B.S.ABDUR RAHMAN
U N I V E R S I T Y

B.S.ABDUR RAHMAN INSTITUTE OF SCIENCE & TECHNOLOGY
(Estd.u/s 3 of the UGC Act, 1956)

(FORMERLY B.S.ABDUR RAHMAN CRESCENT ENGINEERING COLLEGE)
Seethakathi Estate, G.S.T. Road, Vandalur, Chennai - 600 048.

REGULATIONS (2009), CURRICULUM AND SYLLABUS
FOR
M.Tech. SOFTWARE ENGINEERING
(FOUR SEMESTERS / FULL TIME)
(Updated upto June 2012)

**REGULATIONS -2009 FOR
M.TECH / MCA / M. Sc DEGREE PROGRAMMES**

1.0 PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires

i)   **"Programme"** means Post Graduate Degree Programme (M.Tech./ MCA / M.Sc.)

ii) **"Course"** means a theory or practical subject that is normally studied in a semester, like Applied Mathematics, Structural Dynamics, Computer Aided Design, etc.

iii) **"University"** means B.S.Abdur Rahman University, Chennai, 600048.

iv) **"Institution"** unless otherwise specifically mentioned as an autonomous or off campus institution means B.S.Abdur Rahman University.

v)   **"Academic Council"** means the Academic Council of the University.

vi) **'Dean (Academic Courses)'** means Dean (Academic Courses) of B.S.Abdur Rahman University.

vii) **'Dean (Students)'** means Dean(Students) of B.S.Abdur Rahman University.

viii) **"Controller of Examinations"** means the Controller of Examinations of B.S.Abdur Rahman University who is responsible for conduct of examinations and declaration of results.

2.0 PROGRAMMES OFFERED, MODE OF STUDY AND ADMISSION REQUIREMENTS

2.1 P.G. Programmes Offered

The various P.G. Programmes and their modes of study are as follows:

Degree	Mode of study
M.Tech.	Full Time
M.Tech.	Part Time – Day / Evening
M.C.A.	Full Time
M. Sc.	Full Time

2.2 MODES OF STUDY

2.2.1 Full-time

Candidates admitted under "Full-Time" shall be available in the institution during the complete working hours for curricular, co-curricular and extra-curricular activities assigned to them.

2.2.2 A full time student, who has completed all non-project courses desiring to do the Project work in part-time mode for valid reasons, shall apply to the Head of the Institution through the Head of the Department, if the student satisfies the clause 2.3.5 of this Regulations. Permission may be granted based on merits of the case. Such conversion is not permitted in the middle of a semester.

2.2.3 Part time - Day time

In this mode of study, the candidates are required to attend classes for the courses registered along with full time students.

2.2.4 Part time - Evening

In this mode of study, the candidates are required to attend only evening classes.

2.2.5 A part time student is not permitted to convert to the full time mode of study.

2.3. ADMISSION REQUIREMENTS

2.3.1 Candidates for admission to the first semester of the Master's Degree Programme shall be required to have passed an appropriate degree examination of this University as specified in Table 1 or any other examination of any University or authority accepted by the University as equivalent thereto.

2.3.2 Notwithstanding the qualifying examination the candidate might have passed, he/she shall have a minimum level of proficiency in the appropriate programme/courses as prescribed by the institution from time to time.

2.3.3 Eligibility conditions for admission such as class obtained, number of attempts in qualifying examination and physical fitness will be as prescribed by the Institution from time to time.

2.3.4 All part-time candidates should satisfy other conditions regarding experience, sponsorship etc., which may be prescribed by the institution from time to time.

2.3.5 A candidate eligible for admission to M.Tech. Part Time - Day Time programmeshall have his/her permanent place of work within a distance of 65km from the campus of the institution.

2.3.6 A candidate eligible for admission to M.B.A. Part Time - Evening programme shall have a working experience of 2 years at least at supervisory level. He/she shall have his/her place of work within a distance of 65 km from the campus of the institution.

3.0 DURATION AND STRUCTURE OF THE P.G. PROGRAMME

3.1. The minimum and maximum period for completion of the P.G. Programmes are given below:

Programme	Min. No. of Semesters	Max. No. of Semesters
M.Tech. (Full Time)	4	8
M.Tech.(Part Time)	6	12
M.C.A. (Full Time)	6	12
M.Sc. (Full Time)	4	8

3.2 The P.G. programmes will consist of the following components as prescribed in the respective curriculum

  i.   Core courses

  ii.   Elective courses

  iii. Project work / thesis / dissertation

  iv.   Laboratory Courses

  v.   Case studies

  vi.   Seminars

  vii. Practical training

3.3 The curriculum and syllabi of all the P.G. programmes shall be approved by the Academic Council.

3.4 The number of credits to be earned for the successful completion of the programme shall be specified in the curriculum of the respective specialization of the P.G. programme.

3.5 Each academic semester shall normally comprise of 75 to 80 working days spread over sixteen weeks. End-semester examinations will follow immediately after these working days.

ELIGIBLE ENTRY QUALIFICATIONS FOR ADMISSION TO P.G. PROGRAMMES

SI.No.	Name of the Department	P.G. Programmes offered	Qualifications for admission
01.	Civil Engineering	M.Tech. (Structural Engineering)	B.E / B.Tech. (Civil Engineering) / (Structural Engineering)
		M.Tech. (Construction Engineering and Project Management)	B.E. / B.Tech. (Civil Engineering) /(Structural Engineering)
02.	Mechanical Engineering	M.Tech. (CAD - CAM)	B.E. / B.Tech. (Mechanical / Auto /Manufacturing / Production / Industrial/Mechatronics / Metallurgy / Aerospace/Aeronautical / Material Science / Marine Engineering)
		M.Tech. (Manufacturing Engineering)	B.E. / B.Tech. (Mechanical / Auto / Manufacturing / Production / Industrial/Mechatronics / Metallurgy / Aerospace/Aeronautical / Material Science / Marine Engineering)
03.	Polymer Technology	M.Tech. (Polymer Technology)	B. E. / B. Tech. degree Mech./ Production / Polymer Science or Engg or Tech/Rubber Tech/ M.Sc(Polymer Sc./Chemistry Appl. Chemistry)
04.	Electrical and Electronics Engineering	M.Tech. (Power Systems Engg)	B.E/B.Tech (EEE/ECE/E&I/ I&C/ Electronics / Instrumentation)
		M.Tech. (Power Electronics & Drives)	B.E/B.Tech (EEE/ECE/E&I/ I&C/ Electronics/ Instrumentation)
05.	Electronics and Communication Engineering	M.Tech. (Communication Systems)	M.Tech (Power System Engg) B.E / B.Tech (EEE/ ECE / E&I / I&C / Electronics / Instrumentation)
		M.Tech. (VLSI and Embedded Systems)	B.E./ B.Tech. in ECE / Electronics / EIE
06.	ECE Department jointly with Physics Department	M.Tech. (Optoelectronics and Laser Technology)	B.E./B.Tech. (ECE / EEE / Electronics / EIE / ICE) M.Sc (Physics / Materials Science / Electronics / Photonics)
07.	Electronics and Instrumentation Engineering	M.Tech. (Electronics and Instrumentation Engineering)	B.E./B.Tech. (EIE/ICE/Electronics/ECE/EEE)
08.	Computer Science and Engineering	M.Tech. (Computer Science and Engineering)	B.E. /B.Tech. (CSE/IT/ECE/EEE/EIE/ICE/ Electronics / MCA)
		M.Tech. (Software Engineering)	B.E. / B.Tech. (CSE / IT) MCA
09	Information Technology	M.Tech. (Information Technology)	B.E /B.Tech. (IT/CSE/ECE/EEE/EIE/ICE/ Electronics) MCA
10	Computer Applications	M.C.A.	Any degree. Must have studied Mathematics / Statistics /Computer oriented subject.
		M.Tech. (Systems Engineering and Operations Research)	Any degree. Must have studied Mathematics / Statistics /Computer oriented subject.
11	Mathematics	M.Sc. (Actuarial Science)	B.Sc. (Mathematics) of B.Sc. (Applied Science)
12	Chemistry	M.Sc.(Chemistry)	B.Sc (Chemistry) of B.Sc. (Applied Science)

3.6 The curriculum of P.G. programmes shall be so designed that the minimum prescribed credits required for the award of the degree shall lie within the limits specified below:

Programme	Minimum prescribed credit range
M.Tech.	70 to 80
M.C.A	130 to 140
M.Sc	74 to 80

3.7 Credits will be assigned to the courses for all P.G. programmes as given below:

* One credit for one lecture period per week

* One credit for one tutorial period per week

* One credit each for seminar/practical session of two or three periods per week

* One credit for four weeks of practical training

3.8 The number of credits registered by a candidate in non-project semester and project semester should be within the range specified below:

P.G. Programme	Non-project Semester	Project semester
M.Tech. (Full Time)	15 to 23	12 to 20
M.Tech. (Part Time)	6 to 12	12 to 16
M.C.A. (Full Time)	12 to 25	12 to 20
M.Sc. (Full Time)	15 to 25	12 to 20

3.9 The electives from the curriculum are to be chosen with the approval of the Head of the Department.

3.10 A candidate may be permitted by the Head of the Department to choose electives offered from other P.G. Programmes either within a Department or from other Departments up to a maximum of three courses during the period of his/her study, provided the Heads of the Departments offering such courses also agree.

3.11 To help the students to take up special research areas in their project work and to enable the department to introduce courses in latest/emerging areas in the curriculum, "Special Electives" may be offered. A candidate may be

permitted to register for a "Special Elective" up to a maximum of three credits during the period of his/her study, provided the syllabus of this course is recommended by the Head of the Department and approved by the Dean (AC) before the commencement of the semester, in which the special elective course is offered. Subsequently, such course shall be ratified by the Board of Studies and Academic Council.

3.12 The medium of instruction, examination, seminar and project/thesis/ dissertation reports will be English.

3.13 Practical training or industrial attachment, if specified in the curriculum shall be of not less than four weeks duration and shall be organized by the Head of the Department.

3.14 PROJECT WORK/THESIS/DISSERTATION

3.14.1 Project work / Thesis / Dissertation shall be carried out under the supervision of a qualified teacher in the concerned Department.

3.14.2 A candidate may however, in certain cases, be permitted to work on the project in an Industrial/Research Organization, on the recommendation of Head of the Department, with the approval of the Head of the Institution. In such cases, the project work shall be jointly supervised by a supervisor of the Department and an Engineer / Scientist from the organization and the student shall be instructed to meet the supervisor periodically and to attend the review committee meetings for evaluating the progress.

3.14.3 Project work / Thesis / Dissertation (Phase - II in the case of M.Tech.) shall be pursued for a minimum of 16 weeks during the final semester, following the preliminary work carried out in Phase-1 during the previous semester.

3.14.4 The Project Report/Thesis / Dissertation report / Drawings prepared according to approved guidelines and duly signed by the supervisor(s) and the Head of the Department shall be submitted to the Head of the Institution.

3.14.5 The deadline for submission of final Project Report / Thesis / Dissertation is within 30 calendar days from the last working day of the semester in which Project / Thesis / Dissertation is done.

3.14.6 If a candidate fails to submit the Project Report / Thesis / Dissertation on or before the specified deadline he / she is deemed to have not completed the Project Work / Thesis / dissertation and shall re-register the same in a subsequent semester.

3.14.7 A student who has acquired the minimum number of total credits prescribed in the Curriculum for the award of the Masters Degree will not be permitted to enroll for more courses to improve his/her cumulative grade point average (CGPA).

4.0 FACULTY ADVISER

To help the students in planning their courses of study and for getting general advice on academic programme, the concerned department will assign a certain number of students to a faculty member who will be called the Faculty Adviser.

5.0 CLASS COMMITTEE

5.1 Every class of the P.G. Programme will have a Class Committee, constituted by the Head of the Department as follows:

i. Teachers of all courses of the programme

ii. One senior faculty preferably not offering courses for the class, as chairperson.

iii. One or two students of the class, nominated by the Head of the Department.

iv. Faculty Advisers of the class - Ex-Officio Members

v. Professor in-charge of the P.G. Programme - Ex-Officio Member.

5.2 The Class Committee shall be constituted by the respective head of the department of the students.

5.3 The basic responsibilities of the Class Committee are to review periodically the progress of the classes, to discuss problems concerning curriculum and syllabi and the conduct of the classes. The type of assessment for the course will be decided by the teacher in consultation with the Class Committee and will be announced to the students at the beginning of the semester. Each Class Committee will communicate its recommendations to the Head of the Department and the Head of the Institution. The class committee, **without the student members,** will also be responsible for finalization of the semester results.

5.4 The Class Committee is required to meet at least thrice in a semester, once at the beginning of the semester, another time after the end-semester examination to finalise the grades, and once in between.

6.0 COURSE COMMITTEE

Each common theory course offered to more than one group of students shall have a "Course Committee" comprising all the teachers teaching the common course with one of them nominated as Course coordinator. The nomination of the Course coordinator shall be made by the Head of the Department / Head of the Institution depending upon whether all the teachers

teaching the common course belong to a single department or to several departments. The Course Committee shall meet as often as possible and ensure uniform evaluation of the tests and arrive at a common scheme of evaluation for the tests. Wherever it is feasible, the Course Committee may also prepare a common question paper for the test(s).

7.0 REGISTRATION AND ENROLMENT

7.1 For the first semester every student has to register and enroll for the courses he/she intends to undergo on a specified day notified to the student. The concerned Faculty Adviser will be present and guide the students in the registration/enrolment process.

7.2 For the subsequent semesters registration for the courses will be done by the student during a specified week before the end-semester examination of the previous semester. The curriculum gives details of the core and elective courses, project and seminar to be taken in different semester with the number of credits. The student should consult his/her Faculty Adviser for the choice of courses. The Registration form is filled in and signed by the student and the Faculty Adviser.

7.3 Late registration will be permitted with a prescribed fine up to two weeks from the last date specified for registration.

7.4 From the second semester onwards all students shall pay the prescribed fees and enroll on a specified day at the beginning of a semester.

A student will become eligible for enrolment only if he/she satisfies clause 9 and in addition he/she is not debarred from enrolment by a disciplinary action of the Institution. At the time of enrolment a student can drop a course registered earlier and also substitute it by another course for valid reasons with the consent of the Faculty Adviser. Late enrolment will be permitted on payment of a prescribed fine up to two weeks from the date of commencement of the semester.

7.5 Withdrawal from a course registered is permitted up to one week from the date of the completion of the first assessment test.

7.6 Change of a course within a period of 15 days from the commencement of the course, with the approval of Dean (AC), on the recommendation of the HOD, is permitted.

7.6.1 Courses withdrawn will have to be taken when they are offered next if they belong to the list of core courses.

7.7 SUMMER TERM COURSES

7.7.1 Summer term courses may be offered by a department on the recommendation by the Departmental Consultative Committee and approved by the Head of the Institution. No student should register for more than three courses during a summer term.

7.7.2 Summer term courses will be announced by the Head of the Institution at the end of the even semester before the commencement of the end semester examinations. A student will have to register within the time stipulated in the announcement. A student has to pay the fees as stipulated in the announcement.

7.7.3 Fast-track summer courses of 30 periods for 3 credit courses and 40 periods for 4 credit courses will be offered for students with I grades. They may also opt to redo such courses during regular semesters with slotted time-tables. Students with U grades will have the option either to write semester end arrears exam or to redo the courses during summer / regular semesters with slotted time-table, if they wish to improve their continuous assessment marks also.

The assessment procedure in a summer term course will also be similar to the procedure for a regular semester course.

7.7.4 Withdrawal from a summer term course is not permitted. No substitute examination will be held for the summer term courses.

8.0 TEMPORARY WITHDRAWAL FROM THE PROGRAMME

A student may be permitted by the Head of the Institution to temporarily withdraw from the programme up to a maximum of two semesters for reasons of ill health or other valid grounds. However the total duration for completion of the programme shall not exceed the prescribed number of semesters (vide clause 3.1).

9.0 MINIMUM REQUIREMENTS TO REGISTER FOR PROJECT / THESIS / DISSERTATION

9.1 A candidate is permitted to register for project semester, if he/she has earned the minimum number of credits specified below:

Programme	Minimum No. of credits to be earned to enrol for project semester
M.Tech. (Full time)	18 (III semester)
M.Tech. (Part-time)	18 (V semester)
M.C.A. (Full time)	45 (VI semester)
M.Sc. (Full-time)	28 (IV semester)

9.2 **M.Tech.:** If the candidate has not earned minimum number of credits specified, he/she has to earn the required credits (at least to the extent of minimum credit specified in clause 9.1) and then register for the project semester.

9.3 **M.C.A.:** If the candidate has not earned the required minimum number of credits specified he/she has to earn the required credits (at least to the extent of minimum credits specified in clause 9.1) and then register for the project work in subsequent semesters.

10.0 DISCIPLINE

10.1 Every candidate is required to observe discipline and decorous behaviour both inside and outside the campus and not to indulge in any activity, which will tend to bring down the prestige of the institution.

10.2 Any act of indiscipline of a candidate reported to the Head of the Institution will be referred to a Discipline and Welfare Committee for taking appropriate action.

10.3 Every candidate should have been certified by the HOD that his / her conduct and discipline have been satisfactory.

11.0 ATTENDANCE

11.1 Attendance rules for all Full Time Programme and Part time - day Time Programmes are given in the following sub-clauses.

11.2 A student **shall earn 100% attendance** in the contact periods of every course, subject to a **a maximum relaxation of 25%** for genuine reasons like on medical grounds , representing the University in approved events etc., to become eligible to appear for the end-semester examination in that course, failing which the student shall be awarded "I" grade in that course. If the course is a core course, the candidate should register for and repeat the course when it is offered next.

12.0 ASSESSMENTS AND EXAMINATIONS

12.1 The following rule shall apply to the full-time and part-time P.G. programmes (M.Tech./ M.C.A. / M.Sc.)

For lecture-based courses, normally a minimum of two assessments will be made during the semester. The assessments may be combination of tests and assignments. The assessment procedure as decided at the Class Committee will be announced to the students right at the beginning of the semester by the teacher and informed to Dean(AC)

12.2 There shall be one **examination** of three hours duration, at the end of the semester, in each lecture based course.

12.3 The evaluation of the Project work will be based on the project report and a Viva-Voce Examination by a team consisting of the supervisor concerned, an Internal Examiner and External Examiner to be appointed by the Controller of Examinations.

12.4 At the end of practical training or industrial attachment, the candidate shall submit a certificate from the organization where he/she has undergone training and also a brief report. The evaluation will be made based on this report and a Viva-Voce Examination, conducted internally by a Departmental Committee constituted by the Head of the Department.

13.0 WEIGHTAGES

13.1 The following shall be the weightages for different courses:

i) **Lecture based course**

Two sessional assessments	-	50%
End-semester examination	-	50%

ii) **Laboratory based courses**

Laboratory work assessment	-	75%
End-semester examination	-	25%

iii) **Project work**

Periodic reviews	-	50%
Evaluation of Project Report by External Examiner	-	20%
Viva-Voce Examination	-	30%

13.2 The markings for all tests, tutorial assignments (if any), laboratory work and examinations will be on absolute basis. The final percentage of marks is calculated in each course as per weightages given in clause 13.1.

14.0 SUBSTITUTE EXAMINATION

14.1 A student who has missed for genuine reasons any one of the three assessments including end-semester examination of a course may be permitted to write a substitute examination. However, permissions to take up a substitute examination will be given under exceptional circumstances, such as accident or admissions to a hospital due to illness, etc.,

14.2 A student who misses any assessment in a course shall apply in a prescribed form to the Dean(AC) through the Head of the department within a week from the date of missed assessment. However the substitute tests and examination for a course will be conducted within two weeks after the last day of the end-semester examinations.

15.0 COURSEWISE GRADING OF STUDENTS AND LETTER GRADES:

15.1 Based on the semester performance, each student is awarded a final letter grade at the end of the semester in each course. The letter grades and the corresponding grade points are as follows, but grading has to be relative grading

Letter grade	Grade points
S	10
A	9
B	8
C	7
D	6
E	5
U	0
I	-
W	-

Flexible range grading system will be adopted

"W" denotes withdrawal from the course.

"I" denotes inadequate attendance and hence prevention from End Semester examination.

"U" denotes unsuccessful performance in a course.

15.2 A student is considered to have completed a course successfully and earned the credits if he / she secure five grade points or higher. A letter grade U in any course implies unsuccessful performance in that course. A course successfully completed cannot be repeated for any reason.

16.0 METHOD OF AWARDING LETTER GRADE:

16.1 A final meeting of the Class Committee without the student member(s) will be convened within ten days after the last day of the semester end examination. The letter grades to be awarded to the students for different courses will be finalized at the meeting.

16.2 Three copies of the results sheets for each course, containing the final grade and three copies with the absolute marks and the final grade should be submitted by the teacher to the concerned Class Committee Chairman. After finalisation of the grades at the class committee meeting the Chairman will forward two copies of each to the Controller of Examinations and the other copies to the Head of the Department in which course is offered.

17.0 DECLARATION OF RESULTS:

17.1 After finalisation by the Class Committee as per clause 16.1 the Letter Grades awarded to the students in the each course shall be announced on the departmental notice board after duly approved by the Controller of Examinations. In case any student feels aggrieved, he/she can apply for revaluation after paying the prescribed fee for the purpose, within two weeks from the commencement of the semester immediately following the announcement of results. A committee will be constituted by the Controller of Examinations comprising the Chairperson of the concerned Class Committee (Convener), the teacher concerned and another teacher of the department who is knowledgeable in the concerned course. If the Committee finds that the case is genuine, it may jointly revalue the answer script and forward the revised mark to the Controller of Examinations with full justification for the revision if any.

17.2 The **"U"** grade once awarded stays in the grade sheet of the students and is not deleted when he/she completes the course successfully later. The grade acquired by the student later will be indicated in the grade sheet of the appropriate semester.

18.0 COURSE REPETITION AND ARREARS EXAMINATION

18.1 A student should register to re-do a core course wherein "I" or "W" grade is awarded. If the student is awarded "I", or "W" grade in an elective course either the same elective course may be repeated or a new elective course may be taken.

18.2 A student who is awarded "U" grade in a course shall write the end-semester examination as arrear examination , at the end of the next semester, along with the regular examinations of next semester courses. **The marks earned earlier in the continuous assessment tests for the course, will be used for grading along with the marks earned in the end-semester arrear examination for the course.**

19.0 GRADE SHEET

19.1 The grade sheet issued at the end of the semester to each student will contain the following:

(i) the credits for each course registered for that semester.

(ii) the performance in each course by the letter grade obtained.

(iii) the total credits earned in that semester.

(iv) the Grade Point Average (GPA) of all the courses registered for that semester and the Cumulative Grade Point Average (CGPA) of all the courses taken up to that semester.

19.2 The GPA will be calculated according to the formula

$$GPA = \frac{\sum_i (C_i)(GP_i)}{\sum_i C_i}$$

where C_i is the number of credits assigned for i^{th} course
GP_i - Grade point obtained in the ith course
For the cumulative grade point average (CGPA) a similar formula is used except that the sum is over all the courses taken in all the semesters completed up to the point in time.

I and W grades will be excluded for GPA calculations.

U, I and W grades will be excluded for CGPA calculations.

19.3 Classification of the award of degree will be as follows:

CGPA	Classification
8.50 and above, having completed in first appearance in all courses	First class with Distinction
6.50 and above, having completed within a period of 2 semesters beyond the programme period.	First Class
All others	Second Class

However, to be eligible for First Class with Distinction, a candidate should not have obtained U or I grade in any course during his/her study and should have completed the P.G. Programme within a minimum period covered by the minimum duration (clause 3.1) plus authorized break of study, if any (clause 8). To be eligible for First Class, a candidate should have passed the examination in all courses within the specified minimum number. of semesters reckoned from his/her commencement of study plus two semesters. For this purpose, the authorized break of study will not be counted. The candidates who do not satisfy the above two conditions will be classified as second class. For the purpose of classification, the CGPA will be rounded to first decimal place. For the purpose of comparison of performance of candidates and ranking, CGPA will be considered up to three decimal places.

20 ELIGIBILITY FOR THE AWARD OF THE MASTERS DEGREE

20.1 A student shall be declared to be eligible for the award of the Masters Degree, if he/she has:

i) registered for and undergone all the core courses and completed the Project Work,

ii) successfully acquired the required credits as specified in the Curriculum corresponding to his/her programme within the stipulated time,

iii) successfully completed the field visit/industrial training, if any, as prescribed in the curriculum.

iv) has no dues to the Institution, Hostels and Library.

v) no disciplinary action is pending against him/her

20.2 The award of the degree must be approved by the University.

21.0 POWER TO MODIFY:

Notwithstanding all that have been stated above, the Academic Council has the right to modify any of the above regulations from time to time.

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M.Tech SOFTWARE ENGINEERING
(Four Semesters / Full time)
CURRICULUM

SEMESTER I

Sl. No	Subject Code	Subject	L	T	P	C	TC
Theory							
1	MA621	Statistical Methods and Queuing Theory	3	1	0	4	
2	CS621	Object Oriented Software Engineering	3	0	0	3	
3	CS622	Software Requirements Analysis And Estimation	3	0	0	3	
4	CS623	System Dynamics	3	0	0	3	
5	CS624	Computer Networks and Management	3	0	0	3	
6	CS625	Operating Systems	3	0	0	3	
Practical							
1	CS626	Case Tools Lab	0	1	3	2	
2	CS627	Software Development Platforms and Languages	0	1	3	2	**23**

SEMESTER II

Theory

1	CS628	Software Design and Architecture	3	0	0	3	
2	CS629	Integrated Software Project Management	3	0	0	3	
3	CS630	Software Testing and Quality Assurance	3	0	0	3	
4	CS631	Advanced Database Technologies	3	0	0	3	
5		Elective -I	3	0	0	3	
6		Elective - II	3	0	0	3	

Practical

1	CS632	Case Study 1: Software Design	0	0	2	1	
2	CS633	Case Study 2: Software Project Management	0	0	2	1	
3	CS634	Software Testing and Measurements Lab	0	1	3	2	**22**

SEMESTER III

Theory

1	CS721	Information Security	3	0	0	3	
2	CS722	Cloud Computing	3	0	2	4	
3		Elective - III	3	0	0	3	
4		Elective - IV	3	0	0	3	

Practical

1	CS723	Project - Phase I	0	0	12	6*	**13**

SEMESTER IV

Practical

1   CS723   Project - Phase II   0   0   35   18*

* Credits for project work (Phase - I) of III Semester will be accounted along with project work (Phase - II) of IV Semester.

Total	**18**
Total Credits	**76**
Total Number of Theory Courses	**16**
Total Number of Case Studies	**2**
Total Number of Practical Courses	**3**

LIST OF ELECTIVE COURSES

Sl. No.	Subject Code	Subject	L	T	P	C
1	CSY 101	Theory of Computation	3	0	0	3
2	CSY 102	Soft Computing	3	0	0	3
3	CSY 103	Mobile Computing	3	0	0	3
4	CSY 104	Distributed Systems	3	0	0	3
5	CSY 105	Web Technology	3	0	0	3
6	CSY 106	XML and Web Services	3	0	0	3
7	CSY 107	Formal Methods in Software Engineering	3	0	0	3
8	CSY 108	Multimedia Systems	3	0	0	3
9	CSY 109	Software Agents	3	0	0	3
10	CSY 110	Embedded Systems	3	0	0	3
11	CSY 111	IT Systems Management	3	0	0	3
12	CSY 112	Mobile Adhoc Networks	3	0	0	3
13	CSY 113	Data Warehousing and Data Mining	3	0	0	3
14	CSY 114	Performance Evaluation of Computer Systems and Networks	3	0	0	3
15	CSY 115	Agent Based Intelligent Systems	3	0	0	3
16	CSY 116	Personal Software Process	3	0	0	3
17	CSY 117	Team Software Process	3	0	0	3
18	CSY 118	Software Engineering for Image Processing	3	0	0	3
19	CSY 119	Service Oriented Architecture	3	0	0	3
20	CSY 120	Grid Computing	3	0	0	3
21	CSY 121	Pervasive Computing	3	0	0	3
22	CSY 122	User Interface Design	3	0	0	3
23	CSY 123	Software Maintenance	3	0	0	3
24	CSY 124	Multimodal Computing	3	0	0	3
25	CSY 019	Research Methodology for computer Scientist	3	0	0	3

SEMESTER - I

MA 621   STATISTICAL METHODS AND QUEUING THEORY   L T P C

3 1 0 4

OBJECTIVES:

- To teach about the probability and Random variable of the various functions. It also helps to understand the various statistical methods including the Design of experiments.

- To expose the students to apply certain probability, statistical and operational research concepts in practical applications of computer science areas.

UNIT I   PROBABILITY AND RANDOM   10

Probability - Random variables - Binomial, Poisson, Geometric, Uniform, Normal, Exponential distributions - Moments - Moments generating functions and their properties - Function of random variables.

UNIT II   ESTIMATION THEORY   8

Partial and Multiple correlations - Partial and multiple regressions - Estimation of parameters using maximum likelihood estimator and method of moments.

UNIT III   TESTING OF HYPOTHESIS   9

Basic definitions of statistical hypothesis - Tests based on Normal, T, Chi - square and F distributions for mean, variance and proportion.

UNIT IV   DESIGN OF EXPERIMENTS   9

Analysis of variance - One way and two way classifications - Completely randomized design - Randomized block design - Latin square design - 22 factorial design.

UNIT V   QUEUING THEORY   9

Single and Multiple server Markovian Queuing models - Customer impatience - Queuing applications.

L = 45, T = 15
TOTAL = 60

TEXT BOOKS

1.   Gupta S.C. and Kapoor V.K, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi, 2001.

2.   Taha H.A, "Operations Research: An Introduction", 7th edition, Pearson Education Edition, Asia, New Delhi, 2002.

REFERENCES

1. Walpole R.E., Myer R.H, Myer S.L. and Ye. K, "Probability and Statistics for Engineers and Scientists", 7th edition, Pearson Education, Delhi, 2002.

2. Goel B.S. and Mittal S.K, "Operations Research", Pragati Prakashan, Meerut, 2000.

3. Freund J.E. and Miller I.R, "Probability and Statistics for Engineers", Prentice Hall of India, 5th edition, New Delhi, 1994.

4. Gupta, S.C. and Kapur V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 1999.

CS 621   OBJECT ORIENTED SOFTWARE ENGINEERING   L T P C
3 0 0 3

COURSE OBJECTIVES:

• To teach software life cycle models and to describe how software products would be developed in an ideal world.

• To make them understand the techniques for requirement elicitation

• To explain Model Architecture MVC

• To make students get familiarized with UML concepts and to understand the importance of CASE

• To give an account of testing techniques and dynamic modeling concepts

UNIT I   INTRODUCTION TO SOFTWARE ENGINEERING   9

Software engineering development - Software life cycle models - Standards for developing life cycle models.

UNIT II   OBJECT METHODOLOGY & REQUIREMENT ELICITATION   9

Introduction to Object Oriented Methodology - Overview of requirements elicitation, Requirements model - Action & use cases - Requirements elicitation activities, Managing requirements elicitation.

UNIT III   ARCHITECTURE AND MODELING WITH UML   9

Model architecture - Requirements model - Analysis model - Design model - Implementation model-Test model. Modeling with UML: Basic building blocks of UML- A conceptual model of UML- Basic structural modeling - UML diagrams.

UNIT IV   SYSTEM ANALYSIS AND DESIGN   9

Analysis model - Dynamic modeling and testing - System design: Design concepts and activities - Design models - Block design -Testing.

UNIT V   TESTING OBJECT ORIENTED SYSTEMS   9

Introduction -Testing activities and techniques - The testing process - Managing testing -State based testing and Data flow testing for classes - Case studies.

TOTAL = 45

REFERENCES

1. Stephen R. Scach, "Classical & Object Oriented Software Engineering with UML and Java", 4th edition, Tata McGraw - Hill, 2001.

2. Ivar Jacobson and Magnus Christenson, "Object Oriented Software Engineering: A use Case Driven approach", Addison Wisely, 1992.

3. Bernd Bruegge and Alan H Dutoit, "Object - Oriented Software Engineering", 2nd edition, Pearson Education, 2004.

4. Timothy C.Lethbridge and Robert Laganiere, "Object oriented Software Engineering: Practical Software development using UML and Java", Tata McGraw - Hill, 2004.

CS 622	SOFTWARE REQUIREMENTS ANALYSIS AND ESTIMATION	L T P C
		3 0 0 3

COURSE OBJECTIVES:

•   To explain differences between requirement types.

•   To explain different techniques of requirements elicitation.

•   To teach structure the requirements document.

•   To give some exposure on software cost estimation.

UNIT I   REQUIREMENTS ENGINEERING OVERVIEW   9

Software requirement overview - Software development roles - Software development process kernels - Commercial life cycle model - Vision development - Stakeholders needs & analysis.

UNIT II   REQUIREMENTS ELICITATION   9

The process of requirements elicitation - Requirements elicitation problems - Problems of scope - Problems of understanding - Problems of volatility - Current elicitation techniques - Information gathering - Requirements expression and analysis - Validation - An elicitation methodology framework - A requirements elicitation process model - Methodology over method - Integration of techniques - Fact - finding - Requirements gathering - Evaluation and rationalization - Prioritization - Integration and validation.

UNIT III   REQUIREMENTS ANALYSIS   9

Identification of functional and non functional requirements - Identification of performance requirements - Identification of safety requirements - Analysis - Feasibility and internal compatibility of system requirements - Definition of human requirements baseline.

UNIT IV REQUIREMENTS DEVELOPMENT   9

Requirements analysis - Requirements documentation - Requirements development workflow - Fundamentals of requirements development - Requirements attributes guidelines document - Supplementary specification document - Use case specification document - Methods for software prototyping - Evolutionary prototyping -Throwaway prototyping.

UNIT V   SOFTWARE ESTIMATION & COSTING   9

Software Requirements Management - Requirements management Principles and practices - Requirements - attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain

TOTAL = 45

REFERENCES

1.   Ian Somerville and Pete Sawyer, "Requirements Engineering: A Good Practice Guide", 6th edition, Pearson Education, 2004.

2.   Dean Leffingwell and Don Widrig, "Managing Software Requirements: A Use Case Approach", 2nd edition, Addison Wesley, 2003.

3.   Karl Eugene Wiegers, "Software Requirements", Word Power Publishers, 2000.

4.   Ian Graham, "Requirements Engineering and Rapid Development", Addison Wesley, 1998.

5.   McConnell, S. "Software Project: Survival Guide", Microsoft Press, 1998.

6.   Royce W, "Software Project management: A Unified Framework", Addison Wesley, 1998.

7.   Cooper .R, "The Rise of Activity - Based Costing - Part One: What is an Activity - Based Cost System?" Journal of Cost Management, Vol.2, No.2 Summer, 1988.

CS 623	SYSTEM DYNAMICS	L T P C
		3 0 0 3

COURSE OBJECTIVES:

•   To make the students understand the nature of complex problems and their characteristics.

•   To explain the concepts of system thinking.

•   To provide ways and means for problem understanding.

•   To make them understand system archetypes and their uses.

UNIT I   COMPLEXITY IN REAL WORLD   9

Complexity - Characteristics of complex problems - Learning in and about complex systems - Structure and behavior of dynamic systems.

UNIT II   SYSTEM THINKING MINDSET   9

Holistic thinking - Multi   levels of reasoning: Event - Pattern - Structure - Learning organization.

UNIT III   MULTI MODELING APPROACH   9

Multi - perspective - Stakeholder needs - Alterable and Constraints - Problem understanding - Discovery and diagnosis.

UNIT IV   TOOLS FOR SYSTEM THINKING   9

Causal loop diagram - Stocks and flows - Dynamics of simple structure.

UNIT V   SYSTEM ARCHETYPES   9

Limit to growth - Escalation - Drifting goals - Success to the successful - Fixes that fail - Shifting the burden.

                                                                TOTAL = 45

REFERENCES

1.   Senge P.M, "The fifth Discipline: The Art and Practice of learning Organization", Doubleday, 1990.

2.   Joseph O'Connor and Ian McDermott, "The Art of System Thinking," Thorsons, 1997.

3.   John D.Sterman, "Business Dynamics: Systems Thinking and Modeling from Complex World", McGraw Hill/Irwin, 2000.

4.   Dennis Sherwood, "Seeing the forest for the trees: A Manager's Guide to Applying Systems Thinking", Nicolas Brealey, 2002.

CS 624	COMPUTER NETWORKS AND MANAGEMENT	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To make students understand the organization and functioning of computer networks.

- To explain the basic concepts of protocol design including algorithms for congestion control and flow control.

- To provide background knowledge on the basic concepts of link layer properties.

- To give some exposure on the basic concepts of wireless networks and the multimedia networks

- To prepare the students on the basic concepts of network security.

UNIT I   COMPUTER NETWORKS AND THE INTERNET   9

The network edge - The network core - Delay, loss, and throughput in packet - Switched networks - Protocol layers and their service models - Networks under attack - History of computer networking and the internet.

UNIT II   APPLICATION AND TRANSPORT LAYER   9

Principles of network applications - The Web and HTTP - File Transfer: File transfer protocol - DNS - Peer - to - peer applications - Socket programming -transport - Layer and services - Multiplexing and demultiplexing - Connectionless transport: User Datagram Protocol - Principles of reliable data Transfer - Connection - oriented transport: Principles of congestion control - Congestion control mechanism.

**UNIT III   THE NETWORK LAYER AND THE LINK LAYER AND LOCAL
             AREA NETWORKS   9**

Introduction - Virtual circuit and datagram networks - The Internet Protocol (IP): Routing algorithms - Routing in the internet - Broadcast and multicast routing - Link Layer: Services - Error Detection and Correction Techniques - Multiple access protocols - Link - Layer addressing - Ethernet - Link - Layer switches - The Point - to -Point protocol - Link virtualization: A Network as a link layer.

UNIT IV WIRELESS AND MOBILE NETWORKS AND MULTIMEDIA NETWORKING   9

Introduction - Wireless Links and Network Characteristics - WiFi: 802.11 Wireless LANs - Cellular Internet access - Mobility Management: Mobile IP - Managing Mobility in Cellular Networks - Impact on higher - layer protocols - Multimedia networking applications - Streaming stored audio and video - Making the best of the best - Effort service - Protocols for real-time interactive applications - Quality of service guarantees.

UNIT V SECURITY IN COMPUTER NETWORKS & NETWORK MANAGEMENT   9

Introduction - Principles of cryptography - Message integrity - End -Point authentication - Securing e-mail - Securing TCP connections: SSL - Network layer security: Ipsec - Securing wireless LANs - Operational security: Firewalls and intrusion detection systems - Network management - The Infrastructure for network management - The Internet - Standard management framework - ASN.1.

TOTAL = 45

TEXT BOOK

1.	James F. Kurose and Keith W. Ross, "Computer Networking: A Top - Down Approach", 4th edition, Addison Wesley, 2007.

REFERENCES

1.	Larry Peterson and Bruce Davie, "Computer Networks: A System Approach", 4th edition, Morgan Kaufmann, 2007.

2.	C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols", Prentice Hall, 2004.

3.	William Stallings," Wireless Communications & Networks", 2nd edition, Prentice Hall, 2005.

4.	Jochen Schiller, "Mobile Communications", 2nd edition, Addison Wesley, 2003.

CS 625	OPERATING SYSTEMS	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To have an overview of different types of operating system and its components, to have thorough knowledge of process management, scheduling concepts, memory management, I/O and file systems in an operating system.

• To focus on the design issues in a distributed operating system.

UNIT I   OPERATING SYSTEMS OVERVIEW   9

Introduction - Operating system structures - Processes - Threads - CPU scheduling.

UNIT II   PROCESS MANAGEMENT   9

Process Management - The critical-section problem - Peterson's solution - Synchronization hardware - Semaphores - Classic problems of synchronization- Monitors - Synchronization examples - Atomic transactions -System model - Deadlock characterization - Methods for handling deadlocks - Deadlock prevention - Deadlock avoidance - Deadlock detection - Recovery from deadlock.

UNIT III   STORAGE MANAGEMENT   9

Memory management - Swapping - Contiguous memory allocation - Paging - Segmentation - Segmentation with paging - Example: The Intel Pentium virtual memory: Background - Demand paging - Process creation - Page replacement - Allocation of frames - Thrashing - Memory - Mapped files - Allocating kernel memory - Other considerations - Operating system examples.

UNIT IV   STORAGE MANAGEMENT & I/O SYSTEMS   9

File concept - Access methods - Directory structure - File - system mounting - Protection -Directory implementation - Allocation methods - Free-space management - Efficiency and Performance - Recovery - NFS-example: The WAFL File System - Disk scheduling - Disk management - Swap-space management - RAID structure stable - Storage implementation - Tertiary - Storage structure - I/O hardware - Application I/O Interface - Kernel I/O subsystem - Transforming I/O requests to hardware operations - Streams.

UNIT V   PROTECTION AND SECURITY AND CASE STUDY   9

Goals of protection - Principles of protection - Domain of protection - Access Matrix - Implementation of access matrix - Access control - Revocation of access rights - Capability - Based systems - Language - Based protection - Security: The Security problem - Program threats - System and network threats - Cryptography as a security tool - User authentication - Implementing security defenses - Fire walling to protect systems and networks - Computer -security classifications - An example: Windows XP.Case Study : The Linux/ System - Design principles - Kernel modules - Process management. - Scheduling - Memory management - File systems - Windows XP - Design principles - System components - Environmental subsystems - File system.

TOTAL = 45

REFERENCES

1.   Abraham Silberschatz, Peter B. Galvin and Greg Gagne, "Operating System Concepts" ,8th edition, Addison Wesley, 2009.

2.   Andrew S. Tanenbaum, "Modern Operating Systems", 2nd edition, Addison Wesley, 2001.

3.   Gary Nutt, "Operating Systems", 2nd edition, Addison Wesley, 2001.

CS 626	CASE TOOLS LAB	L T P C
		0 1 3 2

COURSE OBJECTIVES:

•   To provide hands-on experience on tools so that they can analyze and design their project.

•   To give a scope in order to identify the analysis elements of the project and define the association between them.

•   To train them to create an analysis model of the project.

The student is expected to take up about Five mini - projects and model them and produce Use Cases, Analysis documents - both static and dynamic aspects, Sequence Diagrams and State-Charts, Database Design using Rational Products.

1.   Online Bookshop

2.   Simulation of a small manufacturing Company.

3.   A Content Management System.

4.   Air traffic Simulation.

5.   Automated Community Portal.

6.   File Management System

7.   Medical Imaging System

CS 627	SOFTWARE DEVELOPMENT PLATFORMS	L	T	P	C
	AND LANGUAGES LAB	0	1	3	2

COURSE OBJECTIVES:

- To explain C++ classes with static members, methods with default arguments, friend functions.

- To give techniques to develop a template of linked –list class and its methods

- To expose the student to web technologies like HTML, XML and their variants as well as Java Programming.

- To explain techniques to develop software for the various applications.

- To make them familiar with the JDBC connectivity program for maintaining database by sending queries.

Web

The students are advised to get exposed to web technologies like HTML, XML and their variants as well as Java Programming

- ❖ Write HTML/Java scripts to display CV in Web Browser.

- ❖ Creation and annotation of static web pages using any HTML editor.

- ❖ Write a program to use XML and JavaScript for creation of your homepage.

- ❖ Write a program in XML for creation of DTD which specifies a particular set of rules.

- ❖ Create a Style sheet in CSS/XSL and display the document in Web Browser.

- ❖ Write a Java Servlet for HTTP Proxy Server.

- ❖ Use JSP pages for sharing session and application data of HTTP Server.

- ❖ Write a program to use JDBC connectivity program for maintaining database by sending queries.

Applications

Develop Software for the applications like:

- ❖ Online railway reservation system

- ❖ Payroll processing application

- ❖ Inventory system

Software required:

- ❖ Development Platform: Eclipse, Delphi, Web sphere, Net beans, NET etc.

- ❖ Languages: C/C++/Java/JSDK/Web browser.

- ❖ Any front end tool (like VB, VC++, Developer 2000) etc

- ❖ Any back end tool (Oracle, MS - Access, SQL) etc.

SEMESTER - II

CS 628   SOFTWARE DESIGN AND ARCHITECTURE   L T P C
                                                     3 0 0 3

COURSE OBJECTIVES:

•   To provide a sound technical exposure to the concepts, principles, methods, and best practices in software architecture and software design

•   To introduce students to nature of software design, design process, design principles, design notations, design tools, design heuristics, and design patterns

UNIT I   DESIGN FUNDAMENTALS   9

The nature of design process - Objectives - Building modules, constructs, design qualities - Assessing the design - Design viewpoints for software.

UNIT II   DESIGN METHODOLOGIES   9

Design practices - Rational for method - Design strategies - Top down and bottom up - Organizational methods and design - Jackson structural programming - Jackson system development - Object-Oriented and Object - based design - Structured system analysis and structured design method.

UNIT III   DESIGN MODELS   9

Traditional approach to design - SADT organizational design practices - SSADM and design for real time systems - MASCOT.

UNIT IV   INTRODUCTION TO SOFTWARE   9

Introduction - Software architecture - Definition - Prospects - State of art - Architectural styles - Pipes and filters - Layered systems - Architecture design patterns - Object oriented organization - User interface architecture.

UNIT V   SHARED INFORMATION SYSTEMS   9

Shared information systems - DB integration - Integration in software development environments - Integration and design of building - Architecture structures for shared information systems.

TOTAL = 45

REFERENCES

1. David Budgen, "Software Design", Addison Wesley, 1994.

2. Pressman R.S, "Software Engineering", 4th edition, McGraw Hill Inc, 1996.

3. Ed Downs, Peter Clare and Jan Coe, "Structured System Analysis and Design Methods Application and Context", Prentice Hall, 1998.

4. Mary Shaw David Garlan, "Software Architectural Perspectives on an Emerging Discipline", EEE, PHI, 1996.

5. Bass L, Clements P, and Kazman R, "Software Architecture in Practices", 2nd edition, SEI series in Software Engineering, PEI, Addison Wesley, 2003.

CS 629 INTEGRATED SOFTWARE PROJECT MANAGEMENT   L T P C
                                                                                3 0 0 3

COURSE OBJECTIVES:

- To make them understand the software management process frameworks and software management disciplines

- To introduce the importance of software estimation, risk management and software metrics in software development process

- To teach how to effectively manage the human resources also how to provide a better environment for both customer and organizations' staff members

UNIT I   PROJECT MANAGEMENT CONCEPTS   9

Evolution of software economics - Software management process framework (Phases, Artifacts, Workflows, Checkpoints) - Software management disciplines (Planning / Project Organization and Responsibilities / Automation / Project Control) - Modern project profiles.

UNIT II   SOFTWARE ESTIMATION & COSTING   9

Problems in software estimation - Algorithmic cost estimation process, Function points, SLIM (Software Life cycle Management), COCOMO II (Constructive Cost Model) - Estimating web application development - Concepts of finance - Activity Based Costing and Economic Value Added (EVA) - Balanced score card.

UNIT III   RISK MANAGEMENT   9

Risk definition - Risk categories - Risk assessment (Identification / Analysis / Prioritization) - Risk control (Planning / Resolution / Monitoring) - Failure Mode and Effects Analysis (FMEA).

UNIT IV   METRICS   9

Need for software metrics - Classification of software metrics: Product metrics (Size Metrics, Complexity Metrics, Halstead's Product Metrics, Quality Metrics), and Process metrics (Empirical Models, Statistical Models, Theory-based Models, Composite Models, and Reliability Models).

UNIT V   PEOPLE MANAGEMENT   9

Team Management - Client Relationship Management - Function organization - Project organization - Matrix organization - Staffing quality replacement - Turnover management.

                                                          TOTAL = 45

REFERENCES

1. McConnell's, "Software Project: Survival Guide", Microsoft Press, 1998.

2. Royce W, "Software Project Management: A Unified Framework", Addison Wesley, 1998.

3. Cooper R, "The Rise of Activity - Based Costing - Part One: What is an Activity - Based Cost System?" Journal of Cost Management, Vol.2, No.2 Summer, 1988.

4. Grant J.L, "Foundations of Economic Value Added", John Wiley & Sons, 1997.

5. Kaplan R.S and Norton D.P, "The Balanced Scorecard: Translating Strategy into Action", Harvard Business School Press, 1996.

6. Boehm B. W, "Software Risk Management: Principles and Practices" in IEEE Software, 1991.

7. Fenton N.E and Pfleeger S.L, "Software Metrics: A Rigorous and Practical Approach, Revised", Brooks Cole, 1998.

8. Demarco T. and Lister T., "People ware: Productive Projects and Teams, 2nd edition", Dorset House, 1999.

9. Bob Hughes and Mike Cotterell, "Software Project Management", 4th edition, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2005.

CS 630   SOFTWARE TESTING AND QUALITY ASSURANCE   L T P C
                                                       3 0 0 3

COURSE OBJECTIVES:

• To explain the scope of software testing.

• To train students on different software testing techniques.

• To highlight the importance of software quality assurance models.

• To discuss the importance of software quality assurance process and various software quality assurance strategies.

• To bring out the future trends in software testing and software quality assurance techniques.

UNIT I   SOFTWARE TESTING PRINCIPLES and TESTING STRATEGIES   10

Need for testing - Psychology of testing - Testing economics - White box, Black box, Grey box testing - White box testing techniques - Statement coverage - Branch coverage - Condition coverage -Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis - Black box testing techniques - Boundary value analysis - Robustness testing - Syntax testing - Finite state testing - Levels of testing - Unit, Integration and system testing.

UNIT II TESTING OBJECT ORIENTED SOFTWARE, TESTABILITY
AND RELATED ISSUES   10

Challenges - Differences from testing - Non-OO Software - Class testing strategies - Class Modality - State-based testing - Message sequence specification - Design for testability - Observability and Controllability - Built-in test - Design by contract - Precondition, Post condition and Invariant - Impact on inheritance - Applying in the real world - Regression Testing - Challenges - Test optimization.

UNIT III   QUALITY ASSURANCE MODELS   8

Models for Quality Assurance - ISO-9000 Series, CMM, SPICE, Malcolm Baldrige Award.

UNIT IV   SOFTWARE QUALITY ASSURANCE RELATED TOPICS   9

Software process - Definition and implementation - Internal auditing and assessments - Software testing - Concepts, Tools, Reviews, inspections and walkthroughs - P-CMM.

UNIT V   FUTURE TRENDS   8

PSP and TSP - CMMI - OO Methodology - Clean-room software engineering -Defect injection and prevention.

TOTAL = 45

REFERENCES

1.   William E.Perry, " Effective Methods for Software Testing", 2nd edition, John Wiley & Sons, 2000.

2.   Robert Furtell, Donald Shafer and Linda Shafer, "Quality Software Project Management", Prentice Hall, 2001.

3.   Boris Bezier, "Black - Box Testing: Techniques for Functional Testing of Software and Systems", John Wiley & Sons, 1995.

4.   Marc Roper, "Software Testing", McGraw - Hill Book Co., London, 1994.

5.   Robert V.Binder, "Testing Object - Oriented Systems: Models Patterns and Tools", Addison Wesley, 2000.

6.   Philip B Crosby, "Quality is Free: The Art of Making Quality Certain", Mass Market, 1992.

CS 631	ADVANCED DATABASE TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

• To provide detailed insight into the practical and theoretical aspects of advanced topics in databases, such as object-relational databases and data warehouses combined with data analysis techniques, such as data mining.

• To expose the main techniques for developing such database systems, the fundamentals of database processing.

UNIT I   DATABASE MANAGEMENT   9

Relational data model - SQL - Database design - Entity-Relationship model - Relational normalization - Embedded SQL - Dynamic SQL - JDBC - ODBC.

UNIT II   ADVANCED DATABASES   10

Object databases - Conceptual object data model - XML and Web Data - XML Schema - Distributed data bases - OLAP and Data Mining - ROLAP and MOLAP

UNIT III   QUERY AND TRANSACTION PROCESSING   8

Query processing basics - Heuristic optimization - Cost, size estimation - Models of transactions - Architecture - Transaction processing in a centralized and distributed system - TP monitor.

UNIT IV   IMPLEMENTING AND ISOLATION   9

Schedules - Concurrency control - Objects and semantic commutativity - Locking -Crash, Abort and Media failure - Recovery - Atomic termination - Distributed deadlock - Global serialization - Replicated databases - Distributed transactions in real world.

UNIT V   DATABASE DESIGN ISSUES   9

Security - Encryption - Digital signatures - Authorization - Authenticated RPC - Integrity - Consistency - Database tuning - Optimization and research issues.

TOTAL = 45

REFERENCES

1.   Philip M. Lewis, Arthur Bernstein and Michael Kifer, "Databases and Transaction Processing: An Application Oriented Approach", Addison Wesley, 2002.

2.   R. Elmasri and S.B. Navathe, "Fundamentals of Database Systems", 3rd edition, Addison Wesley, 2004.

3.   Abraham Silberschatz, Henry. F. Korth and S.Sudharsan, "Database System Concepts", 4th edition, Tata McGraw Hill, 2004.

4.   Raghu Ramakrishna and Johannes Gehrke, "Database Management Systems", 3rd edition, TMH, 2003.

CS 632	CASE STUDY I: SOFTWARE DESIGN	L T P C
		0 0 2 1

COURSE OBJECTIVES:

• To explain the phenomenon of interest by applying the principles and practices of software engineering.

• To train the students for systematic inquiry into an event or set of related events which aims to describe.

• To make them use software engineering course learning goals to derive a set of parameters for objective assessment.

• To explain the soft skills such as communication, team building, art of technical writing and presentation.

LEARNING GOALS AND EVALUATION

Learning	Scoring Parameter
Knowledge	Can state or identify Software engineering principles
Understand	Can summarize the case study correctly, Restate SE knowledge in own words
Application	Can state all pre - conditions and post - conditions related to application of SE knowledge and skills, Successful and complete application of SE procedure (skill) or tool to produce the specified deliverables
Analyze	Can identify patterns, problems, issues, good and bad practices. Differentiate root cause from symptom of a problem/ issue, Identify components of a software system, Explain how patterns/ideas connect or do not connect to each other
Synthesis	Can state the relation between two different things, Refers to previous discussions/learning, Combine ideas to produce an explanation, Justify the application of some knowledge/skill
Evaluation	Can state n number of correct and most important pros and cons (from SE point) of two different proposals
Communication	Clarity of presentation, Use of example Use of case studies for assessment

Methodology of Assessment:

- The class can be grouped into sets of students comprising of not more than five members each.

- Each group should present their own case study observations, based on the parameters discussed above and other groups will act as the critics and can give their suggestions.

- Should prepare and submit the deliverable documents such as Requirement Document, SRS, Design document, Test plan document and so on.

Following are the sample case study examples. Any other real time case study problems can also be considered.

1. **WAREHOUSE MANAGEMENT SYSTEM**

   The system will support warehouse management. A warehouse worker loads goods from a truck and logs in and out, goods using a database. The goods are delivered by a truck driver between warehouses, and distributed within a warehouse by a forklift truck driver. Each warehouse is managed by a foreman, who is able to move goods between warehouses with or without a customer order. A foreman is also able to check the status of a customer order

2. **FOUR WAY TRAFFIC INTERSECTION, TRAFFIC LIGHT CONTROLLER SYSTEM**

   The system is designed to control the four way traffic control system. The signals are designed to glow for fixed time duration. The variation can be for free left turns, adjustable pedestrian crossing time. Provide a feature for emergency mode, where there must be an option to set particular traffic direction to be considered on a priority basis for emergency situations.

3. **DAY CARE CENTER MAINTENANCE SYSTEM**

   Your company has been awarded a contract to develop Child Care Software for a Day Care Center (DCC). The software should maintain a database of Family, Child, and Payroll information. Users of the software shall have the ability to add/update/delete all information based on their access levels. All employees (managers, teachers, admin staff, etc.) will be identified by a unique login ID and given a default password.

4. **University Admission System**

    Design a system to automate the admission procedures of the University system with automatic counseling feature. Depending on the parameters such as Qualifications, entrance test marks and choice of course, the student is given the options for selecting a course. The constraints to be considered are availability f course for that academic session, Number of seats (available) and eligibility criteria.

5. **Hotel Reservation System**

    Design a system for hotel reservation system for optimum space usage. The hotel consists of 5 numbers of ten bed dormitories, 3 numbers of executive suites, 4 numbers of family rooms, 16 numbers of double bed rooms and 10 numbers of single bedrooms. Design must take care of the various issues such as cost, optimum usage of room space, future reservation and cancellations, the charges for reservation, cancellation. Discounts and season time offers may also be considered.

CS 633	CASE STUDY 2: SOFTWARE PROJECT MANAGEMENT	L T P C
		0 0 2 1

COURSE OBJECTIVES:

• To introduce project management in the information systems, or IT development, area.

• To make them understand the purpose, methods and benefits of process management

• To expose the student to the concepts, practices, processes, tools and techniques used in process management for software development.

• To explain the fundamental principles of Software Project management

• To teach different methods and techniques used for project management.

The case studies Software Project Management cover the following topics: Project management - Configuration management - Project Planning - Project management for India and Geographic distribution issues.

Objective :

To train the students for a systematic inquiry into an event or a set of related events which aims to describe and explain the phenomenon of interest by applying the principles and practices of Software Engineering.

The objective can be categorized as

a) Use of the SE course learning goals to derive a set of parameters for objective assessment

b) Soft skills such as communication, Team building, art of technical writing and presentation.

Learning Goals and Evaluation

Learning	Scoring Parameter
Knowledge	Can state or identify Software engineering principles
Understand	Can summarize the case study correctly, Restate SE knowledge in own words
Application	Can state all pre - conditions and post - conditions related to application of SE knowledge and skills, Successful and complete application of SE procedure (skill) or tool to produce the specified deliverables
Analyze	Can identify patterns, problems, issues, good and bad practices. Differentiate root cause from symptom of a problem/issue, Identify components of a software system, Explain how patterns/ideas connect or do not connect to each other
Synthesis	Can state the relation between two different things, Refers to previous discussions/learning, Combine ideas to produce an explanation, Justify the application of some knowledge/skill
Evaluation	Can state n number of correct and most important pros and cons (from SE point) of two different proposals
Communication	Clarity of presentation, Use of example Use of case studies for assess

Methodology of Assessment:

1. The class can be grouped into sets of students comprising of not more than five members each.

2. Each group should present their own case study observations, based on the parameters discussed above and other groups will act as the critics and can give their suggestions.

3. Should prepare and submit the deliverable documents such as Requirement Document, SRS, Design document, Test plan document and so on. The students can also try this case studies using Free Open Source Software.

    Following are the sample case study examples. Any other real time case study problems can also be considered.

1.   **VESSEL TRACKING SYSTEM**

Vessel tracking network used to track vessels to enhance maritime safety and security, environmental protection and emergency response. Current vessel tracking systems have their roots in the shipping industry. Corporations with large fleets of vessels required some sort of system to determine where each vessel was at any given time. Vessel tracking systems can now also be found in consumers vessels as a theft prevention and retrieval device. The navigation technology follows the basic principle of transmission and receiving the signals which are then stored in the database. The database thus records the data about the positions of the vessels from the port.

2.   **TIME TABLE MANAGEMENT SYSTEM**

The time table production in university is very serious work. The time table management system using the macro processing of the spreadsheet in a general personal computer system. This system is able not only to check the contradiction of the time table but also to make the management table concerning the lecturer, the classroom, the core class, and the lecture subject at the same time. By applying this management system, the time table production work was decreased and the check mistake became none at all.

3.   **WAREHOUSE MANAGEMENT SYSTEM**

The system will support warehouse management. A warehouse worker loads goods from a truck and logs in and out goods using a database. The goods are delivered by a truck driver between warehouses, and distributed within a warehouse by a forklift truck driver. Each warehouse is managed by a foreman, who is able to move goods between warehouses with or without a customer order. A foreman is also able to check the status of a customer order.

4.   **FOUR WAY TRAFFIC INTERSECTION, TRAFFIC LIGHT CONTROLLER SYSTEM**

The system is designed to control the four way traffic control system. The signals are designed to glow for fixed time duration. The variation can be for free left turns, adjustable pedestrian crossing time. Provide a feature for emergency mode, where there must be an option to set particular traffic direction to be considered on a priority basis for emergency situations.

Group Discussion is also used in the Course

CS 634   SOFTWARE TESTING AND MEASUREMENTS LAB   L T P C
                                                       0 1 3 2

COURSE OBJECTIVES:

• To describe various software testing tools like Rational Rose Suite, Rational Functional Tester, Rational Performance Tester, Load Runner.

• To explain about the various software testing techniques.

• To discuss how to plan test cases and create a test documentation.

• To tell about the software testing metrics and importance.

SOFTWARE TESTING LAB

1. Study of various tools Study various tools such as Win Runner, Load Runner, Test Director, Rational Rose Suite etc.

2. Perform various types of testing:

   a. Unit Testing

   b. Regression Testing

   c. Integration Testing

   d. Validation Testing

   e. Acceptance Testing

   f. System Testing Prepare test plan and develop test case hierarchy.

3. Generate Test cases and Test Documentation in the following case studies

   a) Library System

   b) Course Registration System

   c) Implement a Quiz System

   d) Student Marks Analyzing System

   e) Online Ticket Reservation System

   f) Stock Management System

   g) Real - Time Scheduler

MEASUREMENTS LAB

Software measurements help to improve the understanding of software. It provides the necessary information for the assessment and management of software project. As the assessment plays an extremely important role in the software development process the grab of measurement are as follows

- Assessment: as evaluation of given situation in special environment

  Comprehension of used methods

  Identification of development problems

- Indication as determination of certain factors or indicators for special characteristics

  Performance evaluation

  Lines of code analysis

  Reviews

- CMM level 5 as a model for the integration of software measurement in the process important

  Measurement based method comparison

1. For example in object oriented programming development

   - Compute method inheritance factor weighted method for class.

2. For a typical web application to calculate the following

   i.   Weighted Method Count (WMC)

   ii. No of Children (NoC)

   iii. Depth of Inheritance (DIT)

   iv. Response for a Class (RFC)

   v.   Coupling and Cohesion between Objects (CCBO)

SEMESTER III

CS 721   **INFORMATION SECURITY**   L T P C
                                                      3 0 0 3

COURSE OBJECTIVES:

•   To make them understand how network security is conceptualized and carried out.

•   To teach how to identify and investigate threats to network security

•   To make students standard firewall functionality and network based IDSs.

•   To expose them to several technologies and techniques of intrusion detection.

UNIT I   **12**

Security Attacks (interruption, interception, modification and fabrication) - Security Services (confidentiality, authentication, integrity, non-repudiation, access control and availability) and mechanisms - A model for Internet work security - Internet Standards and RFCs - Buffer overflow & format string vulnerabilities - TCP session hijacking -ARP attacks- Route table modification - UDP hijacking and man-in-the-middle attacks. Security Models: Military and civil security- vulnerability and threat models- End-end security (COMSEC) - Link encryption (TRANSEC) - Compartments - Privacy - Authentication- Denial of service - Non repudiation.

UNIT II   **8**

Conventional encryption principles - Conventional encryption algorithms - Cipher block modes of operation- Location of encryption devices - Key distribution approaches of Message Authentication, Secure Hash Functions and HMAC. Public key cryptography principles - Public key cryptography algorithms - Digital signatures - Digital Certificates.

UNIT-III   **8**

Certificate authority and key management - Kerberos- X.509 directory authentication - Service Email privacy: Pretty Good Privacy (PGP) and S/MIME- IP security overview- IP security architecture - Authentication Header - Encapsulating security payload - Combining security associations and Key management web security requirements.

UNIT-IV   **8**

Secure Socket Layer (SSL) and Transport Layer Security (TLS) - Secure Electronic Transaction (SET) - Basic concepts of SNMP- SNMPv1 community facility and SNMPv3 - Intruders, viruses and related threats.

UNIT V 9

Intruders, Viruses and related threats - Firewall design principles - Trusted systems - Intrusion detection systems - Key and certificate management - Secure binding of public and private values: DNS certificates - Making and distributing key media: randomization, lifetime issues- Key agreement protocols: STS protocol and IETF work orders- Key Escrow: the Clipper chip - One-time passwords: schemes based on S/KEY- PKI.

TOTAL = 45

TEXT BOOKS

1. William Stallings, "Network Security Essentials (Applications and Standards)", Pearson Education, 2004.

2. Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, "Hack Proofing your network ", 2nd edition, Syngress, 2002.

REFERENCES

1. Eric Maiwald, "Fundamentals of Network Security", 1st edition, McGraw-Hill Osborne Media, 2003.

2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security - Private Communication in a Public World ", Pearson Prentice Hall of India, 2004.

3. Michael E. Whitman ,"Principles of Information Security", Thomson Business Information, 2009

4. Stallings,"Cryptography and network Security", 3rd edition, Prentice Hall of India, 2004.

5. Robert Bragg and Mark Rhodes ,"Network Security: The complete reference", Tata Mgraw Hill, 2004

6. Buchmann ,"Introduction to Cryptography" , Apress / Springer (india) Pvt Ltd. , 2004

7. Schneier B., "Applied Cryptography - Protocols, Algorithms and Source Code in C", 2nd edition, John Wiley and Sons, 1995.

CS 722	CLOUD COMPUTING	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- To provide overview of the cloud architecture and evolution of cloud computing.

- To help them to gain knowledge on various cloud development services and tools.

- To teach how to manage task and event using cloud services.

- To discuss about Blogs and web mail services.

UNIT I   UNDERSTANDING CLOUD COMPUTING   6

Cloud computing - History of cloud computing - Cloud architecture - Cloud storage - Cloud computing matters - Advantages of cloud computing - Disadvantages of cloud computing - Companies in the cloud today - Cloud services.

UNIT II   DEVELOPING CLOUD SERVICES   10

Web - Based application - Pros and Cons of Cloud service development - Types of cloud service development - Software as a service - Platform as a service - Web services - On-Demand computing - Discovering cloud services Development services and tools - Amazon EC2 - Google App engine - IBM clouds.

UNIT III   CLOUD COMPUTING FOR EVERYONE   10

Centralizing email communications - Collaborating on schedules - Collaborating on To - do lists - Collaborating contact lists - Cloud computing for the community - Collaborating on group projects and events - Cloud computing for the corporation.

UNIT IV   USING CLOUD SERVICES   10

Collaborating on calendars, Schedules and Task Management - Exploring online scheduling applications - Exploring online planning and Task management - Collaborating on event management - Collaborating on contact management - Collaborating on project management - Collaborating on word processing - Collaborating on databases - Storing and sharing files.

UNIT V   OTHER WAYS TO COLLABORATE ONLINE   9

Collaborating via Web - Based communication tools - Evaluating web mail

services - Evaluating web conference tools - Collaborating via Social Networks and Groupware - Collaborating via Blogs and Wikis.

L : 45, P : 15

TOTAL = 60

REFERENCES

1.   Michael Miller, "Cloud Computing: Web - Based Applications that change the way you work and Collaborate Online", Que Publishing, 2008.

2.   Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for on - demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, 2008.

ELECTIVES

CSY101   **THEORY OF COMPUTATION**   L T P C
                                                       3 0 0 3

COURSE OBJECTIVES:

• To make them learn about equivalence and minimization of automata.

• To explain about parsing of strings and Context free grammars.

• To teach techniques for acceptance of strings using push down automata and Turing machines.

UNIT I   AUTOMATA   9

Finite Automata (FA) - Deterministic Finite Automata (DFA) - Non-deterministic Finite Automata (NFA) - Finite Automata with Epsilon transitions - Equivalence and minimization of automata.

UNIT II   FINITE AUTOMATA AND REGULAR LANGUAGES   9

Finite automata and regular languages - Regular expressions and Regular languages - Non - determinism and Kleene's theorem - Pumping lemma for regular languages.

UNIT III   CONTEXT - FREE GRAMMAR AND LANGUAGES   9

Context - Free Grammar (CFG) - Parse trees - Ambiguity in grammars and languages - Normal forms for CFG - Pumping lemma for CFL.

UNIT IV   PUSH DOWN AUTOMATA AND TURING MACHINES   9

Definition of the Pushdown automata - Languages of a Pushdown automata - Equivalence of Pushdown automata and CFG - Turing Machines - Programming techniques for TM.

UNIT V   UNSOLVABLE PROBLEMS AND UNDECIDABILITY   9

Recursive and recursively enumerable languages - Undecidable problems about Turing Machine - Universal Turing machines - Rice theorem - Post's Correspondence Problem.

TOTAL= 45

REFERENCES

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", 2nd edition, Pearson Education, 2003.

2. J.Martin, "Introduction to Languages and the Theory of Computation", 3rd edition, TMH, 2003.

3. Michael Sipser, "Introduction of the Theory and Computation", Thomson Brooke/cole, 1997.

CSY102	SOFT COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To explain the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.

- To make them know about uncertainty and how it is solved using Neuro Fuzzy networks.

- To teach them the various applications of computational intelligence.

UNIT I   FUZZY SET THEORY   10

Introduction to neuro - Fuzzy and Soft computing - Fuzzy sets - Basic definition and Terminology - Set - Theoretic operations - Member function formulation and Parameterization - Fuzzy rules and Fuzzy reasoning - Extension principle and Fuzzy relations - Fuzzy If - then rules - Fuzzy reasoning - Fuzzy inference systems - Mamdani fuzzy models - Sugeno fuzzy models - Tsukamoto fuzzy models - Input space partitioning and Fuzzy modeling.

UNIT II   OPTIMIZATION   8

Derivative - Based optimization - Descent methods - The method of steepest descent - Classical Newton's method - Step size determination - Derivative - Free optimization - Genetic algorithms - Simulated annealing - Random search - Downhill simplex search.

UNIT III   NEURAL NETWORKS   10

Supervised learning neural networks - Perceptrons - Adaline - Back propagation - Multilayer perceptrons - Radial basis function networks - Unsupervised learning and Other neural networks - Competitive learning networks - Kohonen self - Organizing networks - Learning vector quantization - Hebbian learning.

UNIT IV   NEURO FUZZY MODELING   9

Adaptive neuro - Fuzzy inference systems - Architecture - Hybrid learning algorithm - Learning methods that cross - fertilize ANFIS and RBFN - Coactive neuro-fuzzy modeling framework - Neuron functions for adaptive networks - Neuro fuzzy spectrum.

UNIT V   APPLICATION OF COMPUTATIONAL INTELLIGENCE   8

Printed character recognition - Inverse kinematics problems - Automobile fuel efficiency prediction - Soft computing for color recipe prediction.

TOTAL= 45

REFERENCES

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro - Fuzzy and soft computing", PHI, Pearson Education, 2004.

2. Timothy J.Ross,"Fuzzy Logic with Engineering Application ", McGraw Hill, 1977.

3. Davis E.Goldberg,"Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y, 1989.

4. S.Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.

5. R.Eberhart, P.simpson and R.Dobbins, "Computional Intelligence, PC Tools", AP Professional, Boston 1996.

CSY103	MOBILE COMPUTING	L T P C
		3 0 0 3

COURSE OBJECTIVES:

Pre requisite - General understanding of Computer Networks & Communication

• To provide the knowledge about various networks like wireless network, ATM network, Cellular network and Mobile IP.

• To make them understand how the spectrum allocation is being done and various IEEE standards for wireless communication.

• To explain how the mobile IP is used in wireless and mobile communication.

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS 9

Introduction - Wireless transmission - Frequencies for radio transmission - Signals - Antennas - Signal propagation - Multiplexing - Modulations - Spread spectrum - MAC - SDMA - FDMA - TDMA - CDMA - Cellular wireless networks.

UNIT II TELECOMMUNICATION SYSTEMS 9

GSM & GPRS:GSM features and Architecture - Network aspects in GSM - GSM frequency allocation - Mobility management - Hand -off mechanisms - Cell splitting - Security issues used in GSM - GPRS features and Architecture - Network operations - Data services in GPRS - Applications and Limitations - SMS and MMS services architecture and operation details.

UNIT III WIRELESS NETWORKS 9

Wireless LAN - IEEE 802.11 standards - Architecture - Services - HIPERLAN - Adhoc network - Blue tooth - EDGE - UMTS - Wireless broadband (WiMAX) - Adhoc networks - Sensor networks - Third generation networks and applications.

UNIT IV NETWORK LAYER AND TRANSPORT LAYER 9

Mobile IP - Dynamic host configuration protocol - Routing - DSDV - DSR - AODV -TCP over Wireless Networks - Indirect TCP - Snooping TCP - Mobile TCP - Fast retransmit / Fast recovery - Transmission/Timeout freezing - Selective retransmission - Transaction oriented TCP - WAP - WAP architecture - WDP - WTLS - WTP - WSP - WML -WML Script - WAE - WTA.

UNIT V   SECURITY ISSUES IN MOBILE COMPUTING   9

Introduction - Information security - Security techniques and Algorithms - security Protocols - Public key infrastructure - Trust - Security models - Security frameworks for mobile environment.

TOTAL = 45

REFERENCES

1.   Jochen Schiller, "Mobile Communications", 2nd edition, Pearson Education, 2003.

2.   Asoke. K Talukder and Roopa R. Yavagal ,"Mobile Computing (Technology, Applications and Service Creation)",TATA McGraw Hill, 2006.

3.   Brian Mennecke and Troy J. Strader ,"Mobile Commerce: Technology, Theory and Applications ", Idea Group Publishing,2002.

4.   William Stallings, "Wireless Communications and Networks", Pearson Education, 2002.

5.   Kaveh Pahlavan, Prasanth Krishnamurthy, "Principles of Wireless Networks", 1st edition, Pearson Education, 2003.

6.   Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.

7.   C.K.Toh, "AdHoc Mobile Wireless Networks", 1st edition, Pearson Education, 2002.

8.   Burkhardt, "Pervasive Computing", 1st edition, Pearson Education, 2003.

CSY104	DISTRIBUTED SYSTEMS	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To expose them to various paradigms in distributed applications.

• To examine various issues in distributed operating system.

• To make them study different fault tolerance methods for distributed environment.

UNIT I   COMMUNICATION IN DISTRIBUTED ENVIRONMENT   8

Introduction - Various paradigms in distributed applications - Remote Procedure Call - Remote Object Invocation - Message Oriented communication - Unicasting, multicasting and broadcasting - Group communication.

UNIT II   DISTRIBUTED OPERATING SYSTEMS   12

Issues in distributed operating system - Threads in distributed systems - Clock synchronization - Causal ordering - Global states - Election algorithms - Distributed mutual exclusion - Distributed transactions - Distributed deadlock - Agreement protocols.

UNIT III   DISTRIBUTED RESOURCE MANAGEMENT   10

Distributed shared memory - Data Centric consistency models - Client Centric consistency models: Ivy - Munin - Distributed scheduling - Distributed file systems - Sun NFS.

UNIT IV   FAULT TOLERANCE AND CONSENSUS   7

Introduction to fault tolerance - Distributed commit protocols - Byzantine fault tolerance - Impossibilities in fault tolerance.

UNIT V   CASE STUDIES   8

Distributed object - Based system - CORBA - COM+ - Distributed coordination based system - JINI.

TOTAL = 45

REFERENCES

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", 3rd edition, Pearson Education Asia, 2002.

2. Hagit Attiya and Jennifer Welch, "Distributed Computing: Fundamentals, Simulations and Advanced Topics", Wiley publications, 2004.

3.   Mukesh Singhal, "Advanced Concepts in Operating systems", McGraw - Hill Series in Computer Science, 1994.

4.   A.S.Tanenbaum and M.Van Steen, "Distributed Systems", Pearson Education, 2004.

5.   M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley, 2004.

CSY105	WEB TECHNOLOGY	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To teach them how develop web applications using server side programming to design web pages and make use of style sheets that span multiple domains for use with legacy browsers.

• To make them build web applications using client side scripting technologies using   Microsoft's IIS and JavaScript for web based development.

UNIT I   INTRODUCTION   9

History of the internet and World Wide Web - HTML 4 protocols - HTTP, SMTP, POP3, MIME, and IMAP. Introduction to Java Scripts - Object based scripting for the web. Structures - Functions-Arrays-Objects.

UNIT II   DYNAMIC HTML   9

Introduction - Objects - Reference, Children, Collection - Dynamic style-Dynamic position, Frames, Navigator, Event Model - On check - On load - Mouse rel -Form process - Event bubblers - Filters -- Creating images - Adding shadows -- Creating motion with blur - Data binding - Simple data binding - Moving with a record set - Sorting table data - Binding of an Image - table.

UNIT III   MULTIMEDIA   9

Audio and video speech synthesis and recognition -   Electronic commerce - E -Marketing - Online payments and security - Web servers - HTTP request types - System architecture - Client side scripting and Server side scripting - Accessing Web servers - IIS - Apache-web server.

UNIT IV   DATABASE - ASP - XML   9

Database, Relational database model - Overview, SQL - ASP - Working of ASP - Objects - File system objects - Session tracking and cookies - ADO - Access a Database from ASP - Server side Active -X components - XML - Structure in data - Name spaces - DTD-Vocabularies-DOM Methods.

UNIT V   SERVLETS AND JSP   9

Introduction - Servlet overview architecture - Handling HTTP request - Get and post request - Redirecting request - Multi-tier applications - JSP - Overview - Objects - Scripting - Standard actions - Directives.

TOTAL = 45

TEXTBOOK

1. Deitel & Deitel and Goldberg, "Internet and World Wide Web - How to program", Pearson Education Asia, 2001.

2. Elliotte Rusty Harold, "Java Network Programming", O'Reilly Publishers, 2002

REFERENCES

1. R. Krishnamoorthy and S. Prabhu, "Internet and Java Programming", New Age International Publishers, 2004.

2. Thomno A. Powell, "The Complete Reference HTML and XHTML", 4th edition, Tata McGraw Hill, 2003.

3. Naughton, "The Complete Reference - Java2", Tata McGraw - Hill, 3rd edition, 1999.

4. Eric Ladd and Jim O' Donnel, "Using HTML 4, XML and JAVA", Prentice Hall of India - QUE, 1999.

5. Aferganatel, "WebProgramming:", PHI,2004.

6. Rajkamal, "Web Technology", Tata McGraw - Hill, 2001.

7. Sebesta, "Programming the World Wide Web", 3rd edition, Addison - Wesley, 2006.

8. Basham, Sierra and Bates, "Head First Servlets and JSP", O'Reilly, 2004.

9. Elisabeth Freeman and Eric Freeman, "Head first HTML with CSS & XHTML",1st edition, 2005.

CSY106	XML AND WEB SERVICES	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To explain the concepts of XML.

• To teach them on basic rules related to writing XML.

• To make them understand the process of building XML based applications

• To expose them on the issues in Web-services deployment.

UNIT I   XML TECHNOLOGY FAMILY   9

XML - Benefits - Advantages of XML - DTD - XML schemas - X -Files - XML processing - DOM - SAX - Presentation technologies - XSL - XFORMS - XHTML - Voice XML - Transformation - XSLT - XLINK - XPATH - XQuery - Service Oriented Architecture (SOA).

UNIT II   WEB SERVICES BUILDING BLOCKS   9

Architecting web services - Transport protocols for web services - Messaging with web services - Protocols - SOAP - Describing web services - WSDL - Anatomy of WSDL - Manipulating - WSDL - Web service policy - Discovering web services - UDDI - Anatomy of UDDI - Web service inspection - Ad - Hoc discovery.

UNIT III   BUILDING XML - BASED APPLICATIONS   9

Parsing XML - Integrating XML with databases - Formatting XML for the web - Leveraging XML in Visual Studio. NET - Applied XML - Understanding XML standards - Delivering wireless and Voice services with XML - Applied XML in vertical Industry.

UNIT IV   XML SECURITY   9

Security overview - Canonicalization - XML security framework - XML encryption - XML Digital Signature - XKMS structure - Guidelines for Signing XML documents - XML in practice.

UNIT V   SEMANTIC WEB   9

Semantic web - Role of Meta data in web content - Resource description framework - RDF schema - Architecture of semantic web - Content management workflow.

TOTAL = 45

REFERENCES

1. Ron Schmeltzer, "XML and Web Services", Pearson Education, 2002.

2. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.

3. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.

4. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.

5. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", 1st edition, Apress, 2004.

6. Russ Basiura and Mike Batongbacal, "Professional ASP .NET Web Services", Apress, 2003.

CSY107 FORMAL METHODS IN SOFTWARE ENGINEERING

L T P C
3 0 0 3

COURSE OBJECTIVES:

• To introduce the notion of formal methods in software engineering

• To make the students understand theoretical foundations of software engineering in terms of basic style, constructs, notations and tools

• To expose the students to the tools used for formal semantics analysis.

UNIT I INTRODUCTION   8

Need for formal methods - Problems in natural language specifications, Formal Versus Informal programming - Advantages of formal methods - Requirements of formal system - Types - Propositional logic - Predicate logic - Relationships and Functions.

UNIT II FORMAL SPECIFICATION STYLE   8

Model - Oriented - Specifications - Concurrency - Based specifications - Example specification languages.

UNIT III VDM   10

Introduction to VDM - Basic types - Quote types - Compound types - Optional types - Functions - Operations - Additional constructs - Modules.

UNIT IV THE Z NOTATION   10

The Interchange language - User - Defined identifiers - Data types - Basic types - Compound types - Schemas - Additional constructs.

UNIT V FORMAL SEMANTICS AND TOOLS   9

Operational semantics - Denotation semantics - Axiomatic semantics proof editors - Proof analyzer - Symbolic simulators -Translators - Test generation tools.

TOTAL = 45

REFERENCES

1. Andrew Harry, "Formal Methods: Fact File VDM and Z", John Wiley and Sons, 1996.

2. Jim Woodcock, Jim Davies, "Using Z Specification, Refinement and Proof", Prentice Hall International, 1996.

CSY108	MULTIMEDIA SYSTEMS	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To explain several compression techniques and the various file formats.

• To make them learn about the various I/O technologies for multimedia devices.

• To help them to gain knowledge about storage and design concepts of multimedia applications.

UNIT I   INTRODUCTION   9

Multimedia applications - System architecture - Objects of multimedia systems - Multimedia databases.

UNIT II   COMPRESSION AND FILE FORMATS   9

Types of compression - Image compression - CCITT - JPEG - Video image compression - MPEG - DVI technology - Audio compression - RTF format - TIFF file format - RIFF file format - MIDI - JPEG DIB - TWAIN.

UNIT III INPUT/OUTPUT TECHNOLOGIES   9

Traditional devices - Pen input - Video display systems - Scanners - Digital audio - Video images and animation.

UNIT IV STORAGE AND RETRIEVAL   9

Magnetic media - RAID - Optical media - CD ROM - WORM - Juke box - Cache management.

UNIT V   APPLICATION DESIGN   9

Application classes - Types of systems - Virtual reality design - Components databases - Authoring systems - Hyper media - User interface design - Display/Playback issues - Hypermedia linking and embedding.

TOTAL = 45

REFERENCES

1. Andleigh P.K and Thakrar .K, "Multimedia Systems Design", Prentice Hall, 1996.

2. Vaughan T," Multimedia", Tata McGraw Hill, 1999.

3. Koegel Buford JFK, "Multimedia Systems", Addison Wesley Longman, 1999.

CSY109	**SOFTWARE AGENTS**	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To introduce basic concepts of Agent programming.

• To explain details concerning Java agents.

• To make them understand the issues and techniques of multiagent system.

• To expose them on how to make agents more intelligent

• To discuss some security issues.

UNIT I   AGENTS - OVERVIEW   9

Agent definition - Agent programming paradigms - Agent Vs Object - Aglet - Mobile agents - Agent frameworks - Agent reasoning.

UNIT II   JAVA AGENTS   9

Processes - Threads - Daemons - Components - Java Beans - ActiveX - sockets - RPCs - Distributed computing - Aglets programming - Jini architecture - Actors and Agents - Typed and proactive messages.

UNIT III   MULTI AGENT SYSTEMS   9

Interaction between agents - Reactive agents - Cognitive agents - Interaction protocols - Agent coordination - Agent negotiation - Agent cooperation - Agent organization - Self-interested agents in Electronic commerce applications.

UNIT IV   INTELLIGENT SOFTWARE AGENTS   9

Interface agents - Agent communication languages - Agent knowledge representation - Agent adaptability - Belief desire intension - Mobile agent applications.

UNIT V   AGENTS AND SECURITY   9

Agent security issues - Mobile agents security - Protecting agents against malicious hosts - Untrusted agent - Black box security - Authentication for agents - Security issues for aglets.

TOTAL= 45

REFERENCES

1.   Bigus & Bigus, "Constructing Intelligent agents with Java ", Wiley, 1997.

2.   Bradshaw, "Software Agents ", MIT Press, 2000.

3.   Russel and Norvig, "Artificial Intelligence: A Modern Approach", 2nd edition, Pearson Education, 2003.

4.   Richard Murch, Tony Johnson, "Intelligent Software Agents", Prentice Hall, 2000.

5.   Gerhard Weiss, "Multi Agent Systems - A Modern approach to Distributed Artificial Intelligence", MIT Press, 2000.

CSY110	EMBEDDED SYSTEMS	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To cover the design issues involved in embedded systems and system-on-chip technologies, thereby dealing with the various applications, programming languages and processor architectures used for embedded systems.

• To review basics of real-time systems and provides an insight into functional modules of a Real Time Operating Systems.

UNIT I   INTRODUCTION   9

Embedded computing: Introduction, complex systems and Microprocessor, The Embedded system design processor, Formalisms for system design, Design examples. Terminology - Gates - Timing diagram - Memory - Microprocessors Buses - Direct Memory Access - Interrupts - Built-ins on the microprocessor - Conventions used on schematic - Schematic. Interrupts microprocessor architecture - Interrupt basics - Shared data problem - Interrupt latency.

UNIT II   PIC MICROCONTROLLER AND INTERFACING   9

Introduction - CPU architecture - Registers - Instruction sets - Addressing modes - Loop timing - Timers - Interrupts - Interrupt timing- I/O Expansion - I 2C Bus operation serial EEPROM - Analog to digital converter -UART - Baud Rate - Data handling - Initialization - Special features - Serial programming - Parallel slave port.

UNIT III   EMBEDDED MICROCOMPUTER SYSTEMS   9

Motorola MC68H11 family architecture registers - Addressing modes Programs. Interfacing methods parallel I/O interface - Parallel port interfaces - Memory Interfacing- High speed I/O interfacing- Interrupts - Interrupt Service Routine - Features of interrupts - Interrupt vector and Priority- Timing generation and measurements - Input capture, output compare, frequency measurement - Serial I/O devices Rs.232, Rs.485. - Analog interfacing and applications.

UNIT IV   SOFTWARE DEVELOPMENT TOOLS   9

Embedded system evolution trends. Round-robin, Robin with Interrupts, function - One-Scheduling Architecture, Algorithms. Introduction to assembler - Compiler - Cross compilers and Integrated Development Environment (IDE). Object Oriented Interfacing- Recursion - Debugging strategies - Simulators.

UNIT V   REAL TIME OPERATING SYSTEMS   9

Task and task states, tasks and data, semaphores and shared data operating system services - Message queues - Timer function - Events - Memory management- Interrupt routines in an RTOS environment - Basic design using RTOS.Multi-tasking in real time systems-Scheduling.

TOTAL= 45

TEXT BOOKS

1.   David E Simon," An Embedded Software Primer", Pearson Education Asia, 2001.

2.   Jonartthan W. Valvano Brooks / cole, "Embedded Micro computer Systems Real time Interfacing ", Thomson learning, 2001.

3.   John B Peat man," Design with Microcontroller ", Pearson education Asia, 1998.

4.   Wayne Wolf, "Computers as Components; Principles of Embedded Computing System Design", Harcourt India, Morgan Kaufman Publishers, 1st indian reprint, 2001.

5.   Alan C. Shaw," Real Time Systems and software", John Wiley & Sons Inc, 2001.

REFERENCE BOOKS

1.   Rajkamal, "Embedded systems architecture, Programming and Design", TATA McGraw Hill, 1st reprint, 2003.

2.   Burns, Alan and Wellings, Andy, "Real -Time Systems and Programming Languages ", 2nd edition, Harlow: Addison Wesley Longman, 1997.

3.   Raymond J.A. Bhur and Donald L.Bialey, " An Introduction to real time systems: Design to networking with C/C++ ", Prentice Hall Inc., New Jersey, 1999.

4.   Grehan Moore and Cyliax, " Real time Programming: A guide to 32 Bit Embedded Development. Reading ", Addison Wesley Longman, 1998.

5.   Frank Vahid and Tony Givargis," Embedded Systems Design - A Unified Hardware/Software introduction", John Wiley, 2002.

CSY111	IT SYSTEMS MANAGEMENT	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To improve them on understanding of the current managerial issues in effectively choosing, deploying, and utilizing information technology.

• To explain essential concepts for understanding of computer hardware, software, and telecommunications technologies

• To develop their capability to identify and exploit information technologies to gain competitive advantage, both at an individual and organizational level

• To explain the change and configuration management processes.

• To explain the operations management processes

UNIT I   INTRODUCTION   5

Introduction to IT Systems management - Scope and definitions, current and future technology - Hardware, software, storage, networks, systems management frameworks.

UNIT II   CHANGE MANAGEMENT   10

Change management processes - Identifying the need for change, making a business case and measuring return on investment, managing change - People, tools, processes.

UNIT III   CONFIGURATION MANAGEMENT   10

Configuration management processes - Current and target architecture definitions, vendor selection, solution deployment.

UNIT IV   OPERATIONS MANAGEMENT I   10

Operations management processes - Application management, Performance management, Capacity planning.

UNIT V OPERATIONS MANAGEMENT II   10

Operations management processes - Business continuity and Disaster recovery, Problem management, Exception management.

TOTAL = 45

REFERENCES

1. Schiesser and Rich, "IT Systems Management", Prentice Hall of India, New Delhi, 2002.

2.   Frenzel and Carol W, "Management of Information Technology", Boyd and Fraser, 1992.

3.   Davenport and Thomas H, "Information Ecology - Mastering the information and Knowledge environment", Oxford University Press, 1997.

4.   Phillips and Joseph, "IT Project Management - On track from start to finish", Tata McGraw Hill, 2002.

5.   Williams, Brian K., Stacey C. Sawyer and Sarah E. Hutchinson, "Using Information Technology - A practical introduction to computers and communications", 3rd edition, Tata McGraw Hill, 1999.

6.   Turban, Efraim, Rainer, R. Kelly, Potter and   Richard E., "Introduction to InformationTechnology", John Wiley, 2003.

CSY 112	MOBILE AD HOC NETWORKS	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To make them understand the design issues and challenges associated with the implementation of ad hoc networks

• To explain different routing mechanisms and multicast routing potocols

• To expose them on the design issues, different attacks and security routing protocols for ad hoc wireless networks

• To teach them the QoS solutions and the different layer solutions

UNIT I WIRELESS LAN, PAN, WAN AND MAN   9

Characteristics of wireless channel - Fundamentals of WLANs - IEEE 802.11 standard - HIPERLAN standard - First, second and third generation cellular systems- WLL- Wireless ATM- IEEE 802.16 standard- HIPERACCESS- Ad Hoc Wireless Internet.

UNIT II MAC, ROUTING AND MULTICAST ROUTING PROTOCOLS   9

MAC protocols: Design issues, goals and classification - Contention - Based protocols with reservation and scheduling mechanisms - Protocols using directional antennas. Routing protocols: Design issues and classification - Table-driven, On-demand and Hybrid routing protocols - Routing protocols with efficient flooding mechanisms- Hierarchical and power - Aware routing protocols. Multicast Routing Protocols: Design issues and operation- Architecture reference model - Classification - Tree - based, Mesh - based protocols - Energy - Efficient multicasting.

UNIT III TRANSPORT LAYER AND SECURITY PROTOCOLS   9

Transport layer protocol: Design issues- Goals and Classification - TCP over AdHoc wireless networks - Security - Security requirements - Issues and challenges in security provisioning - Network security attacks- Security routing. Quality of Service: Issues and challenges in providing QoS - Classification of QoS solutions- MAC layer solutions- Network layer solutions-QoS frameworks.

UNIT IV ENERGY MANAGEMENT   9

Need, Classification of battery management schemes - Transmission power management schemes -System power management schemes. Wireless Sensor Networks: Architecture - Data dissemination - Date gathering, MAC protocols - Location discovery-Quality of a sensor network.

UNIT V   PERFORMANCE ANALYSIS   **9**

ABR beaconing, Performance parameters, Route - Discovery time - End - to - End delay performance - Communication throughput performance - Packet loss performance - Route reconfiguration/repair time - TCP/IP based applications.

TOTAL = 45

REFERENCES

1.   C. Siva Ram Murthy and B.S. Manoj, "AdHoc Wireless Networks: Architectures and protocols", Prentice Hall PTR, 2004.

2.   C. K.Toh, "AdHoc Mobile Wireless Networks: Protocols and Systems", Prentice Hall PTR, 2001.

3.   Mohammad Ilyas, "The Handbook of AdHoc Wireless Networks", CRC press, 2002.

4.   Charles E. Perkins, "AdHoc Networking", Addison Wesley, 2000.

5.   Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, Mobile AdHoc Networking, Wiley IEEE press, 2004.

CSY 113	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

• To make them understand Data mining techniques and algorithms

• To explain the methodology of engineering legacy databases for data Warehousing and data mining to derive business rules for decision support systems.

• To teach the techniques of OLTP and developing a Data Warehouse

• To expose them on Data Mining environments and applications

UNIT I   INTRODUCTION   9

Relation to statistics, Databases - Data mining functionalities - Steps in data mining process - Architecture of a typical data mining systems - Classification of data mining systems - Overview of data mining techniques.

UNIT II   DATA PREPROCESSING AND ASSOCIATION RULES   9

Data preprocessing - Data cleaning, Integration, Transformation, Reduction - Discretization concept hierarchies - Concept description: Data Generalization and Summarization based characterization - Mining association rules in large databases.

UNIT III   PREDICTIVE MODELING   9

Classification and Prediction: Issues Regarding Classification and Prediction - Classification by decision tree induction - Bayesian classification - Other classification methods - Prediction - Clusters analysis: types of data In cluster analysis - Categorization of major clustering methods: partitioning methods - Hierarchical methods.

UNIT IV   DATA WAREHOUSING   9

Data warehousing components - Multi dimensional data model - Data warehouse architecture - Data warehouse implementation -   Mapping the data warehouse to multiprocessor architecture - OLAP - Need - Categorization of OLAP Tools.

UNIT V   APPLICATIONS   9

Applications of data mining WWW - Mining text database - Mining spatial databases.

TOTAL= 45

REFERENCES

1.   Jiawei Han, Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, 2002.

2.   Alex Berson,Stephen J. Smith, "Data Warehousing, Data Mining,& OLAP", Tata Mcgraw Hill, 2004.

3.   Usama M.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth and Ramasamy Uthurusamy, "Advances in Knowledge discovery and Data Mining", The M.I.T Press, 1996.

4.   Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", John Wiley & Sons Inc., 1998.

5.   Sean Kelly, "Data Warehousing In Action", John Wiley & Sons Inc., 1997.

CSY 114	PERFORMANCE EVALUATION OF COMPUTER	L	T	P	C
	SYSTEMS AND NETWORKS	3	0	0	3

COURSE OBJECTIVES:

• To make them understand an overview of probability theory and statistics and fundamental performance analysis techniques including methods for performance measurement, performance metrics, monitoring, experimental design, and system modeling.

• To explain fundamental concepts the queuing theory, mean value analysis, and modeling.

• To teach them various applications of the learned concepts to measure the performances of computer systems like communication networks, LANs, memory and I/O systems.

UNIT I   FUNDAMENTALS   9

Need for performance evaluation - Role of performance evaluation - Performance evaluation methods - Performance metrics and Evaluation criteria - CPU and I/O architectures - Distributed and Network architectures - Secondary storage - Topologies - Computer architecture - Fundamental concepts and performance measures.

UNIT II   PROBABILITY AND STOCHASTIC PROCESSES   9

Scheduling algorithms - Workloads - Random variables - Probability distributions - Densities -Expectation - Stochastic processes - Poisson process - Birth death process - Markov process. Discrete Time Markov chains (DTMC) - Bayes theorem - Conditional probability - Total probability - Discrete and Continuous random variables - Common distributions - Probability generating functions (PGF) and Laplace Transforms (LST) numerous examples from computer networking.

UNIT III   QUEUING THEORY   9

Queuing systems - Networks of queues - Estimating parameters and Distributions - Computational methods - Simulation process - Time control - Systems and Modeling.

UNIT IV   PETRI NETS AND SYSTEM PERFORMANCE   9

Petri nets - Classical petri nets - Timed petri nets - Priority-based petri nets - Colored petri nets - Generalized petri nets - Tool selection - Validation of

results - Performance metrics - Evaluation - Multiple server computer system analysis.

UNIT V   ANALYSIS   9

OS components - System architecture - Workloads - Design - Simulation - Analysis - Database system performance - Computer networks components - Simulation modeling of LAN.

TOTAL = 45

TEXTBOOK

1.   Paul J. Fortier, Howard E. Michael, "Computer Systems Performance Evaluation and Prediction", Elsevier Science, 2003.

REFERENCES

1.   Thomas G. Robertazzi, "Computer Networks and Systems Queing theory and Performance Evaluation", 3rd edition, Springer, 2000.

2.   Domenico Ferrari, Giuseppe Serazzi and Alexandra Zeijher, "Measurement & Tuning of Computer Systems ", Prentice Hall Inc, 1983.

3.   Michael F. Mories and Paul F. Roth, "Tools and techniques Computer Performance Evaluation", Van Nostrand, 1982.

4.   K.Kant and M.M.Srinivasan, "Introduction to computer system performance Evaluation", McGraw Hill, 1992.

5.   Herbert Hellerman and Thomas F.Conroy, "Computer system performance", McGraw -Hill, 1992.

CSY 115	AGENT BASED INTELLIGENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

• To explain how intelligent agents solve complex problems.

• To bring awareness on the techniques of knowledge based agents.

• To describe the reasons for uncertainty and explain how to deal with this.

• To bring out the concepts of learning agents and their applications.

UNIT I   INTRODUCTION   9

Definitions - History - Intelligent agents - Structure - Environment - Basic problem solving agents - Complex problem solving - Formulating - Search strategies - Intelligent search - Game playing as search.

UNIT II   KNOWLEDGE BASED AGENTS   9

Representation - Logic - First order logic - Reflex agent - Building a knowledge base - General ontology - Inference - Logical recovery.

UNIT III   PLANNING AGENTS   9

Situational calculus - Representation of planning - Partial order planning - Practical planners - Conditional planning - Preplanning agents.

UNIT IV   AGENTS AND UNCERTAINTY   9

Acting under uncertainty - Probability Bayes rule and use - Belief networks - Utility theory - Decision network - Value of information - Decision theoretic agent design.

UNIT V   HIGHER LEVEL AGENTS   9

Learning agents - General model - Inductive learning - Learning decision trees - Reinforcement learning - Knowledge in learning - Communicative agents - Types of communicating agents - Future of AI.

                                                    TOTAL= 45

REFERENCES

1. Zhang, Zili Zhang, "Agent-Based Hybrid Intelligent Systems", Vol. 2938, Chengqi (editions.) 2004.

2.	Stuart Russell and Peter Norvig, " Artificial Intelligence - A Modern Approach", Prentice Hall, 1995.

3.	Patrick Henry Winston, "Artificial Intelligence", 3rd edition, AW, 1999.

4.	Nils.J.Nilsson,"Principles of Artificial Intelligence", Narosa Publishing House, 1992.

CSY 116   **PERSONAL SOFTWARE PROCESS**   **L T P C**
                                                     3 0 0 3

COURSE OBJECTIVES:

* To provide software engineers with disciplined methods for improving personal software development processes.

* To make PSP awareness to students.

* To highlight major components of PSP

* To bring out different perceptions about PSP (like & don't like)

* To motive the students to participate in PSP (checklist, open-ended) and set their goals.

* To make the student to participate in PSP

UNIT I   INTRODUCTION   **9**

Software engineer's job - Time management - Tracking time - Period and Product planning.

UNIT II   ESTIMATION AND MANAGEMENT   **9**

Case study - Product size - Function points - Managing your time - Managing commitments.

UNIT III   PLANNING   **9**

Managing schedules - Project plan - Software development process - Defects - Updated PSP.

UNIT IV   DEFECT HANDLING   **9**

Finding defects - Code review checklist - Projecting defects - Economics of defect removal

UNIT V   QUALITY   **9**

Design defects - Product quality - Process quality - A personal commitment to quality.

                                              TOTAL = 45

REFERENCES

1.   Humphrey, Watts S. "Introduction to the Personal Software Process", Addison - Wesley, 1997.

2.   Humphrey, Watts S., "PSP: A Self - Improvement Process for Software Engineers", Boston, MA: Addison - Wesley, 2005.

3.   Steve McConnell, "Code Complete: A Practical Handbook of Software Construction", Microsoft Press, 2004.

4.   Roger S Pressman," Software Engineering: A Practitioner's Approach", 6th edition, R.S. Pressman and Associates, 2005.

CSY 117	TEAM SOFTWARE PROCESS	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To improve the levels of quality and productivity of a team's software development project.

• To establish a mature and disciplined engineering practice that produces secure, reliable software in less time and at lower costs.

• To teach them how to accelerate software process improvement by making CMM level 5 behaviors normal and expected.

• To teach them how managers coach and motivate their teams and how to help them to sustain peak performance.

• To explain how to build self directed teams that plan and track their work, establish goals, and own their processes and plans.

UNIT I   INTRODUCTION   8

PSP overview - TSP overview - Logic of the TSP - Need statements for sample exercises - Launching a Team Project - SCM.

UNIT II   TEAM ROLES   9

Team leader - Development Manager - Planning Manager - Quality/ Process Manager - Support Manager.

UNIT III STRATEGY & PLANNING   10

Development strategy - Development plan - Software inspections.

UNIT IV DEVELOPMENT   10

Defining the requirements - Integration and System testing - Designing with teams - Product implementation.

UNIT V   WRAPPING UP   8

Documentation - Postmortem - Managing yourself - Being on a team - Teamwork.

TOTAL = 45

REFERENCES

1.   Humphrey, Watts S., " Introduction to the Team Software Process", Boston, MA:Addison - Wesley, 2000.

2.   Humphrey, Watts S. , "TSP - Leading a Development Team", Boston, MA: Addison - Wesley, 2005.

3.   Humphrey, Watts S., "Introduction to the Personal Software Process", Boston, MA: Addison - Wesley, 1997.

4.   Roger S Pressman, "Software Engineering: A Practitioner's Approach", 6th edition,R.S. Pressman and Associates, 2005.

CSY 118 SOFTWARE ENGINEERING FOR IMAGE PROCESSING L T P C
                                                       3 0 0 3

COURSE OBJECTIVES:

•   To explain the Role of a Software engineer in image processing application.

•   To provide basic knowledge in Imaging software and properties.

•   To teach them how to implement Imaging system modules using object-oriented software programs, using techniques such as class derivation, the use of software objects as components in a larger software system.

UNIT I   6

Software engineering an overview: Introduction - A case for a software engineering approach to building an imaging system - The role of the software engineer- The nature of software for imaging system- Case study: A visual inspection system. Imaging software and its properties: Classification of software qualities - Basic software engineering principles.

UNIT II   9

Software Process and life cycle models: Software processes and methodologies - Software life cycle models - V model - The spiral model-Evolutionary model- Fountain model - Lightweight methodologies- Unified process mode - CMM Software standards. Software Requirements: Requirements engineering process- Types of requirements - Requirements users-Formal methods in software specifications- Specification of imaging systems - Case study - Object oriented analysis- organizing the requirements document- Requirements validation and reviews.

UNIT III   9

Software system design: The design activity- Procedural oriented design-Object oriented design - Hardware considerations in imaging system - Fault tolerant design.The Software production process: Programming languages-Writing and testing code- Coding standards.

UNIT IV   12

Software measurements and testing: The role of metrics - Faults - Failures and bugs- The role of testing - Testing techniques- Design of testing plans. Hardware - Software Integration and maintenance: Goals of system integration - System Unification- System verification - System integration tools- Software integration - Post integration software optimization - A software reengineering process model - A maintenance process model- Software reuse - The second system effect- code and program maintenance.

UNIT V 9

Management of software project: Software project management - General project maintenance - Managing and Mitigating risks- Personnel management-Assessment of project personnel - Tracking and reporting progress-Cost estimation using COCOMO.

TOTAL = 45

REFERENCES

1. Philip A. Laplante ,"Software Engineering for Image Processing", CRC Press, USA, 2003.

CSY 119	SERVICE ORIENTED ARCHITECTURE	L T P C
		3 0 0 3

COURSE OBJECTIVES:

- To make them understand and explain SOA values

- To explain the model of SOA management

- To prepare students with comprehensive knowledge and broad perspective of this important trend in software engineering

- To discuss the impact of SOA on software quality, efficiency, security, performance and flexibility

UNIT I SOA AND WEB SERVICES FUNDAMENTALS 5

Fundamentals of SOA - Characteristics - Common misperception - Benefits - Pitfalls of adopting SOA - Transition from XML to web service to SOA - Reshaping of XML and web service through SOA - Standards for SOA - Comparison of SOA vs Past architecture - Web services frame work - Service description - Messaging with SOA.

UNIT II SECOND GENERATION WEB SERVICES 9

Activity management and comparison - Message exchange patterns - Service activity - Coordination - Atomic transactions - Business activities - Business protocols - Process definitions - Process services - Orchestration and coordination - Collaboration. Addressing - Reliable messaging - WS policy framework - Policy assertions and alleviates policies relationship to activity management - Metadata exchange security - WS notification and eventing.

UNIT III SERVICE ORIENTATION 9

Service oriented architecture - Components - Common principles of service - Orientation - Interrelationship among principles - Service orientation VS object orientation - Service layers - Different services layers - Configuration scenarios of service layers. SOA delivery life cycle phases - Agile strategy - SOA analysis - Service modeling - guidelines - Classifications of service models.

UNIT IV TECHNOLOGIES AND DESIGN FOR SOA 11

Service oriented design - Web service description language (WSDL) - Related XML schema - WSDL language basis - SOAP language basis - Service interface design tools - SOA comparison guide lines - Industry standards - XML AWSOA - WSDL and SOA - SOAPAWAOA - SOA extension.

UNIT V   SERVICE DESIGN AND SECURITY   11

Service design - Guidelines - Business process design - WS - BPEL language basics - WS - BPEL elements - WS co ordination - Service oriented process design - WS addressing language and messaging basis - WS - Meta data exchange - Security language basis - WSOA platform - SOA support in J2EE and .NET.

TOTAL = 45

TEXT BOOK

1.   Thomas Erl, "Service-Oriented Architecture: Concepts, Technology & Design", Prentice Hall / Pearson, 2005.

REFERENCES

1.   Thomas Erl , "Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services ", The Prentice Hall, Service-Oriented Computing Series, 2004.

2.   Thomas Erl, "SOA Principles of Service Design", Prentice Hall Service-Oriented Computing Series, 2007.

3.   Shankar Kambhampaty, "Service Oriented Architecture for Enterprise Applications", 1st edition, Wiley India Private Limited, 2008.

4.   Mike Rosen, Boris Lublinsky, Kevin T. Smith and Marc J. Balcer, "Applied SOA Service Oriented Architecture And Design Strategies", Wiley India Private Limited, 2008.

5.   Eric Newcomer Greg Lomow, "Understanding SOA with Web Services", Pearson Education, 2nd edition, 2008.

6.   Paul. C. Brown, "Implementing SOA Total Architecture in Practice", Pearson Education, 2009.

7.   Nicolai M. Josuttis, "SOA in Practice, The Art of Distributed System Design", 2nd edition, 2008.

CSY 120	GRID COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To explain grid computing standards and protocols

- To make them learn and understand the recent trends in the field of computation to optimize the utilization of resources.

- To give the recent trends in the field of computation to optimize the utilization of resources.

- To tell about resource sharing across the heterogeneous entities.

- To explain how to integrate heterogeneous computing elements and data resources to provide a global computing space.

- To explain techniques to manage and schedule the resources in grid environments.

UNIT I   CONCEPTS AND ARCHITECTURE   9

Introduction - Parallel and distributed computing - Cluster computing - Grid Computing - Anatomy and physiology of grid - Web and grid services - Grid standards, trends, challenges and applications.

UNIT II   GRID MONITORING   9

Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems - Grid ICE - MDS - Service Level Agreements (SLAs) - Other monitoring systems.

UNIT III   GRID SECURITY AND RESOURCE MANAGEMENT   9

Grid Security - A brief security primer - PKI - X.509 certificates - Grid security - Grid scheduling and resource management, Grid way and Grid bus broker - principles of local schedulers, QoS.

UNIT IV   DATA MANAGEMENT AND GRID PORTALS   9

Data management - Categories and origins of structured data - data management challenges - Architectural approaches - Collective data management services - Federation services - Grid portals - Generations of grid portals.

UNIT V   GRID MIDDLEWARE   9

List of globally available middleware - Case studies: Globus toolkit - Architecture, components and features -   Features of next generation grid.

TOTAL= 45

REFERENCES

1.   Ian Foster and Carl Kesselman, "The Grid 2: Blueprint for a New Computing Infrastructure", Elsevier Series, 2004.

2.   Vladimir Silva, "Grid Computing for Developers", Charles River Media, 2006.

3.   Parvin Asadzadeh, Rajkumar Buyya, Chun Ling Kei, Deepa Nayar, and Srikumar Venugopal, "Global Grids and Software Toolkits: A Study of Four GridMiddleware Technologies, High Performance Computing: Paradigm and Infrastructure, Laurence Yang and Minyi Guo (editors)", Wiley Press, New Jersey, USA, 2005.

4.   Jarek Nabrzyski, Jennifer M. Schopf and Jan Weglarz, " Grid Resource Management:State of the Art and Future Trends ", International Series in Operations Research & Management Science, Springer, 1st edition, 2003.

5.   Srikumar Venugopal, Krishna Nadiminti, Hussein Gibbins and Rajkumar Buyya, "Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience", Wiley Press, New York, USA, 2008.

6.   Fran Berman , Geoffrey Fox and Anthony J.G. Hey, "Grid Computing: Making The Global Infrastructure a Reality", Wiley, 2003.

7.   Maozhen Li and Mark Baker, "The Grid: Core Technologies", Wiley, 2005.

8.   Joshy Joseph and Craig Fellenstein, "Grid Computing", IBM Press, 2004.

9.   Borja Sotomayor and Lisa Childers, "Globus Toolkit 4: Programming Java Services. The Elsevier Series in Grid Computing", Morgan Kaufmann, 2005.

CSY 121	PERVASIVE COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To provide a sound conceptual foundation in the area of Pervasive Computing aspects.

- To provide a balanced treatment of the mechanisms and environments of pervasive computing and initiates students to the state-of-the-art in the area.

- To teach the techniques to conceptualize, analyze and design select classes of pervasive computing systems.

UNIT I   FUNDAMENTALS   9

Evolution - Ubiquitous computing - Applied pervasive computing - Pervasive computing. Principles: Decentralization - Diversification - Connectivity - Simplification - Pervasive information technology - Scenarios - Roaming Environment - Infrastructure - Personalized services and the virtual pervasive home.

UNIT II   ADAPTATION IN MOBILE AND PERVASIVE COMPUTING   9

Adaptability - Mechanisms for adaptation: spectrum of adaptation - Resource monitoring - Characterizing adaptation strategies - Example application architecture: Odyssey - Incorporating adaptations in applications - Support for adaptive applications.

UNIT III   DATA DISSEMINATION, MANAGEMENT AND CONTEXT
AWARE COMPUTING   9

Publish subscribe mode - Information caching -Challenges for distributed data management - Data dissemination - Mobile data caching - Mobile cache maintenance schemes - Mobile web caching - Context: Definitions - Types - Core capabilities for context awareness - Types of context aware applications.

UNIT IV   MIDDLEWARE AND DEVICE TECHNOLOGY   9

Middleware support - Mobile middleware - Puppeteer - Adaptation middleware - Agents - Mobile agents - Service discovery - Hardware: Batteries - Displays - Memory - Processor - Human Machine Interface - Operating systems: Palm OS - EPOC - Windows CE - QNX Neutrino - BeOS - Embedded Linux - Comparison - Java for pervasive devices.

UNIT V   PERVASIVE APPLICATION ARCHITECTURE AND EXAMPLES   9

Background - Scalability and Availability - Application architecture - Securing pervasive computing applications - Overview of classes - Use of the framework - Usage examples: Retail - Airline check in and Booking - Sales force automation - Health care - Tracking - Car information systems - E - mail access via WAP and voice.

TOTAL = 45

TEXT BOOKS

1. Frank Adelstein,Sandeep Gupta, Golde Richard and Loren Schweibert "Fundamentals of mobile and pervasive computing", Tata McGraw - Hill, First Edition.

2. Buckhardt, J, Henn, H., Hepper, S., Rindtorff, Schack and T.,"Pervasive Computing - Technology and architecture of mobile internet applications", Pearson Education, Low Price Edition,2002.

3. Uwe Hansmann, Lother Merk, Martin S. Nicklous and Thomas Stober ,"Pervasive Computing - The Mobile World", Springer Professional Computing - Second Edition,2003.

CSY 122	USER INTERFACE DESIGN	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To make them understand the concept of menus, windows, interfaces.

• To explain the business functions.

• To teach the characteristics, components and controls of windows

• To describe techniques to analyze the testing methods and tools

UNIT I   INTRODUCTION AND OVERVIEW   9

Introduction - Importance - Human - Computer interface - Characteristics of graphics interface - Direct manipulation graphical system - Web user interface - Popularity - Characteristic & principles.

UNIT II   THE GUI SCREEN DESIGN PROCESS   9

User interface design process - Obstacles - Usability - Human characteristics in design - Human interaction speed - Business functions - Requirement analysis - Direct - Indirect methods - Basic business functions - Design standards - System timings - Human consideration in screen design.

UNIT III   MENU DESIGN   9

Structures of menus - Functions of menus - Contents of menu - Formatting - Phrasing the menu - Selecting menu choice - Navigating menus - Graphical menus.

UNIT IV   WINDOW COMPONENTS   9

Windows: Characteristics - Components - Presentation styles - Types - Managements - Organizations - Operations - Web systems - Device - Based controls: Characteristics - Screen - Based controls: Operate control - Text boxes - Selection control - Combination control - Custom control - Presentation control.

UNIT V   TEXT AND DESIGN PAGE   9

Text for web pages - Effective feedback - Guidance & assistance - Internationalization - Accessibility - Icons - Image.

TOTAL = 45

TEXT BOOK

1.   Wilbent. O. Galitz, "The Essential Guide to User Interface Design", John Wiley& Sons, 2001.

REFERENCE

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

CSY 123	SOFTWARE MAINTENANCE	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To give a general idea on the need for software maintenance.

• To explain different software maintenance models.

• To provide various software maintenance measures and its guidelines.

• To explain the functioning software maintenance tools

UNIT I   **9**

Introduction - The need for software maintenance - Categorizing software change - Software maintenance frame work - Fundamentals of software change - Limitations and economic implications.

UNIT II   **9**

Maintenance Process - Models - Quick Fix Model - Boehm's model - Osborne's Model - Iterative enhancement model - Reuse oriented model - Process maturity.

UNIT III   **9**

Program understanding - Program comprehension - Comprehension process models - Reverse Engineering - Levels of reverse engineering - Other supporting techniques - Forward engineering - Restructuring - Reengineering.

UNIT IV   **9**

Maintenance Measures - Guidelines for building maintenance measures - Building and sustaining maintainability.

UNIT V   **9**

Maintenance tools - Maintenance manual - Documentation - Case Studies.

TOTAL=45

TEXTBOOK

1. Panygrub,Armstrong A Takang ," Software Maintenance: Concepts and Practice",2nd edition, World Scientific Publishing Co.Ptc.Ltd.,2003.

REFERENCES

1. Alain April ,Alain Abran," Software Maintenance Management: Evaluation and Continuous Improvement", Wiley - IEEE Computer Society Press, 2008.

CSY 124	MULTIMODAL COMPUTING	L T P C
		3 0 0 3

COURSE OBJECTIVES:

• To explain special feature of multimodal systems.

• To make them realize that multimodal composition is both rhetorical and creative, and thus can be useful in many disciplines.

• To discuss the impact of digital technologies on reading and producing multimedia texts.

• To tell them about various applications and interfacing techniques.

UNIT I   INTRODUCTION TO MULTIMODAL SYSTEMS   9

Introduction to Multimodal systems - Multimodal Interfaces: Unimodal-Multimedia interfaces - GUI. Interaction Modalities: Acoustic, Tactile - Visual-Basics of data acquisition: Audio, Video - Single microphone source separation - Admissibility of audio evidence - Acquisition of digital evidence.

UNIT II   AUDIO ATTENTION MODELLING AND DATA FUSION   9

Audio attention modelling and data fusion: Types of attention - Measuring attention - Fusion of audiovisual attention. Multimodal integration and understanding: Early approaches - Unification multimodal integration and Parsing.

UNIT III   AUDIO RECOGNITION AND CLASSIFICATION   9

Audio recognition and classification: Feature extraction - Hidden Markov Modelling - Training and pattern matching - Training and pattern matching. Audio enhancement techniques for forensics: Objectives of forensic analysis. Case study: Gaze recognition

UNIT IV   ISSUES IN THE DESIGN AND IMPLEMENTATION OF
MULTIMODALITY   9

Issues in the design and implementation of Multimodality: Multimodal user interface client - Modality recognition - Modality integration and understanding - Multimodal generation: Multimodal output planning - Multimodal synchronization - Multimodal Dialog management.

UNIT V SECURITY AND SURVEILLANCE APPLICATIONS   9

Security and surveillance applications: Requirements analysis - Challenges, Audio analysis as part of larger systems - Audio-based human computer interaction: Audio scene analysis - Source localisation - Source separation - Performance analysis and comparison - Case Study involving Gesture recognition.

TOTAL: 45

TEXTBOOKS

1.   P. Maragos, A. Potamianos, P. Gros, Multimodal Processing and Interaction: Audio, Video, Text, Springer, 2010.

2.   D. Wang, G. Brown, Computational Auditory Scene Analysis: Principles, Algorithms, and Applications, Wiley - IEEE Press, 2006.

3.   W. Wang, Machine Audition: Principles, Algorithms and Systems, IGI Global, 2010.

REFERENCES

1.   D. Monekosso, P. Remagnino, Y. Kuno, Intelligent Environments: Methods, Algorithms and Applications Springer, 2008.

2.   E. Damiano, J. Jeong, L. C. Jain, New Directions in Intelligent Interactive Multimedia, Springer, 2009.

3.   R. Maher, Audio Forensic Examination, IEEE Signal Processing Magazine, Vol. 26, No. 2, pp. 84-94, 2009.

4.   F. Camastra, Machine Learning for Audio, Image and Video Analysis: Theory and Applications Springer, 2007.

CSY 019	RESEARCH METHODOLOGY FOR COMPUTER SCIENTIST	L T P C 3 0 0 3

COURSE OBJECTIVES:

* To describe the steps involved in research process.

* To explain how to formalize research problems.

* To tell them basics of operation research and optimization techniques.

* To teach application of queuing theory.

UNIT I RESEARCH PROBLEM   9

The Research problem - Sources of research problem - Information, how to deal with it - Criteria / Characteristics of a good research problem - Errors in selecting a good research problem - Types of research - Nature and use of arguments.

UNIT II PROBABILITY, STATISTICAL INFERENCE AND ANALYSIS   9

Probability - Random variables - Binomial, Poisson, Geometric, Uniform, Normal, Exponential distributions - Moments - Moments generating functions and their properties - Function of random variables. Design of experiments: Analysis of variance - One way and two way classifications- Completely randomized design - Randomized block design - Latin square design -22 factorial design.

UNIT III OPERATIONS RESEARCH AND OPTIMIZATION TECHNIQUES   9

Basic of operation research : Characteristic of OR-OR and Decision making - Linear programming - Stimulation and Graphical solution canonical and standard terms of Linear programming problem - Algebraic solution - Simplex method - Chranes method of penalties - Concept of duality - properties of duality -Transportation model: Definition - Formulation and solution of transportation models. Sequencing problems - Processing each of n jobs through m machine. - Linear Programming - Introduction to supervised and unsupervised learning - Graph theory- Basic definitions - Connected graph - Tree.

UNIT IV QUEUING THEORY   9

Single and Multiple server Markovian queuing models - Customer impatience -Queuing applications.

UNIT V   CASE STUDIES   9

Presentation by students on their area of interest.

TOTAL = 45

TEXT BOOKS

1.   Nicholas Walliman, "Your Research Project", 2nd edition, Vistaar Publications, New Delhi , 2005.

2.   Gupta, S.C. and Kapoor, V.K., "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi, 2001.

3.   Taha, H.A., "Operations Research: An Introduction", 7th edition, Pearson Education Edition, Asia, New Delhi, 2002.

REFERENCES

1.   Walpole, R.E., Myer R.H., Myer, S.L. and Ye, K., "Probability and Statistics for engineers and Scientists", 7th edition, Pearson Education, Delhi, 2002.

2.   Goel, B.S. and Mittal S.K, "Operations Research", Pragati Prakashan, Meerut, 2000.

3.   Freund, J.E., and Miller, I.R., "Probability and Statistics for Engineers", Prentices Hall of India, 5th edition, New Delhi, 1994.