTION-A

Introduction: Basics of the emerging cloud computing paradigm, cloud computing history and evolution, cloud enabling technologies, practical applications of cloud computing for various industries, the economics and benefits of cloud computing

Cloud Computing Architecture: Cloud Architecture model, Types of Clouds: Public Private & Hybrid Clouds, Resource management and scheduling, QoS (Quality of Service) and Resource Allocation, Clustering

SECTION-B

Cloud Computing delivery Models: Cloud based services: Iaas , PaaS and SaaS Infrastructure as a Service (IaaS):Introduction to IaaS, Resource Virtualization i.e. Server, Storage and Network virtualization Platform as a Service (PaaS):Introduction to PaaS, Cloud platform & Management of Computation and Storage, Azure, Hadoop, and Google App. Software as a Service (SaaS):Introduction to SaaS, Cloud Services, Web services, Web 2.0, Web OS Case studies related to IaaS, PaaS and SaaS

SECTION-C

Data Processing in Cloud: Introduction to Map Reduce for Simplified data processing on Large clusters, Design of data applications based on Map Reduce in Apache Hadoop

Advanced Technologies: Advanced web technologies (AJAX and Mashup), distributed computing models and technologies (Hadoop and MapReduce), Introduction to Open Source clouds like Virtual Computing Lab (Apache VCL), Eucalyptus

SECTION-D

Cloud Issues and Challenges: Cloud computing issues and challenges like Cloud provider Lock-in, Security etc. **Introduction to Python Runtime Environment:** The Datastore, Development Workflow

Recommended Books:

1. The Complete Cornerstone Guide to Cloud Computing Best Practices, Second Edition, Gerard Blokdijk, Ivanka Menken by Emereo Pty Ltd, 2009
2. Cloud Computing: A practical Approach Anthony Velte, Toby Velte and Robert Elsenpeter by Tata McGrawHill
3. Cloud Computing Principles and Paradigms, Rajkumar Buyya, James Broberg and Goscinski by John Wiley and Sons
4. *Raj Kumar Buyya, James Broberg, Andrezei M. Goscinski, Cloud Computing: Principles and Paradigms, 2011*
5. *Michael Miller, Cloud Computing, 2008*

DETAILED SYLLABUS

Semester-III

Fault Tolerant Systems

Course Code: MTCSE-309	L	T	P
	4	0	0

SECTION-A

Fundamental concepts in the theory of reliable computer systems design. Introduction to redundancy theory, limit theorems; decision theory in redundant systems.

SECTION-B

Hardware fault tolerance, redundancy techniques, detection of faults, replication and compression techniques, self-repairing techniques, concentrated and distributed voters, models of fault tolerant computing systems, Case studies.

SECTION-C

Software fault tolerance: fault tolerance versus fault intolerance, errors and their management strategies. Implementation techniques: software defense, protective redundancy, architectural support.

SECTION-D

Fault recovery techniques & Coding theory: application to fault tolerant system design. Fault-tolerance and reliability of multicomputer networks (direct and indirect) including fault-tolerant routing and sparing techniques. Yield and reliability enhancement techniques for VLSI/WSI array processors.

Recommended Books:

1. Israel Koren, C. Mani Krishna Fault Tolerant Systems.
2. Course developed by professor

DETAILED SYLLABUS

Semester-III

Data warehousing & Data mining

Course Code: MTCSE-310	L	T	P
	4	0	0

SECTION-A

INTRODUCTION TO DATA: Need for Data Warehousing , Paradigm Shift, Business Problem Definition, Operational and Information Data Stores, Data Warehouse Definition and Characteristics, Data Warehouse Architecture.

SECTION-B

DATAWAREHOUSING COMPONENTS
Overall Architecture, Data Warehouse Database, Sourcing, Acquisition, Cleanup and Transformation Tools, Metadata, Access Tools, Data Marts, Data Warehouse Administration and Management, Information Delivery Systems.

MAPPING THE DATA WAREHOUSE TO A MULTIPROCESSOR ARCHITECTURE
Relational Database Technology for Data warehouse. Database Architectures for Parallel Processing, Parallel RDBMS Features, Alternative Technologies, Parallel DBMS Vendors.

SECTION-C

DATA EXTRACTION, CLEANUP AND TRANSFORMATION TOOLS
Tool Requirements, Vendor Approaches, Access to Legacy Data, Vendor Solutions, Transformation Engines.

METADATA : Metadata Defined, Metadata Interchange Initiative, Metadata Repository, Metadata management, Implementation Examples, Metadata Trends.

SECTION-D

INTRODUCTION TO DATA MINING

Data Mining, Measuring Data Mining Effectiveness: Accuracy, Speed and Cost, Embedding **Data Mining into Business Process, Discovery versus Prediction.**

RULEINDUCTION
Business Score Card, Rule Induction, The General Idea, Rule Induction.

SELECTING AND USING THE RIGHT TECHNIQUE

Right Technique, Data Mining in the Business Process, Embedded Data Mining, Measure Accuracy, Explanation and Integration.

Recommended Books:

1. "Mastering Data Mining: The Art and Science of Customer Relationship Management", by Berry and Lin off, John Wiley and Sons, 2001.
2. "Data Ware housing: Concepts, Techniques, Products and Applications", by C.S.R. Prabhu, Prentice Hall of India, 2001.

DETAILED SYLLABUS

Semester-III

High Performance Computing

Course Code: MTCSE-311	L	T	P
	4	0	0

SECTION-A

Review of Computer Architectures

Taxonomy of MIMD Computers, Multi-vector and SIMD, Computers, Vector Supercomputers SIMD Supercomputers PRAM and VLSI Models. Parallel Random Access Machines, VLSI Complexity Model Architectural Development Tracks

Multiple –Processor Tracks, Multi-vector and SIMD Tracks, Multithreaded and Dataflow Tracks Conditions and Parallelism

SECTION-B

Parallelism

Data and Resource Dependences, Hardware and Software parallelism, the role of Compilers Program partitioning and scheduling. Grain Sizes and Latency, Grain Packing and Scheduling, Static Multiprocessor Scheduling Program. Control flow Mechanism, Demand-Driven Mechanism, Comparison of Flow Mechanisms, System Interconnect Architectures: Network properties and Routing, Static Connection networks, Dynamic Connection

Networks. Performance Metrics and Measures

Parallelism Profile in Programs, Harmonic mean Performance, Efficiency, Utilization and Quality, Standard Performance Measures Scalability Analysis and Approaches.
Scalability metrics and Goals, Evolution of Scalable Computers Advance processor Technology

Instruction set architecture, CISC and RISC Scalar processors Superscalar and Vector Processors, Superscalar Processors, The VLIW Architecture, Vector processors Memory

SECTION-C

Hierarchy Technology

Hierarchical Memory Technology Inclusion, Coherence and Locality, Memory Capacity Planning. Multiprocessor System Interconnects Hierarchical Bus system, Crossbar Switch and Multiport Memory, Multistage and Combining networks Cache Coherence and Synchronization Mechanisms. The cache coherence problem, Snoopy bus protocol Vector processing principles. Vector Instruction Types, Vector Access Memory SchemesSIMD Computer Organization

SECTION-D

Implementation Models, The CM-2 architectureSoftware for Parallel programming - variable Model, Message-passing Model, Data-parallel Model, Object-Oriented Model, Functional and Logic ModelsParallel Languages and Compilers

Language features for parallelism, Parallel Language Constructs, Optimizing Compilers for parallelismParallel Programming Environment

Tools and Environment, Y-MP, Paragon and CM-5 Environment, Visualization and Performance TuningSynchronization and Multiprocessing Modes

Principles of synchronization, Multiprocessor execution Models, Shared-Variable Program Structures, Locks for Protected access, Semaphores and Applications, Monitors and Applications, Message-passing program Development, Distributing the Computation, Synchronous Message passing, Asynchronous message passing

Recommended Books:

1. Kai Hwang: Advance Computer Architecture- Parallelism, Scalability and Programmability, McGraw-Hill International Edition, Computer Series, 1993.
2. Michael J. Quinn: Parallel Computing – theory and Practice, McGraw Hill International Edition, Computer Science Series, 2nd Edition, 1994.
3. S.G. Akl: Design and Analysis of parallel algorithms, Prentice hall, Englewood Cliff NJ.
4. S. Lakshmivarahan and S.K. Dhall: Analysis and Design of Parallel Algorithms- arithmetic and Matrix Problems, McGraw Hill International Edition, Computer Science Series. 1990.
5. A practical approach to parallel Computing by S K Ghosal, Universities press (India) Limited

DETAILED SYLLABUS

Semester-III

Multimedia Communications & Systems

Course Code: MTCSE-312	L	T	P
	4	0	0

SECTION-A

INTRODUCTION

Benefits and problems associated with multimedia, elements of Multimedia System, Technology for multimedia, Multimedia Hardware and Software, Application of Multimedia, Issues and Objectives of multimedia, Structural Multimedia Development & User Interfaces.

SECTION-B

MULTIMEDIA COMMUNICATIONS

Multimedia communication model, user and network requirements, signal processing in networks, video on demand broadcasting protocols, IP telephony technology and standards, VOIP, building multimedia networks with cable and broadcast communication.

SECTION-C

AUDIO-VISUAL PROCESSING

Media interaction, audio visual mapping, challenges of multimedia processing, image, audio and video coding in multimedia, audio, video and image capture and their compression standards and techniques

DISTRIBUTED MULTIMEDIA SYSTEMS

Features and resource management of distributed management systems, networking in DMS, multimedia operating systems, applications

SECTION-D

STORAGE FOR MULTIMEDIA AND PUBLISHING TOOLS

Types of storage - analog and digital media and Optical devices, Standards and processing parameters, Multimedia servers, Multimedia Publishing tools

Recommended Books:

1. Multimedia Making it work: Von Haughan,TMH
2. Multimedia Communications: Jerry D. Gibson, Harcourt India Private Limited
3. Multimedia Technology & Application, David Hillman, Galgotia Publication, 1998