DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2013

SRI KRISHNA COLLEGE OF TECHNOLOGY (AUTONOMOUS)
KOVAIPUDUR, COIMBATORE - 641 042

REGULATIONS FOR FOUR YEAR BE / BTech DEGREE PROGRAMMES - 2013
(For the batches of candidates admitted in 2013 - 2014 and subsequently)

NOTE: The regulations, hereunder, are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the programme) as may be decided by the Academic Council.

DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i.   "**Programme**" means BE / BTech Degree Programme.

ii. "**Course**" means a Theory or Practical subject that is normally studied in a semester, like Material Science, Engineering Thermodynamics, etc.,.

iii. "**Controller of Examinations"** means the Authority of the College who is responsible for all activities of the assessment process.

iv. "**Head of the Institution**" means the Principal of the College who is responsible for all academic activities of the College and for implementation of relevant rules of this Regulation.

v.   **"Head of the Department"** means Head of the concerned Department of the College.

vi. "**University**" means the affiliating university, viz., Anna University, Chennai.

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1. BE / BTech PROGRAMMES OFFERED AND MODES OF STUDY

1.1.   **Programmes:** The following are the branches of study under BE / BTech degree programme.

BE	Branch I	Civil Engineering
	Branch II	Mechanical Engineering
	Branch III	Electronics and Communication Engineering
	Branch IV	Computer Science and Engineering
	Branch V	Electrical and Electronics Engineering
	Branch VI	Instrumentation and Control Engineering
BTech	Branch I	Information Technology

1.2   MODES OF STUDY

1.2.1 Full -Time: All the programmes are full-time programmes and Candidates admitted should be available in the College during the complete working hours for curricular, co-curricular and extra-curricular activities.

2.   ADMISSION REQUIREMENTS

Candidates for admission to the BE / BTech degree programme will be required to satisfy the conditions of admission thereto prescribed by the affiliating university and Government of Tamil Nadu.

3.   DURATION OF THE PROGRAMME

i.   Minimum Duration: The programme will extend over a period of four years leading to the Degree of Bachelor of Engineering (BE) / Bachelor of Technology (BTech) of the Anna University, Chennai. The four academic years will be divided into eight semesters with two semesters per year.

Provision is made for lateral entry of candidates in the third semester of the programme in one of the   branches of study and they will be required to satisfy the conditions of admissions thereto prescribed by the affiliating university and Government of Tamil Nadu.

Each semester shall normally consist of 90 working days or 450 hours (or 490 periods of 55   minutes duration each).

ii.   Maximum Duration: The candidate shall complete all the passing requirements of the BE / BTech degree programme within a maximum period of 7 years (6 years for lateral entry). These periods will be reckoned from the commencement of the first semester (third semester in the case of lateral entry) to which the candidate was first admitted to the programme.

4.   STRUCTURE OF PROGRAMMES

4.1 Medium:
The medium of instruction shall be English for all Courses, Examinations, Seminar presentations and Project / Thesis / Dissertation.
The curriculum will comprise courses of study as given in curriculum section 22 infra in accordance with the prescribed syllabi.

4.2 Curriculum:
Every Programme will have a Curriculum and Syllabi consisting of core courses, elective courses and project work. The Programme may also include Seminar / Practical / Practical Training, if they are specified in the curriculum as given section 22 infra.

4.3 Electives:
Every candidate will be required to opt for one elective in VI semester and two electives each in VII & VIII semesters from the list of electives relating in his/her branch of study as given in section 22 infra. However, a candidate may be permitted to take one elective from the list of electives from other branches of BE/BTech programme during his/her course of study with specific permission from the respective head of the department.

Acceleration of Electives: A Student may be permitted to take Electives IV and V in the 6th and 7th semesters respectively instead of the 8th semester normal course of study with specific permission from the concerned Head of the department, in order to do Project work phase II during the full period of semester 8.

4.4. One- Credit Courses:
 Students can opt for one credit industry oriented courses of 15 hours duration which will be offered by experts from industry/other Institution, subject to the approval by the Head of the department. Grades for the course should be submitted by the expert to Controller of Examinations

after the course work is completed. There will not be any Semester End Examination for such One credit courses. Students can complete such one credit courses during the semesters 3 to 7 as and when the courses are offered by the department. "Elective V" can be waived if a student successfully completes three such one credit courses.

4.5 Project Work:

Every candidate will be required to undertake a suitable project in department / industry / research organization in consultation with the Head of the Department and the faculty guide and submit the project report thereon at the end of the semesters 7 and 8 on dates announced by the College/Department. Also he/she will be required to present two seminars on the progress of the project work during each of semesters 7 and 8.

4.6 Comprehensive Viva- voce:

Comprehensive viva-voce shall be conducted during seventh semester covering all the department courses of the previous semesters.

4.7 Personality development:

All candidates shall enroll, on admission, in any one of the Community Service & Extension activities (NSS / YRC / RRC/ Sports & Games) and participate actively for a minimum of 20 hours during the first four semesters of study.

National Service Scheme (NSS) will have social service activities in and around the College.

Youth Red Cross (YRC) society activities will include peace time activities like health & hygiene, international friendship, awareness camps etc.

Red Ribbon Club (RRC) activities will include the conduct of awareness and education programmes on health related issues.

Sports & Games activities will include preparation for inter-collegiate sports events.

While the training activities will normally be held during week ends, the camps will normally be held during vacation period.

4.8 Credit assignment:

Normally one credit for one period of Lecture per week, 1 credit for one period of Tutorial per week and one credit for three periods of Practical/Project Work per week are assigned for each course. The exact number of credits assigned to the different courses is as shown in section 22 infra.

4.8.1 Minimum credits:

The minimum number of credits to be earned through successful completion of the courses of study in the respective branches listed in section 1 supra, by a candidate to qualify for the award of degree is provided below:

Branch of Study	Minimum number of credits to be earned through successful completion of the courses of study of the respective branch listed in section 1 supra, for the award of degree	
	for entry at first semester	for *lateral entry* at third semester
BE Programme		
Branch: I Civil Engineering	185	136
Branch: II Mechanical Engineering	184	135
Branch: III Electronics and Communication Engineering	181	133
Branch: IV Computer Science and Engineering	179	131
Branch: V Electrical and Electronics Engineering	182	134
Branch: VI Instrumentation and Control Engineering	181	133
B.Tech Programme		
Branch: I Information Technology	182	134

5. **FACULTY ADVISOR**

To help the students in planning their courses of study and for general advice on the Academic programme, the Head of the Department will attach 20 students to a Teacher of the Department who shall function as Faculty Advisor for those students throughout their period of study. Such Faculty Advisor shall advise the students and monitor the courses taken by the students, check the Attendance and progress of the students attached to him/her and counsel them periodically. If necessary, the Faculty Advisor may also discuss with or inform the parents about the progress of the students.

6. **CLASS COMMITTEE**

6.1   A Class Committee consists of Teachers of the concerned class, student representatives and a chairperson who is not teaching the class. It is like the 'Quality Circle' (more commonly used in industries) with the overall goal of improving the Teaching-Learning Process. The functions of the class committee include

i.   Solving problems experienced by students in the class room and in the laboratories

ii. Clarifying the regulations of the programme and the details of rules therein

iii. Informing the student representatives the Academic schedule including the dates of assessments and the syllabus coverage for each assessment

iv. Informing the student representatives the details of regulations regarding the weightage used for each assessment. In the case of practical courses (laboratory / Project work / Seminar etc.) the breakup of marks for each Experiment/ Exercise/ module of work, shall be clearly discussed in the class committee meeting and informed to the students.

v.   Analyzing the performance of the students of the class after each test and finding the ways and means of solving academic problems of the students, if any

vi. Identifying the weak students, if any, and arrange to provide some additional help or guidance or coaching to such weak students.

6.2   The Class committee for a class under a particular programme is normally constituted by the Head of the Department. However, if the students of different programmes are mixed in a Class, the Class committee is to be constituted by the Head of the Institution.

6.3   The class committee shall be constituted on the first working day of any semester or earlier.

6.4   At least 4 student representatives (usually 2 boys and 2 girls) shall be included in the Class committee. One Student having CGPA above average, two students having average CGPA and one student having CGPA less than average may be nominated as the class committee members for one semester.

6.5   The chairperson of the class committee may invite the Faculty advisor(s) and the Head of the Department to the meeting of the class committee.

6.6   The Head of the Institution may participate in any class committee of the institution.

6.7   The chairperson is required to prepare the minutes of every meeting, submit the same to the Head of the Institution within two days of the meeting and arrange to circulate among the concerned students and Teachers. If there are some points in the minutes requiring action by the management, the same shall be brought to the notice of the management by the head of the Institution.

6.8.   The First meeting of the class committee shall be held within one week from the date of commencement of the semester in order to inform the students about the nature and weightage of assessments within the framework of the Regulations. Two subsequent meetings may be held (one after First test and other after second test) to discuss on the performance of the students and progress of the course work. During these meetings the student members, representing the entire class, shall meaningfully interact and express the opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process.

7.   COURSE COMMITTEE FOR COMMON COURSES

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).

8.   ATTENDANCE REQUIREMENTS AND PROGRESS FOR COMPLETION OF A SEMESTER

8.1   A candidate who has fulfilled the following conditions shall be deemed to have satisfied the Attendance requirements for completion of the courses of a Semester.
Ideally every student is expected to attend all classes and earn 100% attendance. However in order to allow provision for certain unavoidable reasons such as prolonged Hospitalization / Accident / specific illness the student is expected to earn a minimum of 80% overall attendance and a minimum of 50% attendance in each course to become eligible to write the End-Semester Examination.
Therefore, every student shall secure not less than 80% of overall attendance in that semester taking into account the total number of periods in all courses attended by the candidate as against the total number of periods in all courses offered during that semester and he/she should have a minimum 50% attendance in each course during that semester.

8.2.   However, a candidate who secures overall attendance between 70% and 79% in that current semester due to medical reasons (prolonged hospitalization / accident / specific illness / participation in Co curricular, Extra curricular events) may be permitted to appear for the current semester examinations subject to the condition that the candidate shall submit the medical certificate / sports participation certificate to the Head of the Institution. The same shall be forwarded to the COE of the college for record purposes.

8.3 Candidates who could secure less than 70% overall attendance will not be permitted to write the end-semester examination of that current semester.

8.4 Notwithstanding the said provisions a candidate will be deemed to have completed the course of any semester only if the candidate's progress and conduct has been satisfactory.

8.5 Candidates who do not satisfy the requirement that they shall undergo 20 hours of NSS / YRC / RRC/ Sports & Games activities (vide section 4.7 supra) during the first four semesters will not be permitted to appear for the end semester examinations of the following semesters unless they complete the requirements specified.

8.6 Candidates who do not qualify to appear for end-semester examinations of any semester for want of attendance and/or progress and/or conduct have to register for and redo that semester programme at the next immediate available opportunity subject to the approval of Directorate of Technical Education and affiliating University.

9. REQUIREMENTS FOR APPEARING FOR SEMESTER END EXAMINATION

9.1 A candidate shall normally be permitted to appear for the Semester End Semester Examination of the current semester if he/she has satisfied the semester completion requirements as per clause 8.1& 8.2 supra.

9.2 Further, registration is mandatory for all the courses in the current semester as well as for arrear course(s) for the Semester End Examinations failing which the candidate will not be permitted to move to the higher semester.

9.3 In the case of examination in project work, no candidate will be permitted to appear at the project work examination unless he /she has submitted the project report within the prescribed date.

10. SEMESTER END EXAMINATIONS

10.1 There shall be a semester end examination of 3 hours duration in each lecture based course. The examinations shall ordinarily be conducted between October and December during the odd semesters and between March and May in the even semesters. For the practical examinations (including project work), both internal and external examiners shall be appointed by the College. Supplementary examinations may be conducted at such times as may be decided by the College.

10.2 The following will be the weightages for different courses.

    i)   Lecture or Lecture cum Tutorial based courses:

        Continuous Assessment   - 40%
        Semester End Examination   - 60%

    ii)   Laboratory based courses:
        Continuous Assessment   - 60%
        Semester End Examination   - 40%

    iii)   Comprehensive Viva-voce   - 100 % Semester End Examination

    iv)   Project work – Phase I &
        Project work – Phase II:
        Continuous Assessment   - 60%
        Viva-Voce Examination   - 40%

10.3 If a student indulges in malpractice in any of the Semester End Examinations / Tests he/she shall be liable for punitive action as prescribed by the Board of Examiners.

11. PROCEDURE FOR SEMESTER PROGRESS

A candidate will be permitted to proceed to the courses of study of any semester only if he/she has satisfied the requirements of attendance, progress and conduct in respect of the preceding semester and had paid all the fees for that semester.

12. PROCEDURE FOR REJOINING THE PROGRAMME

A candidate who is required to repeat the study of any semester for want of attendance/ progress/conduct or who desires to rejoin the programme after a period of discontinuance or who upon his/her own request is permitted by the authorities to repeat the study of any semester, may join the semester which he/she is eligible or permitted to join, only at the time of its normal commencement for a regular batch of candidates and after obtaining the approval from the Directorate of Technical Education and affiliating university. No candidate will however be enrolled in more than one semester at any time. In the case of repeaters, the continuous assessment marks secured earlier in the repeated courses will be discarded.

13. ASSESSMENT AND PASSING REQUIREMENTS

i) **Assessment:** The assessment will comprise of final examination and / or continuous assessment, carrying marks as specified in the scheme in section 22 infra. Continuous assessment marks will be awarded on assessing the candidate continuously during the semester as per guidelines framed by the College. All assessment will be done on absolute mark basis. However, for the purpose of reporting, the performance of a candidate letter grades and grade points will be awarded as per section 13 (iii) infra

The Continuous assessment for every theory subject shall be evaluated based on conduct of 3 internal tests, tutorials/seminars/mini project/assignments and attendance. The maximum marks for Continuous Assessment will be 40. Out of 40 marks for Continuous Assessment 25 marks can be given for the best two test performances, 10 marks for Tutorials/Seminars/Mini project/Assignments and 5 marks for attendance.

Every practical experiment shall be evaluated based on conduct of experiment and Records maintained duly signed by the HOD. There shall be at least one Mid-Semester test. The maximum marks for Continuous Assessment will be 60. Out of 60 marks for Continuous Assessment 20 marks can be given for Model Laboratory Test; 5 marks for attendance and the remaining 35 marks can be distributed for completion of record, observation and neatness.

ii) The break up for the award of 5 marks for attendance to a candidate who puts in 80% and above attendance is as follows:

80 %	-	1 mark
Above 80% and less than or equal 85%	-	2 marks
Above 85% and less than or equal 90%	-	3 marks
Above 90% and less than or equal 95%	-	4 marks
Above 95%	-	5 marks

A candidate will be permitted to appear for the examination of a semester only if he/she has completed the study of that semester (vide section 9 supra). A candidate will not be allowed to register for Semester End Examination of any semester unless he/she simultaneously registers for the examinations of the highest semester eligible and all the arrear courses he/she has.

iii) **Letter grade and grade point:** The letter grade and the grade points are awarded based on total marks secured by a candidate in individual courses as detailed below:

Range of Total Marks	Letter Grade	Grade Point, GP
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
< 50 or <50% in SEE	RA	0
Withdrawal	W	0
Inadequate Attendance	IA	0

"RA" – reappearance: "IA" – Inadequate Attendance.

14. GRADE SHEETS

After the publication of the results, each student will be issued individual grade sheet for each Semester containing the following information:

(i) The list of courses enrolled during the Semester and the grade awarded.
(ii) The Grade Point Average (GPA) for the Semester and the cumulative Grade Point Average (CGPA) of all courses successfully cleared from First Semester Onwards
(iii) Credits enrolled and credits earned up to the current semester.

FORMULAE FOR GPA & CGPA

$$GPA = \frac{\Sigma_I C_i GP_i}{\Sigma_I C_i} \qquad CGPA = \frac{\Sigma_I C_i GP_i}{\Sigma_I C_i}$$

Where, C_i - is the Credit assigned to the Course
GP_i - is the Grade point for each course corresponding to the grade obtained
Σ_I - is the sum for all courses successfully cleared during the particular semester in the case of GPA and during all the Semesters in the case of CGPA.

FORMULA FOR CALCULATING PERCENTAGE OF MARKS

$$CGPA \times 10 = \% \text{ OF MARKS}$$

14.1 Passing a course:

a) A Candidate who secures grade point of 5 or more in any course of study will be declared to have passed that course, provided a minimum of 50% is secured in the Semester end examination of that course of study.

b) A candidate, who absents or withdraws or is disqualified as per section 8.1 or who secures a letter grade RA (Grade point 0) or less than 50% in Semester end examination in any course carrying

continuous assessment and final examination marks, will retain the already earned continuous assessment marks for the next immediate appearance only in the examination of that course and thereafter he/she will be solely assessed by semester end examination carrying the entire marks of that course.

A candidate, who absents or secures a letter grade RA (Grade point 0) in any course carrying only continuous assessment marks, will be solely examined subsequently by a final examination carrying the entire marks of that course, the continuous assessment marks obtained earlier being discarded.

c) If a candidate fails to submit the report on project work on or before the date specified by the college / department, he/she is deemed to have failed in the project work and awarded grade RA.

d) A candidate who lacks in attendance or who fails to submit the report on the 7th and 8th semester project (or whose report is not accepted for reasons of incompleteness or other serious deficiencies) within the prescribed date or whose project work and viva-voce has been assessed as grade RA will have to register at the beginning of a subsequent semester following the current semester, redo and submit the project report at the end of that semester. Continuous Assessment marks earned earlier for the project will be discarded.

e) If a candidate fails to appear for the viva-voce examination after submitting the report on project work on the date specified by the college / department, he/she will be marked as absent for the project work. Such candidates will be allowed to appear for the viva-voce examination at the next earliest opportunity, the project being evaluated at that time. Continuous Assessment marks earned earlier for the project will be considered.

15. REVALUATION

A candidate can apply for revaluation of his/her Semester Examination answer paper in a theory course, within 2 weeks from the declaration of results, on payment of a prescribed fee through proper application to the Controller of Examinations through the Head of Department. The Controller of Examinations will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for Project work.

A student who has passed all the courses prescribed in the Curriculum for the award of the degree shall not be permitted to re-enroll to improve his/her Grades in a course or CGPA.

16. WITHDRAWAL FROM EXAMINATION

i) A candidate may, for valid reasons, be granted permission to withdraw from appearing for the examination in any course or courses of only one semester examination, if he/she does not have any history of arrears at the time of request for withdrawal. Also, only one application for withdrawal is permitted for that semester examination in which withdrawal is sought.

ii) Withdrawal application shall be valid only if the candidate is otherwise eligible to write the examination and if it is made prior to the commencement of the examination in that course or courses and also recommended by the Head of the Department.

17. TEMPORARY BREAK OF STUDY FROM THE PROGRAMME

i) A candidate is not normally permitted to temporarily break the study. However, if a candidate intends to temporarily discontinue the programme in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the programme in a later respective semester, he/she shall apply to the Principal through the Head of the Department and stating the reasons there for**.**

ii) A candidate is permitted to rejoin the programme at the respective semester as and when it is offered after the break subject to the approval of Directorate of Technical Education / affiliating University.

iii) The conditions specified for passing all the courses for the purpose of classification (vide sections 19(i) and (ii) infra), shall be applicable to such break of study permitted.

iv) The candidate permitted to rejoin the Programme after the break shall be governed by the Curriculum and Regulations in force at the time of rejoining. Such candidates may have to do additional courses as prescribed by the COE/ Principal if the Regulation warrants.

v) The total period for completion of the programme reckoned from, the commencement of the semester to which the candidate was first admitted shall not exceed the maximum period specified in section 3 (ii) supra irrespective of the period of break of study in order that he/she may be qualified for the award of the degree.

vi) If any candidate is detained for want of requisite attendance, progress and conduct, the period spent in that semester shall not be considered as authorized 'Break of Study'.

18. QUALIFYING FOR THE AWARD OF DEGREE

A candidate shall be declared to have qualified for the award of the BE / BTech Degree provided

i) the candidate has successfully completed the course requirements and has passed all the prescribed courses of study of the respective programme listed in section 1.1 supra within the duration specified in section 3 supra and

ii) no disciplinary action is pending against the candidate.

19. CLASSIFICATION OF DEGREE

i) **First Class with Distinction:** A candidate who qualifies for the award of the Degree (vide section 18 supra) having passed all the courses of study of all the eight semesters (six semesters for lateral entry candidates) at the first opportunity within eight consecutive semesters (six consecutive semesters for lateral entry candidates) after the commencement of his /her study and securing a CGPA of 8.50 and above shall be declared to have passed in First Class with Distinction. For this purpose the withdrawal from examination (vide section 16 supra) will not be construed as an opportunity for appearance in the examination. Further, the authorized break of study (vide section 17 supra) will not be counted for the purpose of classification.

ii) **First Class:** A candidate who qualifies for the award of the degree (vide section 18 supra) having passed all the courses of study of semesters 1 to 8 (semesters 3 to 8 for lateral entry candidates) within a maximum period of ten consecutive semesters (eight consecutive semesters for lateral entry candidates) and securing a CGPA of 6.5 and above shall be declared to have passed in First Class. Further, the authorized break of study (vide section 17 supra) will not be counted for the purpose of classification.

iii) **Second Class:** All other candidates who qualify for the award of the degree shall be declared to have passed in Second Class.

iv) A candidate who is absent in semester Examination in a course / Project work after having enrolled for the same shall be considered to have appeared in that Examination for the purpose of classification.

20. DISCIPLINE

Every student is expected to observe discipline and decorum both inside and outside the college and not to indulge in any activity which will tend to bring down the prestige of the College. In the event of an act of indiscipline being reported, the Head of the Institution will refer it to a disciplinary committee constituted by the Institution to inquire into acts of indiscipline and disciplinary action to be taken.

21. REVISION OF REGULATION AND CURRICULUM

The College may from time to time revise, amend or change the Regulations, scheme of Examinations and syllabi if found necessary through the Board of Studies and Academic Council of the College and implement either retrospective or prospective shall be as decided by the Academic Council.

22. CURRICULUM AND SYLLABI

TOTAL CREDITS: 179

SEMESTER - I

Course Code	Course Title	Hours / week			C	Maximum Marks			CAT
		L	T	P		CA	SEE	Total	
THEORY									
13EN101	Technical English - I	3	0	0	3	40	60	100	HUM
13MA102	Linear Algebra, Calculus and Applications	3	1	0	4	40	60	100	BS
13PY103	Engineering Physics	3	0	0	3	40	60	100	BS
13CS105	Fundamentals of Computing and C Programming	4	0	0	4	40	60	100	EAS
13CE106	Basics of Civil and Mechanical Engineering	4	0	0	4	40	60	100	EAS
13CH108	Engineering Chemistry for Electrical Sciences	3	0	0	3	40	60	100	BS
PRACTICAL									
13CS111	Fundamentals of Computing and C Programming Laboratory	0	0	3	1	60	40	100	EAS
13ME112	Engineering Graphics	1	0	3	2	60	40	100	EAS
13PY211	Physics/Chemistry Laboratory *	0	0	3	Refer Sem. II &footnote [#]				BS
Total		**21**	**1**	**9**	**24**				

SEMESTER - II

Course Code	Course Title	Hours / week			C	Maximum Marks			CAT
		L	T	P		CA	SEE	Total	
THEORY									
13EN201	Technical English - II	3	0	0	3	40	60	100	HUM
13MA202	Transform Techniques and Integral Calculus	3	1	0	4	40	60	100	BS
13CH204	Environmental Science	3	0	0	3	40	60	100	EAS
13CS206	Advanced C Programming	3	0	0	3	40	60	100	DC
13EE207	Basics of Electrical and Electronics Engineering	4	0	0	4	40	60	100	EAS
13PY208	Materials Science for Electrical Sciences	3	0	0	3	40	60	100	BS
PRACTICAL									
13PY211	Physics/Chemistry Laboratory*	0	0	3	2	60	40	100	BS
13CS212	Advanced C Programming Laboratory	0	0	3	1	60	40	100	DC
13ME213	Engineering Practices	0	0	3	1	60	40	100	EAS
Total		**19**	**1**	**9**	**24**				

SEMESTER – III

Course Code	Course Title	Hours / week			C	Maximum Marks			CAT
		L	T	P		CA	SEE	Total	
THEORY									
13CS301	Database Management Systems	3	0	0	3	40	60	100	DC
13MA302	Discrete Transforms and Fourier Analysis	3	1	0	4	40	60	100	BS
13CS303	Object Oriented Programming and C++	3	0	0	3	40	60	100	DC
13IT304	Digital Principles and System Design	4	0	0	4	40	60	100	DC
13CS307	System Programming and Operating Systems	4	0	0	4	40	60	100	DC
13CS308	Data Structures and Algorithms	4	0	0	4	40	60	100	DC
PRACTICAL									
13CS311	Data Structures and Object Oriented Programming Laboratory	0	0	3	1	60	40	100	DC
13CS312	Database Management Systems Laboratory	0	0	3	1	60	40	100	DC
13CS313	System Programming and Operating Systems Laboratory	0	0	3	1	60	40	100	DC
Total		**21**	**1**	**9**	**25**				

SEMESTER - IV

Course Code	Course Title	Hours / week			C	Maximum Marks			CAT
		L	T	P		CA	SEE	Total	
THEORY									
13CS401	Computer Architecture	3	0	0	3	40	60	100	DC
13CS402	Software Engineering	3	0	0	3	40	60	100	DC
13MA403	Discrete Mathematics	3	1	0	4	40	60	100	BS
13CS404	Analog and Digital Communication	3	0	0	3	40	60	100	DC
13CS405	Design and Analysis of Algorithms	4	0	0	4	40	60	100	DC
13EC408	Microprocessors and Microcontrollers	3	0	0	3	40	60	100	EAS
PRACTICAL									
13CS411	Algorithms Laboratory	0	0	3	1	60	40	100	DC
13IT412	Digital Laboratory	0	0	3	1	60	40	100	DC
13EC414	Microprocessors and Microcontrollers Laboratory	0	0	3	1	60	40	100	EAS
Total		**19**	**1**	**9**	**23**				

SEMESTER - V

Course Code	Course Title	Hours / week			C	Maximum Marks			CAT
		L	T	P		CA	SEE	Total	
THEORY									
13MA501	Probability and Queuing Theory	3	1	0	4	40	60	100	BS
13CS502	Theory of Computation	4	0	0	4	40	60	100	DC
13CS503	Artificial Intelligence	3	0	0	3	40	60	100	DC
13CS504	Java Programming	3	0	0	3	40	60	100	DC
13CS505	Computer Networks	3	0	0	3	40	60	100	DC
13CS506	Computer Graphics and Multimedia	4	0	0	4	40	60	100	DC
PRACTICAL									
13CS511	Computer Networks Laboratory	0	0	3	1	60	40	100	DC
13CS512	Computer Graphics and Multimedia Laboratory	0	0	3	1	60	40	100	DC
13CS513	Java Programming Laboratory	0	0	3	1	60	40	100	DC
Total		**20**	**1**	**9**	**24**				

SEMESTER - VI

Course Code	Course Title	Hours / week			C	Maximum Marks			CAT
		L	T	P		CA	SEE	Total	
THEORY									
13MA601	Numerical Methods	3	1	0	4	40	60	100	BS
13MB602	Principles of Management	3	0	0	3	40	60	100	HUM
13CS603	Compiler Design	4	0	0	4	40	60	100	DC
13CS604	Object Oriented Analysis and Design	3	0	0	3	40	60	100	DC
13EC607	Digital Signal Processing	3	1	0	4	40	60	100	EAS
13CSxxx	Elective I	3	0	0	3	40	60	100	DE
PRACTICAL									
13EN612	Communication Skills Laboratory	1	0	3	2	60	40	100	HUM
13CS613	Compiler Design Laboratory	0	0	3	1	60	40	100	DC
13CS615	CASE Tools Laboratory	0	0	3	1	60	40	100	DC
Total		**20**	**2**	**9**	**25**				

SEMESTER - VII

Course Code	Course Title	Hours / week			C	Maximum Marks			CAT
		L	T	P		CA	SEE	Total	
THEORY									
13CS701	Open Source Software	3	0	0	3	40	60	100	DC
13IT702	Mobile Computing	3	0	0	3	40	60	100	DC
13CS703	Web Technology	3	0	0	3	40	60	100	DC
13CS704	Data Warehousing and Mining	3	0	0	3	40	60	100	DC
13CSxxx	Elective II	3	0	0	3	40	60	100	DE
13CSxxx	Elective III	3	0	0	3	40	60	100	DE
PRACTICAL									
13CS711	Open Source Software Laboratory	0	0	3	1	60	40	100	DC
13CS712	Web Technology Laboratory	0	0	3	1	60	40	100	DC
13CS721	Comprehensive Viva Voce	0	0	0	1	-	100	100	DC
13CS751	Project Work - Phase I	0	0	3	1	60	40	100	DC
	Total	**18**	**0**	**9**	**22**				

SEMESTER - VIII

Course Code	Course Title	Hours / week			C	Maximum Marks			CAT
		L	T	P		CA	SEE	Total	
THEORY									
13CSxxx	Elective IV	3	0	0	3	40	60	100	DE
13CSxxx	Elective V	3	0	0	3	40	60	100	DE
PRACTICAL									
13CS851	Project Work - Phase II	0	0	18	6	60	40	100	DC
	Total	**6**	**0**	**18**	**12**				

L	-	Lecture		T	-	Tutorial
P	-	Practical		C	-	Credits
CA	-	Continuous Assessment		SEE	-	Semester End Examination
BS	-	Basic Science		HUM	-	Humanities
EAS	-	Engg. Arts & Science		CAT	-	Category
DC	-	Department Core		DE	-	Department Elective

- Continuous Assessment marks are awarded for performance in both semesters(I and II) as given in section 13 supra Semester End Examination is in second semester only.

* - Laboratory classes for Physics and Chemistry are held in alternate weeks.

LIST OF ELECTIVES

PROGRAMMING, ARCHITECTURE AND OPERATING SYSTEM DESIGN

Course Code	Course Title
13CS001	C# & .NET framework
13CS002	Advanced Java Programming
13CS003	Advanced Computer Architecture
13CS004	UNIX Internals
13CS005	Advanced Operating System

SECURITY AND NETWORK PROGRAMMING

Course Code	Course Title
13CS021	Information Security
13CS022	Network Security
13CS023	Network Programming and Management
13CS024	Wireless Sensor Networks
13IT047	High Speed Networks

MULTIMEDIA, DATABASE AND ADVANCED COMPUTING

Course Code	Course Title
13CS041	Digital Image Processing
13CS042	Knowledge Based Decision Support Systems
13CS043	Pattern Recognition
13CS044	User Interface Design
13CS045	Advanced Databases
13CS046	Parallel Computing
13CS047	Soft Computing

SOFTWARE ENGINEERING, CLOUD AND DISTRIBUTED COMPUTING

Course Code	Course Title
13IT042	Grid Computing
13CS061	Software Quality Management
13CS062	Software Testing
13CS063	Service Oriented Architecture
13CS064	Component Based Technology
13CS065	Distributed Computing
13CS067	E-Commerce
13CS068	Cloud Computing

GENERAL

Course Code	Course Title
13GE001	Intellectual Property Rights
13GE002	Total Quality Management
13GE004	Professional Ethics and Human Values
13CS081	Management Information Systems
13CS082	Systems Modeling and Simulation

SEMESTER I

13EN101   **TECHNICAL ENGLISH - I**   **3 0 0 3**
(Common to all branches of B.E/B.Tech Programmes)

OBJECTIVES
- To develop listening skills for academic and professional purposes.
- To acquire the skill to speak effectively in English in real-life situations.
- To inculcate reading habit and to develop effective reading skills.
- To improve active and passive vocabulary of the students.
- To familiarize students with different rhetorical functions of scientific English.
- To enable students write letters and reports effectively in formal and business situations.

UNIT I   **9**
General Vocabulary – changing words from one form to another - Adjectives, comparative adjectives – Adverbs - Active and passive voice – Tenses - simple present, present continuous - compound nouns - Skimming and scanning - Listening and transfer of information – bar chart, flowchart – paragraph writing, description – discussing as a group and making an oral report on the points discussed, conversation techniques – convincing others.
Suggested activities:
1. Matching words & meanings - Using words in context – Making sentences
2. Changing sentences from active to passive voice & vice versa.
3. Skimming, cloze exercises, exercises transferring information from text to graphic form - bar charts, flow charts.
4. Writing descriptions using descriptive words & phrases, and technical vocabulary
5. Role play, conversation exercises, discussions, oral reporting exercises
Any other related relevant classroom activity

UNIT II   **9**
Vocabulary – prefixes & suffixes – Antonyms-simple past tense - Spelling and punctuation –Scanning, inference - Listening & note-making - Paragraph writing - comparison and contrast - Creative thinking and speaking.
Suggested Activities:
1.. Vocabulary activities using prefixes and suffixes
2. Scanning the text for specific information
3. Listening guided note-taking - Writing paragraphs using notes, giving suitable headings and subheadings for paragraphs. Using expressions of comparison and contrast.
4. Discussion activities and exploring creative ideas.
Any other related relevant classroom activity

UNIT III   **9**
Tenses - simple future and past perfect - Reading in Context -Listening & note taking – single line - Definitions – sequencing of sentences – instruction – Persuasive speaking.
Suggested activities:
1. Providing appropriate context for the use of tenses
2. Listening and note-taking
3. (a) Writing sentence definitions, instructions
   (b) Identifying the discourse links and sequencing jumbled sentences / writing instructions
4. Speaking exercises, discussions, role play exercises using explaining, convincing and persuasive strategies
   Any other related relevant classroom activity

UNIT IV   **9**
Modal verbs and Probability – Concord subject verb agreement – correction of errors - Cause and effect expressions – Speaking –Welcome Address-Vote of Thanks

Suggested activities:
1. Making sentences using modal verbs to express probability
2**.** Gap filling using relevant grammatical form of words.
3. Speaking - role play activities, discussions, extempore speaking exercises speculating about the future.
4. Any other related relevant classroom activity

TOTAL: 45

TEXT BOOK

1. Department of Humanities & Social Sciences, Anna University, 'English for Engineers and Technologists' Combined Edition (Volumes 1 & 2), Chennai: Orient Longman Pvt. Ltd.,2006. Themes 1 – 4 (Resources, Energy, Computer, Transport)

REFERENCES

1. Meenakshi Raman and Sangeeta Sharma, 'Technical Communication English skills for Engineers' Oxford University Press, 2008.
2. Andrea, J. Rutherford, 'Basic Communication Skills for Technology', Second Edition, Pearson Education, 2007.

13MA102   LINEAR ALGEBRA, CALCULUS AND APPLICATIONS   3   1   0   4
(Common to all branches of B.E/B.Tech   Programmes)

OBJECTIVES

- To develop the skill to use matrix algebra techniques that is needed by engineers for practical applications.
- To gain adequate exposure to the theory and applications of differential calculus.
- To familiarize with functions of several variables which are needed in many   branches of engineering.
- To acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.

UNIT I   MATRICES   9
Introduction with Applications- Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties (excluding proof)–Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form –Reduction of quadratic form to canonical form by orthogonal transformation

UNIT II   DIFFERENTIAL CALCULUS   9
 Introduction with Applications- Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of   curvature – Evolutes – Envelopes – Evolute as envelope of normals.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   9
Introduction with Applications- Function of two variables -Partial derivatives – Euler's theorem for homogenous functions Total derivatives – Differentiation of implicit functions – Jacobians – Taylor's expansion- Maxima and Minima – Method of Lagrangian multipliers.

UNIT IV   ORDINARY DIFFERENTIAL EQUATIONS   9
Higher order linear differential equations with constant coefficients- Cauchy's linear differential equations - Legendre's linear differential equations-Method of Variation of parameters

UNIT V   APPLICATIONS OF DIFFERENTIAL EQUATIONS   9
Modeling-Free oscillations- Undamped system-Damped system-Solution of specified differential equations connected with electric circuits and bending of beams (Differential equations and associated conditions need be given)

TUTORIALS: 15
TOTAL: 60

TEXT BOOKS

1. Kreyszig. E, "Advanced Engineering Mathematics" Eighth Edition, John Wiley and Sons (Asia) Limited, Singapore 2010.
2. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi, 2009.

REFERENCES

1. Veerarajan. T, "Engineering Mathematics for first year", 4th edition, Tata Mc Graw-Hill Publishing Company Ltd., New Delhi, 2005.
2. Dr.P.Kandasamy, Dr.K.Thilagavathy, Dr.K.Gunavathy, "Engineering Mathematics", S.Chand & Company Ltd.,Ninth Edition,2010.
3. Venkataraman. M.K, "Engineering Mathematics, Volume I & II Revised Enlarged, Fourth Edition",The National Pub. Co., Chennai, 2004.

13PY103   **ENGINEERING PHYSICS**   **3 0 0 3**
                    (Common to all branches of B.E/B.Tech programmes)

OBJECTIVES

- To gain knowledge on principles of Ultrasonic, Lasers, Optical fibers and their applications in various medical and engineering fields.
- To acquire knowledge about various types of microscopes and their applications.
- To get exposure to the various vacuum pumps and gauges with their principle of operation and some of their applications.

UNIT I   ULTRASONICS   9
Introduction – Production – Magnetostriction effect – magnetostriction generator – Piezoelectric effect – piezoelectric generator – Detection of ultrasonic waves – properties – cavitations – velocity measurement – acoustic grating – Industrial applications – drilling, welding, soldering and cleaning – SONAR – Non Destructive testing – pulse echo system through transmission and reflection modes – A,B and C scan displays, Applications - sonogram – ultrasonic flaw detector.

UNIT II   LASERS   9
Introduction – Principle of spontaneous emission and stimulated emission – population inversion, pumping. Einstein's A and B coefficients – derivation. Types of lasers – He-Ne, CO_2, Nd-YAG, Semiconductor lasers (homojunction & heterojunction). Qualitative industrial applications – Lasers in welding, heat treatment, cutting – Medical applications – Holography (construction & reconstruction).

UNIT III   FIBRE OPTICS & APPLICATIONS   9
Principle and propagation of light in optical fibres – Numerical aperture and acceptance angle – Types of optical fibres (material, refractive index, mode) – double crucible technique of fibre drawing – splicing, loss in optical fibre – attenuation, dispersion, bending – fibre optical communication system (Block diagram) – light sources – Detectors – fibre optic sensors – temperature & displacement – Endoscope.

UNIT IV   QUANTUM PHYSICS   AND MICROSCOPY   9
Compton Effect.- Theory and experimental verification – matter waves – Schrödinger's wave equation – Time dependent and time independent equations (derivation)- physical significance of wave function, particle in a box (in one dimension) .Limitations of Optical microscopy, Electron Microscope, Scanning electron microscope, Transmission electron microscope, applications.

UNIT V   VACUUM SCIENCE AND TECHNOLOGY   9
Introduction-Concepts of vacuum-Throughput, Pumping speed, Effective   Pumping speed and Conductance. Types of Pumps-working principle and Construction of rotary pump, diffusion pump. Operation of pressure gauges-pressure range, measurement of vacuum using Pirani and Penning Gauges, Merits and limitations-Working of Vacuum system applications.

                                                                    TOTAL: 45

TEXT BOOKS

1. R. K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications,New Delhi(2003).
2. M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics',S.Chand and company, Ltd., New Delhi, 2005.

REFERENCES

1. Serway and Jewett, 'Physics for Scientists and Engineers with Modern Physics', 6th Edition, Thomson Brooks/Cole, Indian reprint (2007).
2. Rajendran, V and Marikani A, 'Engineering Physics' Tata Mc Graw Hill Publications Ltd, III Edition, New Delhi, (2004).
3. Palanisamy, P.K., 'Engineering Physics' Scitech publications, Chennai, (2007).
4. Jayakumar. S, 'Engineering Physics', R.K. Publishers, Coimbatore, (2003).
5. Chitra Shadrach and Sivakumar Vadivelu, 'Engineering Physics', Pearson Education, New Delhi, (2007).

13CS105   FUNDAMENTALS OF COMPUTING AND C PROGRAMMING   4 0 0 4
(Common to all branches of B.E/B.Tech programmes)

OBJECTIVES

At the end of this course student should be able
- To understand the functioning of various components of a computer system.
- To understand the role of an Operating System, Problem Solving Methods
- To know the fundamental programming aspects of C
- To know about the use of Arrays, Strings, Structures and Union in C

UNIT I   COMPUTER HARDWARE AND SOFTWARE   12

Introduction - Characteristics of computers - Evolution - Computer Generations - Classification of computers - Basic computer organization - Applications of computers - Number systems and their Conversions - Input Unit - Output Unit - Recent I/O devices - Memory organization - Memory characteristics - Software: Definition - Types of software - System Software - Introduction to OS -Functions of OS - Compiler - Assembler - Application Software - Editor - Firmware.

UNIT II   PROBLEM SOLVING METHODS   12

Planning the Program - Purpose - Algorithm - Flowchart - Pseudo Code - Software Development Steps - Programming Language Generations – Internet.

UNIT III   INTRODUCTION TO C PROGRAMMING   12

Structure of C Program - Keywords - Character set - Constants - Variable declaration -Operators-Data Input and Output Statements - Control statements - Programming examples.

UNIT IV   ARRAYS AND STRINGS   12

Arrays-Definition-Declaration-Types-one dimensional Array - two dimensional Array-Introduction to Pointers-Functions: Basics-Types-Parameter passing-Strings-Defining a String-Initialization of String-Reading and Writing a String-String manipulation.

UNIT V   STRUCTURES AND UNION   12

Declaring Structures and Structure variables-Accessing the members of a Structure-Initialization of Structures-Copying and Comparing Structures-Arrays within the Structure-Union-Declaring a Union -Accessing and Initializing Members of a Union.

TOTAL: 60

TEXT BOOKS

1. D.Ravichandran, "Introduction to Computers and Communication" Tata McGraw Hill, 2006

2. Ashok N Kamthane, "Computer Programming" , ITL Education Solutions Limited, Pearson, Second Edition, 2012
3. Byron S. Gottfried, "Programming With C", Tata McGraw-Hill, 3rd Edition,2011.

REFERENCES

1. Yashwant P. Kanetkar ,"Let us C", Infinity Science Press, 8th Edition,2008
2. M.Morris Mano, "Computer System Architecture", Pearson Education,3rd Edition,2007
3. Pradip Dey, Manas Ghosh , "Computer Concepts & Programming in C" ,Oxford Higher Education, 2009.

13CE106/13CE206   BASICS OF CIVIL AND MECHANICAL ENGINEERING   4 0 0 4

OBJECTIVES
- To know the various Civil Engineering Materials and Components of Buildings
- To be familiar with the applications of various types of Power Plants
- To know the working principle of IC Engines, Refrigeration and Air conditioning Systems

UNIT I   CIVIL ENGINEERING MATERIALS   12
Uses of stones- Tests for stone qualities of good building stone- Composition of brick- Comparison of brick work & stone work – Manufacturing of brick- Tests for brick- Composition of cement- Properties of cement- Manufacturing of cement- Test for cement- Types of sand- proportioning of concrete- Workability- curing of concrete - Tests on concrete-properties of mild steel

UNIT II   BUILDING COMPONENTS   12
 Requirement of good foundation-bearing capacity of soil- types of foundation-Roofing materials-Types of roofs-Flooring materials-types of floors- plastering-Painting-types of beams, columns and lintel-Importance of bridges and dams-stress, strain, elasticity, poisons ratio, modulus of rigidity

UNIT III   POWER PLANT ENGINEERING   12
Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV   I C ENGINES   12
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V   REFRIGERATION AND AIR CONDITIONING SYSTEM   12
Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner

TOTAL: 60

TEXT BOOKS

1. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi.
2. Venugopal K and Prahu Raja V, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, (2000).

REFERENCES

1. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P)Ltd.
2. Seetharaman S. "Basic Civil Engineering", Anuradha Agencies, (2005).
3. Shantha Kumar S R J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, (2000).

13CH108   ENGINEERING CHEMISTRY FOR ELECTRICAL SCIENCES   3 0 0 3
(Common to ECE, EEE,CSE, IT, ICE)

OBJECTIVES
- To educate the principles of electrochemistry and its applications.
- To gain knowledge about the various types of energy sources, accumulators and fuel cells
- To acquire knowledge about the application of polymers and composites materials.
- To familiarize students with the specialty materials in nuclear energy.
- To get exposure about the instrumental quantitative analysis.

UNIT I   ELECTROCHEMISTRY   9
Electrochemical cells – Reversible and Irreversible cells – emf of a cell – Measurement of emf of a cell – Electrode potential - Nernest equation (problems) – Electrodes – Reference electrodes – Standard hydrogen electrode and Calomel electrode – Ion selective electrode – Glass electrode – measurement of pH - emf series and its significance.

UNIT II   ENERGY SOURCES & STORAGE DEVICES   9
Nuclear energy- fission and fusion reaction - Nuclear reactor for power generation (block diagram only)- Breeder reactor- Solar energy conversion- Solar cells- Wind energy-wind energy -fuel cells-hydrogen-oxygen fuel cell Batteries-alkaline batteries- lead-acid Batteries -Nickel-cadmium Lithium batteries.

UNIT- III   POLYMERS AND COMPOSITES   9
Polymers - definition- polymerization- Types-addition and condensation polymerization - Mechanism- free radical only- Rubbers-Natural –Synthetic rubbers-Vulcanization of rubber-Plastics- its classification Preparation, properties and uses of PVC, Teflon, Polycarbonate, Polyurethane, nylon 6, nylon-6 6, PET. Composites- definition, types. Polymer matrix composites-FRP only.

UNIT IV   SPECIALTY MATERIALS IN NUCLEAR ENERGY   9
Dielectrics, insulating materials, soldering materials, magnetic materials, metals and semiconductors – properties – and its applications. Determination of the Half-Life and Average Life of a Radioactive Nucleus. - Determination of the Binding Energy of a Nucleus or a Particle.

UNIT- V   ANALYTICAL TECHNIQUES   9
Introduction –Types of Spectroscopy-UV-IR-Beer-Lambert'slaw-Applications- Problems based on Beer-Lambert's law-Colorimetry-Instrumentation–Application-Flame photometry-estimation of sodium by flame photometry-Atomic absorption spectroscopy – instrumentation -Estimation of nickel by atomic absorption spectroscopy.

TOTAL: 45

TEXT BOOKS

1. B.K.Sharma, "Engineering Chemistry",Krishna Prakasam media (P),Meerut,2001.
2. Glasstone S., Electrochemistry, 5th edition, Maurice Press, USA, 2004.

REFERENCES

1. B.K.Sharma, ""Engineering Chemistry",Krishna Prakasam media (P), Meerut, 2001.
2. S.Bahl, G.D.Tuli and Arun Bahl "Essentials of Physical Chemistry:,S.Chand and Company Ltd,New Delhi,2004.
3. P.C.Jain and Monica Jain, "Engineering Chemistry", 15th Edition, Dhanpat Rai Publishing Company (P),Ltd,New Delhi,2007.

13CS111 FUNDAMENTALS OF COMPUTING AND C PROGRAMMING LABORATORY 0 0 3 1
(Common to all branches of B.E/B.Tech programmes)

OBJECTIVES

At the end of this course student should be able
- To demonstrate the basics in word processing
- To demonstrate the basics of spread sheet
- To implement simple programs in C

WORD PROCESSING AND SPREAD SHEET APPLICATIONS

a) WORD PROCESSING
    1. Document creation, Text manipulation with Scientific notations.
    2. Table creation, Table formatting and Conversion.
    3. Mail merge and Letter preparation.
    4. Drawing - flow Chart

b) SPREAD SHEET
    5. Chart - Line, XY, Bar and Pie.
    6. Formula - formula editor.
    7. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
    8. Sorting and Import / Export features.

C PROGRAMMING

c) BASIC C PROGRAMMING
    9. Data types, Operators- Expression Evaluation
    10.Data input and output statements- Condition Statements
    11. Operations on Strings

d) ARRAYS ,FUNCTIONS,POINTERS
    12..Arrays – One dimension –Two dimension
    13. Functions, Recursion and parameter passing mechanisms
    14. Use of dereferencing operator and address of operator - pointer arithmetic

 e) STRUCTURES AND UNION
    15. Comparing Structures variables
    16. Structure within Structures
    17. Accessing the Members of a Union

TOTAL: 45

13ME112/13ME212   ENGINEERING GRAPHICS   1 0 3 2

OBJECTIVES

At the end of this course the student should be able
- To understand and utilise the commands used in 2D drawing package.
- To visualise the 3D drawing
- To draw orthographic projection for simple Engineering components.
- To develop the surfaces of solids like prism, cylinders and pyramids.

UNIT I   ORTHOGRAPHIC PROJECTION   12
General principles of orthographic projection – Need for importance of multiple views and their placement –
First angle projection – Layout views – Developing visualization skills through sketching of multiple views
from pictorial views and sketching of isometric view from the multiple views of objects.

UNIT II   PROJECTION OF POINTS, LINES AND PLANE SURFACES   12

Projection of points and straight lines located in the first quadrant – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III   PROJECTION OF SOLIDS   12

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV   SECTION OF SOLIDS   12

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other.

UNIT V   DEVELOPMENT OF SURFACES   12

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones.

TOTAL: 60

TEXT BOOK

1. K.Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International (P) Limited ,2008.

REFERENCES

1. Dhananjay A. Jolhe, "Engineering Drawing with an Introduction to AutoCAD", Tata McGraw Hill Publishing Company Limited, (2008).
2. Basant Agarwal and C.M. Agarwal, "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008).
3. K. R. Gopalakrishnana, "Engineering Drawing" (Vol. I & II), Subhas Publications, (1998).
4. N. D. Bhatt, "Engineering Drawing", Charotar Publishing House, 46th Edition, (2003).
5. K. V.Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
6. Modeling Software Packages like DWG Editor and AutoCAD

Publication of Bureau of Indian Standards:
1. IS 10711 – 2001: Technical Products Documentation – Size and Layout of Drawing Sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical Products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for Technical Drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical Drawings – Projection Methods.

13PY211   PHYSICS/CHEMISTRY LABORATORY   0   0   3   2
(Common to all branches of B.E/B.Tech programmes)

PHYSICS LABORATORY

OBJECTIVES
- To implement and visualize theoretical aspects in the laboratory.

LIST OF EXPERIMENTS

1. Determination of Young's modulus of the material – uniform bending
2. Determination of thickness of a thin wire – Air wedge method
3. Determination of Wavelength of Mercury Spectrum - Spectrometer Grating
4. Determination of Coefficient of viscosity of liquid - Poiseuille's Method
5. a)   Particle Size Determination using Diode Laser
   b)   Determination of Laser Parameter – Wavelength
   c)   Determination of Acceptance angle and Numerical Aperture of an optical fiber
6. Determination of Band Gap of a semiconducting material

7. Determination of Specific Resistance of the given coil of wire using Carey Foster's Bridge
8. Determination of Crystal Structure from XRD pattern
9. Determination of Photodiode Characteristics
10. Study of I –V characteristics of solar cell and determination of its efficiency

Demonstration

1. Determination of Thermal Conductivity of a bad conductor – Lee's Disc method
2. Determination of moment of inertia of disc and Rigidity modulus of a wire – Torsional pendulum

CHEMISTRY LABORATORY

OBJECTIVES

- To make conversant with theoretical principles and experimental procedures for quantitative estimation

LIST OF EXPERIMENTS

1. Determination of Total, Temporary calcium and magnesium hardness of water by EDTA method
2. Determination of Alkalinity and TDS in water
3. Estimation of Dissolved oxygen by Winklers method
4. Estimation of Chloride in Water sample
5. Determination of COD of water
6. Potentiometric determination of ferrous iron
7. Estimation of acids in a mixture by conductometry
8. Estimation of strength of an acid by pH metry
9. Determination of inhibitor efficiency on the corrosion rate of steel in acid media by weight loss method
10. Electroplating of Nickel and determination of cathode efficiency

Demonstration

1. Spectrophotometric determination of ferrous iron
2. Anodizing of Aluminium and determination of thickness of anodic film

TOTAL: 90

SEMESTER II

13EN201   **TECHNICAL ENGLISH - II**   3 0 0 3
(Common to all branches of B.E/B.Tech programmes)

OBJECTIVES

- To develop listening skills for academic and professional purposes.
- To acquire the ability to speak effectively in English in real-life situations.
- To inculcate reading habit and to develop effective reading skills.
- To improve their active and passive vocabulary.
- To familiarize students with different rhetorical functions of scientific English.
- To enable students write letters and reports effectively in formal and business situations.

UNIT I   **9**
Technical Vocabulary – meanings in context, sequencing words, Articles – Prepositions intensive reading and predicting content, Reading and interpretation, extended definitions, process description
Suggested activities:
1. Exercises on word formation using the prefix 'self' – Gap filling with preposition.
2. Exercises – Using sequence words.
3. Reading comprehension exercise with questions based on inference – Reading headings.
4. Predicting the content – Reading advertisements and interpretation.
5. Writing extended definitions – Writing descriptions of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future.

UNIT II   9

Phrases / Structures indicating use / purpose – Adverbs – Skimming – Non-verbal communication – Listening – correlating verbal and non-verbal communication – Speaking in group discussions – Formal Letter writing – Writing analytical paragraphs.

Suggested activities:

1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) – Reading comprehension exercises with texts including graphic communication – Exercises in interpreting non-verbal communication.

2. Listening comprehension exercises to categorize data in tables.

3. Writing formal letters, quotations, clarification, placing orders and complaint – Letter seeking permission for Industrial visits – writing analytical paragraphs on different debatable issues.

UNIT III   9

Cause and effect expressions – Different grammatical forms of the same word – speaking – Stress and intonation, Group Discussions – Reading – Critical reading – Listening – Writing – Using connectives, report writing (industrial accident report) – types, structure, data collection, content, form, recommendations.

Suggested activities:

1. Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word. (Eg : object – very / object – noun)

2. Speaking exercises involving the use of stress and intonation – Group discussions –analysis of problems and offering solutions.

3. Reading comprehension exercises with critical questions, Multiple choice question

4. Sequencing of jumble sentences using connectives – Writing different types of reports like industrial accident report and survey report – Writing recommendations.

UNIT IV   9

Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application – content, format (CV / Bio-data) – Instructions, imperative forms – Checklists, Yes / No question form – E-mail communication.

Suggested Activities :

1. Rewriting exercises using numerical adjectives

2. Reading comprehension exercises with analytical questions on content – Evaluation of content

3. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.

4. Speaking – Role play – group discussions – Activities giving oral instructions.

5. Writing descriptions, expanding hints – Writing argumentative paragraphs –Writing formal letters – Writing letter of application with CV/Bio-data – Writing general and safety instructions – Preparing checklists – Writing e-mail messages.

UNIT V   9

Speaking – Discussion of Problems and solutions – Creative and critical thinking – writing an essay, writing a proposal.

Suggested Activities:

1. Case Studies on problems and solutions

2. Brain storming and discussion

3. Writing Critical essays

4. Writing short proposals of 2 pages for starting a project, solving problems, etc.

5. Writing advertisements.

TOTAL: 45

TEXT BOOK

1.   Chapters 5-8, Department of Humanities & Social Sciences, Anna University, 'English for Engineers and Technologists' Combined Edition (Volumes 1 & 2) Chennai : Orient Longman Pvt.Ltd.,206. Themes 5-8 (Technology, Communication, Environment, Industry)

REFERENCES

1. P.K. Dutt, G. Rajeevan and C.L.N.Prakash, 'A Course in Communication Skills',Cambridge University Press, India 2007
2. Krishna Mohan and Meera Banerjee, 'Developing Communication Skills', Macmillan India Ltd. (Reprinted 1994 – 2007)
3. Edgar Thorpe, Showick Thorpe, Objective English', Second Edition, Pearson Education, 2007.

13MA202 TRANSFORM TECHNIQUES AND INTEGRAL CALCULUS 3 1 0 4
(Common to all branches of B.E/B.Tech programmes)

OBJECTIVES
- To develop logical thinking and analytical skills in evaluating multiple integrals.
- To grasp the concept of expression of a function under certain conditions as a double integral.
- To acquaint with the concepts of vector calculus needed for problems in all engineering disciplines.
- To know the Fourier transform and Laplace Transform, their properties and the possible special cases with attention to their applications.

UNIT I MULTIPLE INTEGRALS 9
Introduction with Applications -Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between Cartesian and polar coordinates – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral.

UNIT II VECTOR CALCULUS 9
Introduction with Applications - Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds

UNIT III LAPLACE TRANSFORM 9
Introduction with Applications -Laplace transform –Conditions for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals-Transform of unit step function and impulse functions – Transform of periodic functions- Inverse Laplace transform – Convolution theorem (excluding proof).

UNIT IV APPLICATIONS OF LAPLACE TRANSFORM 9
Initial and Final value theorems - Solution of linear ODE of second order differential equations with constant coefficients -First order simultaneous differential equations with constant coefficients –Integro Differential equations using Laplace transform techniques.

UNIT V FOURIER TRANSFORMS 9
Introduction with Applications -Statement of Fourier Integral Theorem- Fourier Transform Pairs-Fourier sine and cosine transforms-Properties-Transforms of simple functions-Convolution theorem- Parseval's Identity.

TUTORIALS: 15
TOTAL: 60

TEXT BOOKS

1. Kreyszig. E, "Advanced Engineering Mathematics" Eighth Edition, John Wiley and Sons (Asia) Limited, Singapore 2010.
2. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi,   (2009).

REFERENCES

1. Veerarajan. T, "Engineering Mathematics for first year ", 4th edition, Tata Mc Graw-Hill Publishing Company Ltd., New Delhi, 2005.

2. Dr.P.Kandasamy, Dr.K.Thilagavathy, Dr.K.Gunavathy, "Engineering Mathematics", S.Chand & Company Ltd.,Ninth Edition,2010.
3. Venkataraman. M.K, "Engineering Mathematics", Volume I & II Revised Enlarged Fourth   Edition", The National Pub. Co., Chennai, 200

13CH204   **ENVIRONMENTAL SCIENCE**   **3 0 0 3**
                                   (Common to all branches of B.E/B.Tech programmes)
OBJECTIVES
 To be familiar with the need and scope of the environmental studies and to know about the natural resources.
● To gain knowledge about the various ecosystems and its biodiversity.
● To get exposure to various pollutions and its control measures.
● To conversant with the environmental issues and its possible solutions.
● To get awareness about the environmental laws.

UNIT I   INTRODUCTION TO ENVIRONMENTAL SCIENCE AND NATURAL RESOURCES 9
Definition, scope and importance- Need for public awareness.
Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification-Role of an individual in conservation of natural resources-Equitable use of resources for sustainable life styles.

UNIT II   ECOSYSTEM AND BIODIVERSITY   9
Concept of an ecosystem –Structure and function of an ecosystem-producers, consumers and decomposers-Energy flow in the ecosystem-Ecological succession-Food chains, food webs and ecological pyramids.
Introduction- types- characteristic features, structure and functions-Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, and estuaries).
Introduction to Biodiversity-Definition:genetic,species and ecosystem diversity-Biogeographical classification of India-Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels-India as a mega –diversity nation-Hot-spots of biodiversity-Threats to biodiversity :habitat loss, poaching of wildlife, man-wildlife conflicts-Endangered and endemic species of India-Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

UNIT III   ENVIRONMENTAL POLLUTION   9
Definition-Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards.Solid waste Management: Causes, effects and control measures of urban and industrial wastes-Role of an individual in prevention of pollution-Pollution case studies-Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV   SOCIAL ISSUES RELATED TO ENVIRONMENT   9
From Unsustainable to Sustainable development-Urban problems related to energy-Water conservation, rain water harvesting, watershed management-Resettlement and rehabilitation of people; its problems and concerns, case studies-Environmental ethics: Issues and possible solutions-Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies-Wasteland reclamation-Consumerism and waste products.

UNIT V   ENVIRONMENTAL LEGISLATIONS AND HUMAN POPULATION   9

Environment Protection Act-Air (Prevention and Control of Pollution) Act- Water (Prevention and Control of Pollution) Act-Wildlife Protection Act-Forest Conservation Act-Issues involved in enforcement of environmental legislation-Public awareness- standards –permissible level of pollutants.

Population growth, variation among nations-Population explosion-Family Welfare Programme-Environment and human health-Human rights-Value Education-HIV/AIDS-Women and Child Welfare-Role of Information Technology in Environment and human health.

TOTAL: 45

TEXT BOOKS

1. Anubha Kaushik and Kaushik.C.P, 3rd edition, "Environmental Science and Engineering" New age International (P) Ltd., Publishers, 2008.
2. Linda D. Williams – "Environmental Science Demystified", Tata Mc Graw Hill Publishing Company Limited, 2005.

REFERENCES

1. Tyler Miller.G., "Environmental Science"- Thomson, 2004.
2. Trivedi R.K., "Hand book of Environmental Laws, Rules, Guidelines, Compliances and Standards", Volume I& II, Enviro Media, 2006.
3. Dharmendra.S.Sengar, 'Environmental Law"Prentice hall of India Pvt Ltd., New Delhi, 2007.
4. Rajagopalan.R, "Environmental studies-From crisis to cure", Oxford University press, 2005.

13CS206   ADVANCED C PROGRAMMING   3 0 0 3

OBJECTIVES

At the end of this course student should be able
- To understand the advanced aspects of the C programming language.
- To gain in-depth knowledge about Pointers and File Management.
- To gain an insight about Preprocessing, Modular Programming and System Programming

UNIT I   FUNCTIONS, STRUCTURES AND UNIONS   9

Function prototyping, Passing arguments , Recursive Functions, Arrays as function arguments, Array of Structures-Passing Structures to functions-Structures within Structures-Bit Fields-Enumeration

UNIT II   POINTERS   9

Basics of Pointers :-Pointer operators, Pointer arithmetic, Pointers and functions, Array of pointers, Pointer and Strings, Pointer to structures, Pointers within structure, Introduction of Static and Dynamic memory allocation, Malloc(),Sizeof(),free(),realloc()

UNIT III   FILES   9

Introduction to File handling-File structure, File handling functions, File types, Streams, text, Binary, File system basics, File pointer, Opening and Closing a file, Writing and Reading a character, Sequential and Indexed Sequential Access File, Random Access I/O, Command Line Arguments

UNIT IV   PREPROCESSORS   9

C Preprocessor, # define, macros, # error, #include, creating header files, include user defined header files, Conditional compilation directives - # if, # else, # elif and #ifdef &undef, using defined, #line, #pragma, the #&## preprocessor, Error handling

UNIT V   ADVANCED FEATURES   9

Modular Programming, Graphics with C- Graphics and Text mode, graphics.h, functions - Drawing a Point on Screen, Drawing – lines, rectangle, circles, arcs, polygon

TOTAL : 45

TEXT BOOKS

1. Yashwant kanetkar , "Let us C", 10th Edition, BPB Publications, 2010
2. Yashwant kanetkar , "Understanding pointers in C", 4th Edition , BPB Publications,2009
3. Steve Oualline, "Practical C Programming", Third Edition, Oreilly Publications,1997

REFERENCES

1. E.Balagurusamy , "Programming in ANSI C", Tata McGraw Hill, 4th Edition ,2008
2. Herbert Schildt,"C:The Complete Reference C", Tata McGraw Hill, 4th Edition ,2000
3. Brian W. Kernighan, Dennis M. Ritchie, "The C Programming language",2nd Edition ,2005

13EE107/13EE207 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING 4 0 0 4

OBJECTIVES
At the end of this course student should be able
- To expose the fundamentals of electric circuits.
- To understand the principles and working of measuring equipments.
- To familiarize with the constructional details of different types of electrical machines.
- To get exposure to the various Electronic components and devices with their principle of operation and some of their applications.
- To know various number systems, Digital Circuits.

UNIT I   ELECTRICAL CIRCUITS   12
Ohm's Law – Kirchhoff's Laws – Mesh current and node voltage method of analysis for D.C Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits.

UNIT II   INTROCDUCTION TO POWER SYSTEM AND MEASURING INSTRUMENTS   12
Structure of electric power systems – Generation, transmission, sub-transmission and distribution systems - EHVAC and EHVDC transmission systems – Substation layout – Insulators – cables.Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters – Cathode Ray Oscilloscope.

UNIT III   ELECTRICAL MACHINES   12
Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer and Single Phase Induction Motor.

UNIT IV   SEMICONDUCTOR DEVICES AND APPLICATIONS   12
Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.

UNIT V   DIGITAL ELECTRONICS   12
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts).

TOTAL: 60

TEXT BOOKS

1. V.N. Mittle "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delh,2009
2. R.S. Sedha, "Applied Electronics" S. Chand & Company Ltd, 2006.

REFERENCES

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, 2006.
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press, 2005.
3. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, 1994.

4. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers, 2003.
5. C.L. Wadhwa, 'Electrical Power Systems', Wiley eastern ltd India, 1985.
6. V.K.Mehta and Rohit Mehta, 'Principles of Power System', S.Chand and Company Ltd, third edition, 2003.

13PY208   MATERIALS SCIENCE FOR ELECTRICAL SCIENCES   3 0 0 3

OBJECTIVES
- To familiarize the students about the types of crystal structures.
- To gain knowledge about the metals and alloys.
- To acquaint the students about the semi conducting materials and their applications.
- To know about the types of magnetic and dielectric materials and their applications.
- To give an exposure to the students on advanced materials.

UNIT I   CRYSTALLOGRAPHY   9
Definitions in crystallography-Bravais lattices and seven crystal systems-Miller indices-Bragg's law-Determination of crystal structure by Debye Scherrer method -Atomic radius, Number of atoms per unit cell,Co-ordination number,atomic packing factor for SC,BCC,FCC,and HCP,interplanar distance, Imperfections in crystals-point,line,surface-Polymorphism and allotrophy

UNIT II   METALS AND ALLOYS   9
Drude Lorentz Theory of electrical conduction - Wiedemann-Franz law(derivation) –Band theory of solids.Factors affecting resistivity of metals – temperature ,alloying , magnetic field and strain. Applications of conductors – strain gauges, transmission lines, conducting materials, precision resistors, heating elements and resistance thermometer.

UNIT III   SEMICONDUCTING MATERIALS   9
Elemental and Compound semiconductors-Intrinsic semiconductor-carrier concentration derivation- Fermi level-Variation of Fermi level with temperature- Electrical conductivity-band gap determination- extrinsic semiconductors- carrier concentration derivation in n-type and p-type semiconductor- variation of Fermi level with temperature and impurity concentration- Hall effect-Determination of Hall Coefficient.

UNIT IV   MAGNETIC AND DIELECTRIC MATERIALS   9
Origin of magnetic moment – Bohr magneton, Properties of dia, para and ferro, antiferro magnetic materials – Ferromagnetism–Domain theory of Ferromagnetism-different types of energies involved in the domain growth-Hysteresis – Hard and soft magnetic materials - Ferrites – Applications- Dielectric materials – Electronic, Ionic, Orientational and space charge polarization – Frequency and temperature dependence of polarization–Dielectric loss – Dielectric breakdown – Ferroelectric materials – properties and applications.

UNIT V   ADVANCED MATERIALS   9
Nanomaterials- properties –synthesis techniques – Plasma arcing, Chemical vapour deposition, Sol-gel method, Electro deposition, Ball milling –applications. Shape memory alloys(SMA) – Characteristics – Shape memory effect, Pseudo elasticity, Hysterisis- Properties of Ni-Ti alloy,applications,advantages and disadvantages of SMA.Super conductivity,types of super conductors, High Tc superconductors- applications of super conductors. Metallic glasses, preparation, properties, applications.

TOTAL: 45

TEXT BOOKS
1. William D.Callister Jr,Materials Science and Engineering –An   Introduction ,John Wiley and Sons Inc., Sixth Edition , New York,2007.
2. Shaffer J P ,Saxena A,Antolovich S D , Sanders T H Jr and Warner S B ,"The Science and Design of Engineering Materials" McGraw Hill Companies,Inc., New York,1999.

REFERENCES
1. Arumugam M, Materials Science, 3rd Edition. Anuradha agencies, Kumbakonam, 2007.
2. Rajendran V. and Marikani A., Applied Physics for Engineers, 3rd Edition.Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2003.
3. Pillai S.O., Solid State Physics, 5th Edition,New Age International Publication, New Delhi, 2003.
4. Ali Omar M., Elementary Solid State Physics, Pearson Education (Singapore) Pvt. Ltd., Indian Branch, New Delhi, 2002.
5. Jayakumar.S,"Material Science", R.K Publishers, Coimbatore,2006.

13CS212   **ADVANCED C PROGRAMMING LABORATORY**   **0 0 3 1**

OBJECTIVES

At the end of this course student should be able
- To demonstrate the advanced aspects of the C programming language.
- To write C programs using pointers, strings and files.
- To perform modular programming and system programming

a) FUNCTIONS, STRUCTURES AND UNIONS

Functions – Structures - Array of Structures-Passing Structures to functions- Structures within Structures - Unions-Bit Fields-Enumeration

b) POINTERS

PointeRs-Pointers and functions, Array of pointers, Pointer and Strings, Pointer to structures, Pointers within structure, Malloc(),Sizeof(),free(),realloc()

c) FILES

File handling functions- Opening a file, Closing a file, Writing a character, Reading a character, Command Line Arguments

d) PREPROCESSORS

C Preprocessor, # define, macros, # error, #include, creating header files, include user defined header files, Conditional compilation directives - # if, # else, # elif and #ifdef &undef, using defined, #line, #pragma, the #&## preprocessor.

e) ADVANCED FEATURES

Modular Programming, Graphics with C- Graphics and Text mode, graphics.h, functions - Drawing a Point on Screen, Drawing – lines, rectangle, circles, arcs, polygon.

TOTAL : 45

13ME113/13ME213   **ENGINEERING PRACTICES**   **0 0 3 1**
(Common to all branches of B.E/B.Tech programmes)

OBJECTIVES

At the end of this course student should be able
- To obtain knowledge about plumbing, carpentry ,carpentry tools ,welding and sheet metal practices
- To know the assembly practices of centrifugal pump and air conditioner
- To do the residential house wiring and soldering.

GROUP A - (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE   **9**

Buildings:
(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:
(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.

    (c) Preparation of plumbing line sketches for water supply and sewage works.
    (d) Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
    (e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:
    (a) Study of the joints in roofs, doors, windows and furniture.
    (b) Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE   13

Welding:
    (a) Preparation of arc welding of butt joints, lap joints and tee joints.
    (b) Gas welding practice

Sheet Metal Work:
    (a) Forming & Bending:
    (b) Model making – Trays, funnels, etc.
    (c) Different type of joints.

Machine assembly practice:
    (a) Study of centrifugal pump
    (b) Study of air conditioner

Demonstration on:
    (a) Turning and drilling practices.
    (b) Smithy operations, upsetting, swaging, setting down and bending. Example –Exercise – Production of hexagonal headed bolt.
    (c) Foundry operations like mould preparation for gear and step cone pulley.
    (d) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B - (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE   10

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair-case wiring.
4. Measurement of electrical quantities – voltage, current, power and power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of insulation resistance of electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE   13

1. Study of Electronic components and equipments – Resistor, color coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, XOR and NOT.
3. Soldering practice – Components Devices and Circuits – Using general purpose
4. Study of PCB.
5. Measurement of ripple factor of HWR and FWR.
6. VI characteristics of PN diode and Zener diode.

TOTAL: 45

TEXT BOOKS

1. .Jeyapoovan, M.Saravanapandian & S.Pranitha, "Engineering Practices Lab Manual", Vikas Publishing House Pvt. Ltd, (2006).
2. P.Kannaiah & K.L.Narayana, "Manual on Workshop Practice", SciTech Publications,(1999)

REFERENCES

1. K.Jeyachandran, S.Natarajan and S.Balasubramanian, "A Primer on Engineering Practices Laboratory", Anuradha Publications, (2007).
2. H.S.Bawa, "Workshop Practice", Tata McGraw Hill Publishing Company Limited, (2007).
3. A.Rajendra Prasad & P.M.M.S. Sarma, "Workshop Practice", Sree Sai Publication, (2002).

SEMESTER III

| 13CS301 | DATABASE MANAGEMENT SYSTEMS | 3 0 0 3 |

OBJECTIVES
- To understand the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To learn about SQL and relational database design.
- To study the basic concepts in deadlock occurrence and recovery techniques.
- To understand the emerging trends in the area of distributed database

OUTCOMES
At the end of the course the student should be able to
- Develop an Entity Relationship Model with the appropriate entities, attributes, relationships.
- Develop an understanding of essential DBMS concepts such as: concurrency, distributed database, and transaction management
- Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS

UNIT I   INTRODUCTION AND CONCEPTUAL MODELING   9
Introduction to File and Database systems - Database system structure - Data Models - Introduction to Network and Hierarchical Models - ER model - Relational Model - Relational Algebra and Calculus.

UNIT II   RELATIONAL AND DOCUMENT-ORIENTED DATA MODEL   9
SQL - Data definition - Queries in SQL - Updates - Views - Integrity and Security –Relational Database design - Functional dependences and Normalization for Relational Databases (up to BCNF).

UNIT III   DATA STORAGE AND QUERY PROCESSING   9
Record storage and Primary file organization - Secondary storage Devices - Operations on Files - Heap File - Sorted Files - Hashing Techniques - Index Structure for files - Different types of Indexes - B-Tree - B+ Tree - Query Processing.

UNIT IV   TRANSACTION MANAGEMENT   9
Transaction Processing - Introduction - Need for Concurrency control - Desirable properties of Transaction - Schedule and Recoverability - Serializability and Schedules - Concurrency Control - Types of Locks -Two Phases locking – Deadlock - Recovery Techniques - log based recovery.

UNIT V   OBJECT ORIENTED AND DISTRIBUTED DATABASE   9
Object Oriented Databases: Need for Complex Data types - OO data Model - Nested relations - Complex Types - Inheritance   Reference Types - Distributed databases: Homogenous and Heterogeneous - Distributed data Storage-Distributed transactions

UNIT VI   STATE OF ART/ADVANCES (NOT FOR EXAMINATION)
JSON - Complex Event Processing - Data Stream Management System -No SQL -In memory database

TOTAL: 45

TEXT BOOK
1. Abraham Silberschatz, Henry F.Korth, "Database System Concepts", 6th Edition, McGraw –Hill,2011

REFERENCES
1. Ramez Elmasri, Shamkant B.Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson Education, 2011.
2. Raghu Ramakrishnan,Johannes Gehrke, "Database Management Systems", 3rd Edition, McGraw-Hill,2003

3. Hector Garcia-Molina, Jeffrey D.Ullman, Jennifer D.Widom, "Database System Implementation" Prentice Hall, 2000.
4. http://nptel.ac.in/courses/IIT-MADRAS/Intro_to_Database_Systems_Design/index.php
5. http://www.json.org

| 13MA302 | DISCRETE TRANSFORMS AND FOURIER ANALYSIS | 3 1 0 4 |

OBJECTIVES
- To study the concept of mathematical formulation of certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- To understand the different possible forms of Fourier series and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.
- To learn the working procedure of formulating and identifying certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them and interpret the results.
- To learn the concept of evaluating the complex integration in terms of residue theorem.
- To understand the basics of Z – transform in its applicability to discretely varying functions.

OUTCOMES
At the end of the course the student should be able to
- Solve the engineering problems using PDE
- Find Fourier series solution to the engineering problems
- Find the derivatives of the complex numbers and to evaluate complex integrals.
- Design and formulate certain problems in terms of difference equations and solve them using Z-transform technique

UNIT I   PARTIAL DIFFERENTIAL EQUATIONS   9
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions-Solution of standard types of first order partial differential equations- Lagrange's linear equation – Linear homogeneous partial differential equations of second and higher order with constant co-efficient

UNIT II   FOURIER SERIES   9
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series –Change of interval- Parseval's identity- harmonic analysis.

UNIT III   BOUNDARY VALUE PROBLEMS   9
Classification– Solution of one dimensional wave equation – one dimensional heat equation – steady state solution of two dimensional heat equations (excluding insulated edges) – Fourier series solution in Cartesian coordinates.

UNIT IV   ANALYTIC FUNCTIONS AND COMPLEX INTEGRATION   9
Functions of a complex variable–Analytic functions–Necessary conditions, Cauchy-Riemann equation and Sufficient conditions (excluding proofs) – Harmonic conjugate – Construction of analytic functions - Complex integration–Singular points – Residues – Residue theorem statement – Application of residue theorem to evaluate real Integrals.

UNIT V   Z- TRANSFORM AND DIFFERENCE EQUATIONS   9
Z-transform- Properties – Inverse Z- transform- Convolution theorem- Formation of difference equations – Solution of difference equations using Z-transform

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Modeling of heat and mass transfer equation using PDE – Discrete Fourier transform in the field of Digital Signal Processing and Spectral analysis – Analytic continuation – Special functions.

TUTORIAL: 15
TOTAL: 60

TEXT BOOK
1. Grewal B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi, (2007).
2. Kreyszig. E, "Advanced Engineering Mathematics", tenth Edition, John Wiley and Sons (Asia) Limited, Singapore 2011.

REFERENCES
1. Veerarajan.T., "Engineering Mathematics" (for semester III), third edition, Tata McGraw-Hill Pub. Co., New Delhi, 2005.
2. Venkataraman. M.K, "Engineering Mathematics", Volume I & II Revised Enlarged Fourth Edition", National Pub. Co., Chennai, 2005.
3. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, 2007.

13CS303/13CS033   OBJECT ORIENTED PROGRAMMING   3 0 0 3
AND C++

OBJECTIVES
- To understand the concepts of objects and classes.
- To study the various types of constructors and destructors.
- To understand the types of inheritance.
- To learn the concept of file handling.
- To study the concept of generic programming.

OUTCOMES
At the end of the course the student should be able to
- Analyze and apply the object oriented principles.
- Solve the real time applications using object oriented programming.

UNIT I   INTRODUCTION TO OOP   9
Programming Paradigms-Basic concepts and benefits of OOP-Structure of C++ program -Tokens-Keywords-Identifiers-constants-Data types –Basic- User defined -Derived -Dynamic initialization - Reference variables-Scope resolution operator-Member dereferencing operators-memory management operators-Type casting-Function, Prototyping-call by reference- return by reference-Inline function-Default arguments –Function overloading.

UNIT II   CONSTRUCTORS AND OPERATOR OVERLOADING   9
Class specification-Access qualifiers-Static data members and member functions -Array of objects-Objects as function arguments-Friend functions-Returning objects-Pointers to members-Local classes - Constructors –copy-null –Parameterized- Constructors with default arguments—Constructor overloading -Dynamic constructors -Dynamic initialization using constructors-Destructors –Operator Overloading.

UNIT III   TEMPLATES AND EXCEPTION HANDLING   9
Function templates- overloaded function templates- user defined template arguments- class templates - Exception Handling: Exception handling mechanism- multiple catch- nested try- throwing the exception.

UNIT IV   INHERITANCE, POLYMORPHISM AND VIRTUAL FUNCTION   9
Defining Derived classes-Single Inheritance-Multiple Inheritance-Multi level inheritance-Hierarchical Inheritance-Hybrid Inheritance-Multipath inheritance-Virtual Base Class-Abstract class-Constructors in derived and base class-Virtual functions-Pure virtual functions

UNIT V   CONSOLE INPUT/OUTPUT OPERATION AND FILE HANDLING   9
Stream classes-Formatted I/O-I/O Manipulators-User defined manipulators-File handling-File pointer and manipulation-Sequential and random access-Error handling

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Aspect oriented programming - reusable components- macro-generator- Ada– Shareable Content Object Reference Model.

TOTAL: 45

TEXT BOOKS
1. B.Trivedi," Programming with ANSI C++", 2nd Edition, Oxford University Press, 2012.
2. B.Stroustrup, "The C++ Programming Language",4th Edition, Pearson Education, 2013.

REFERENCES
1. K.R.Venugopal, Rajkumar, T.Ravishankar, "Mastering C++ ",Tata McGraw Hill, 2007.
2. E.Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, 5th Edition, 2011.

13IT304   **DIGITAL PRINCIPLES AND SYSTEM DESIGN**   **4   0   0   4**

OBJECTIVES
- To understand different methods used for the simplification of Boolean functions.
- To study combinational circuits.
- To learn synchronous sequential circuits.
- To understand asynchronous sequential circuits.
- To gain knowledge about the fundamentals of HDL.

OUTCOMES
At the end of the course the student should be able to
- Simplify boolean functions using different methods.
- Design and implement combinational logic circuits.
- Design and implement various sequential logic circuits
- Write HDL code for digital circuits

UNIT I   BOOLEAN ALGEBRA AND LOGIC GATES   12
Binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation methods – Realization of Boolean functions using Logic gates

UNIT II   COMBINATIONAL LOGIC   12
Combinational circuits – Analysis and design procedures - Circuits for arithmetic operations - Code conversion - Multiplexers and Demultiplexers - Decoders and encoders -Memory and programmable logic.

UNIT III   SYNCHRONOUS SEQUENTIAL LOGIC   12
Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment - Shift registers – Counters

UNIT IV   ASYNCHRONOUS SEQUENTIAL LOGIC   12
Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables – Race-free state assignment – Hazards

UNIT V   HARDWARE DESCRIPTION LANGUAGE (HDL)   12
Introduction to Hardware Description Language (HDL) - HDL for combinational circuits- HDL for sequential logic circuits, Shift registers and counters.
UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Field Programmable Gate Array (FPGA) - Simple Programmable Logic Device (SPLD)-Complex Programmable Logic Devices (CPLD) - Power Logic 8 bit shift register.
                                                                        TOTAL: 60
TEXT BOOK
1. M.Morris Mano, Michael D.Ciletti, "Digital Design", 5th edition, Prentice Hall, 2013.

REFERENCES
1. Charles H.Roth, Jr. "Fundamentals of Logic Design", 7th Edition, Jaico Publishing House, 2013.

2. Donald D.Givone, "Digital Principles and Design", 7th Edition, Tata McGraw-Hill, 2010.
3. http://nptel.ac.in/courses.php?disciplineId=117.

13CS307/13CS407   SYSTEM PROGRAMMING AND OPERATING SYTEMS   4   0   0   4

OBJECTIVES
- To understand data structures and algorithms of Assembler, Linker, Loader and Macro processor.
- To learn different types of Operating System.
- To learn the concepts of CPU scheduling, memory management and file management of Operating System.

OUTCOMES
At the end of the course the student should be able to
- Design Assembler, Linker, and Loader and Macro processor.
- Analyze the various types of Operating System.
- Use the concepts of CPU scheduling, memory management and file management of Operating system.

UNIT I   SYSTEM PROGRAMMING   **12**
Simplified Instruction Computer- CISC machines- RISC machines- Assembler- Basic Assembler Functions-Machine dependent assembler features- Machine independent assembler features- Basic loader functions-Machine dependent loader features- Basic Macro processor functions.

UNIT II   EVOLUTION OF OS AND PROCESS CONCEPTS   **12**
Introduction - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.

UNIT III   CPU SCHEDULING AND SYNCHRONIZATION   **12**
Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

UNIT IV   DEADLOCK AND MEMORY MANAGEMENT   **12**
System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

UNIT V   VIRTUAL MEMORY AND FILE MANAGEMENT   **12**
Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection - File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management.

UNIT VI   STATE OF THE ART(NOT FOR EXAMINATION)
Cloud Operating Systems - Multi core Operating systems - Grid Operating Systems - Mobile Operating Systems.

TOTAL: 60

TEXT BOOKS
1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2000.

2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 8th Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2008.

REFERENCES
1. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 1999.
2. Harvey M. Deitel, "Operating Systems", 3rd Edition, Pearson Education Pvt. Ltd, 2004.
3. Andrew S. Tanenbaum, "Modern Operating Systems", 3rd Edition, Prentice Hall of India Pvt. Ltd, 2008.
4. William Stallings, "Operating Systems: Internals & Design Principles", 7th Edition, Prentice Hall of India, 2011.

13CS308   **DATA STRUCTURES AND ALGORITHMS**   **4   0   0   4**

OBJECTIVES
- To learn problem solving techniques.
- To understand the different methodologies of organizing data.
- To learn different sorting and searching techniques.
- To study the implementation of different data structures for specific problems

OUTCOMES
At the end of the course the student should be able to
- Solve problems involving data structures.
- Design algorithms for different problems.
- Analyze the algorithms developed.
- Use the applications of data structures in different fields of Engineering and Science.

UNIT I   FUNDAMENTALS OF DATA STRUCTURES   **12**
Introduction to Time and Space Complexity - Asymptotic Notations - Running Time Calculation, Data Structures: Introduction to Array and Pointer Implementation - Structures in C - Array Implementation of list, Recursion: Definition - Examples.

UNIT II   LISTS, STACKS AND QUEUES   **12**
Abstract Data Type (ADT) - The List ADT: Singly, Doubly, Circular Linked List - Cursor Implementation of Linked List. Stack ADT: Array and Pointer Implementation - Applications. Queue ADT: Array and Pointer Implementation - Circular Queue - Applications.

UNIT III   TREES AND HASHING   **12**
Preliminaries - Binary Trees - Expression trees - Tree Traversals - The Search Tree ADT - Binary Search Trees - AVL Trees. Hashing: - Separate Chaining - Open Addressing - Priority Queues: Binary heap.

UNIT IV   SORTING AND SEARCHING   **12**
Sorting: Types, Internal Sorting: Selection - Insertion - Bubble - Shell - Radix - Quick - Heap. External Sorting: Merge - Multiway Merge - Polyphase Merge. Searching: Linear - Binary.

UNIT V   GRAPHS   **12**
Definitions - Searching Techniques - Topological Sort - Shortest Path Algorithms - Unweighted Shortest Paths - Dijkstra's Algorithm - Minimum Spanning Tree: Prim's and Kruskal's Algorithm - Applications of Depth-First Search - Undirected Graphs - Bi-Connectivity.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Network flow - Optimization and Graph Clustering - Splay trees - Red Black trees - Deaps - Min-Max heaps - Hill Climbing.

                                       TOTAL: 60

TEXT BOOK
1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education Asia, 2007.

REFERENCES
1. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2009.
2. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE, 2004.
3. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Pearson Education Asia, 2009.
4. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Computer Algorithms/C++", University Press, 2007.

13CS311	DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LABORATORY	0 0 3 1

OBJECTIVES
- To understand the fundamentals of object oriented programming concepts.
- To understand and improve the programming skills using constructor and function overloading
- To gain knowledge about mapping real world problem in object oriented programming environment
- To implement abstract data types (ADTs)
- To write programs to solve problems using ADTs

LIST OF EXPERIMENTS

1. Implementation of matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor and overloading of assignment operator.
2. Define Point class and an Arc class. Define a Graph class which represents graph as a collection of Point Objects and Arc Objects. Write a method to find the minimum cost spanning tree in a graph.
3. Design stack and queue classes with necessary exception handling.
4. Develop with suitable hierarchy - classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon etc. Design a simple test application to demonstrate dynamic polymorphism and RTTI.
5. Array implementation of List Abstract Data Type (ADT).
6. Linked list implementation of List ADT – Doubly Linked List.
7. Cursor implementation of List ADT.
8. Array Implementation of Stack ADT and its Applications.
9. Binary Search Tree ADT and Tree Traversal
10. Dijkstra's Algorithm

TOTAL: 45

13CS312	DATABASE MANAGEMENT SYSTEMS LABORATORY	0 0 3 1

OBJECTIVES
- To learn the fundamental aspects of a relational database.
- To understand and use Data Definition Language, data manipulation language and to query, update, and manage a Database.
- To understand SQL and PL/SQL queries to create, report, and update data in a relational database.
- To study the purpose of and be able to create views, scripts, triggers, and transactions.
- To learn about relational database design using Normal form.

LIST OF EXPERIMENTS

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. High-level language extension with Cursors.
4. High level language extension with Triggers
5. Procedures and Functions.
6. Embedded SQL.
7. Design and implementation of Distributed Database
8. Design and implementation of Object Oriented Database.

TOTAL: 45

**13CS313/13CS413   SYSTEM PROGRAMMING AND OPERATING   0   0   3   1
                        SYSTEMS LABORATORY**

OBJECTIVES
- To implement the pass1 and pass2 assembler algorithms
- To learn the various shell commands and scripts
- To use the various system calls of UNIX operating system
- To implement the CPU scheduling, synchronization and memory management algorithms

LIST OF EXPERIMENTS

1. Design and implement two pass assembler.
2. Implement an absolute loader.
3. Shell programming
    - Command syntax
    - write simple functions
    - loops
    - Patterns
    - Expansions
    - Substitutions
4. Write programs using the following system calls of UNIX operating system:
        i.   fork, exec, getpid, exit, wait, close, stat, opendir, readdir
5. Write C programs to simulate UNIX commands like ls, grep, etc.
6. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS, SJF, Priority and Round Robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
7. Implement the Producer – Consumer problem using semaphores.
8. Implement all page replacement algorithms.
9. Implement disk scheduling algorithms.
10. Design of File Systems.

TOTAL: 45

SEMESTER IV

13CS401   COMPUTER ARCHITECTURE   3   0   0   3

OBJECTIVES
- To understand the basic structure and operation of a digital computer.
- To understand the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To know in detail the different types of control and the concept of pipelining.
- To know the hierarchical memory system including cache memory and virtual memory.
- To know the different ways of communicating with I/O devices and standard I/O interfaces.

OUTCOMES

At the end of the course the student should be able to

- Design of a pipelined CPU and cache hierarchy
- Analyse and evaluate CPU and memory hierarchy performance
- Design the trade-offs in modern CPU including issues affecting superscalar and dynamically scheduled architectures
- Design hardware of multiprocessors including cache coherence and synchronization
- Design a complex simulation tool to study various micro architectural features.

UNIT I   BASIC STRUCTURE OF COMPUTERS   9

Functional units - Basic operational concepts - Bus structures - Performance and metrics - Instructions and instruction sequencing - Hardware - Software Interface - Instruction set architecture - Addressing modes – RISC - CISC.

UNIT II   ARITHMETIC OPERATIONS   9

Arithmetic Operations - Addition and subtraction of signed numbers - Design of fast adders - Multiplication of positive numbers - Signed operand multiplication and fast multiplication - Integer division- Floating point and fixed point operations.

UNIT III   BASIC PROCESSING UNIT AND PIPELINING   9

Fundamental concepts - Execution of a complete instruction - Multiple bus organization - Hardwired control - Micro programmed control - Pipelining :Basic concepts - Data hazards - Instruction hazards - Data path and control considerations - Performance considerations - Exception handling - ILP – Hardware and Software approaches.

UNIT IV   MEMORY SYSTEM   9

Basic concepts - Semiconductor RAM - ROM - Speed - Size and cost - Cache memories -Improving cache performance - Virtual memory - Memory management requirements - Associative memories - Secondary storage devices.

UNIT V   I/O ORGANIZATION   9

Accessing I/O devices - Programmed Input/output Interrupts - Direct Memory Access- Buses - Interface circuits - Standard I/O Interfaces (PCI, SCSI, and USB), IOP - CPU Communication.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)

Software and hardware multithreading - SMT and CMP architectures - Design issues - Case studies - Multi-core architecture.

TOTAL: 45

TEXT BOOK

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization and Embedded Systems", 6th Edition, Tata McGraw Hill, 2002.

REFERENCES

1. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", 3rd Edition, Elsevier, 2005.
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", 8th Edition, Pearson Education, 2009.
3. John P. Hayes, "Computer Architecture and Organization", 3rd Edition, Tata McGraw Hill, 2002.
4. V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", 2nd Edition, Pearson Education, 2004.
5. http://nptel.iitm.ac.in/video.php?courseId=1075
6. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati /comp_org_arc/web/index.html.

13CS402 **SOFTWARE ENGINEERING** **3 0 0 3**

OBJECTIVES
- To study the concept of different life cycle models
- To understand the different types of requirement elicitation process
- To understand the architectural and detailed design methods
- To gain knowledge about the working of testing strategies
- To gain knowledge about the working of CASE Tools

OUTCOMES
At the end of the course the student should be able to
- Design, formulates and analyze a problem.
- Analyze a software development process from beginning to end
- Solve specific problems alone or in teams
- Design the testing strategy tools

UNIT I INTRODUCTION TO SOFTWARE PROCESS **9**
Software Engineering Paradigm - life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering - Agile process models

UNIT II SOFTWARE REQUIREMENTS **9**
Functional and non-functional - user - system - requirement engineering process - feasibility studies - requirements - elicitation - validation and management - software prototyping - prototyping in the software process - rapid prototyping techniques - user interface prototyping - S/W document, Analysis and modeling - data, functional and behavioural models - structured analysis and data dictionary.

UNIT III DESIGN CONCEPTS AND PRINCIPLES **9**
Design process and concepts - modular design - design heuristic - design model and document. Architectural design - software architecture - data design - architectural design - transform and transaction mapping - user interface design - user interface design principles, Real time systems -Real time software design - system design - real time executives - data acquisition system - monitoring and control system, SCM - Need for SCM - Version control - Introduction to SCM process - Software configuration items.

UNIT IV TESTING **9**
Taxonomy of software testing – levels - test activities - types of s/w test - black box testing - testing boundary conditions - structural testing - test coverage criteria based on data flow mechanisms - regression testing - testing in the large, S/W testing strategies - strategic approach and issues - unit testing - integration testing - validation testing - system testing and debugging.

UNIT V SOFTWARE PROJECT MANAGEMENT **9**
Measures and measurements - S/W complexity and science measure - size measure - data and logic structure measure - information flow measure, Software cost estimation - function point models - COCOMO model - Delphi method - Defining a Task Network – Scheduling - Earned Value Analysis - Error Tracking - Software changes - program evolution dynamics - software maintenance - Architectural evolution - Taxonomy of CASE tools

UNIT VI STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Design Patterns ,SCRUM,Software Reuse,GITHUB,Crowd Sourcing

TOTAL: 45

TEXT BOOK
1. Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition,   7th Edition, 2005.

REFERENCES
1. Ian Sommerville, Software engineering, Pearson education Asia, 8th Edition, 2011.
2. James F Peters and Witold Pedrycz, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.

13MA403   **DISCRETE MATHEMATICS**   **3   1   0   4**

OBJECTIVES
- To study   the concepts needed to test the logic of a program.
- To understand the different types of   applications in expert system, in data base and   basic for the prolog language.
- To understand and identify different types of patterns on many levels.
- To learn the working of class of functions which transform a finite set into another finite set which relates to input output functions in computer science.
- To learn the working of graphical models in sensor networks.

OUTCOMES
At the end of the course the student should be able to
- use the concepts of Discrete Mathematics in software development and hardware design.
- analyse fault tolerant computing system using graph models.
- use graph algorithm in computer network security.

UNIT I   PROPOSITIONAL CALCULUS   **9**
Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions –Contrapositive – Logical equivalences and implications – DeMorgan's Laws – Normal forms – Principal conjunctive and disjunctive normal forms – Rules of inference – Arguments - Validity of arguments.

UNIT II   PREDICATE CALCULUS   **9**
Predicates – Statement function – Variables – Free and bound variables – Quantifiers– Universe of discourse – Logical equivalences and implications for quantified statements – Theory of inference – The rules of universal specification and generalization – Validity of arguments.

UNIT III   SET THEORY   **9**
Basic concepts – Notations – Subset – Algebra of sets – The power set – Ordered pairs and Cartesian product – Relations on sets–Types of relations and their properties– Relational matrix and the graph of a relation – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram.

UNIT IV   FUNCTIONS   **9**
Definitions of functions – Classification of functions –Type of functions - Examples –Composition of functions–Inverse function–Binary and n-ary operations–Characteristic function of a set – Hashing functions – Recursive functions –Permutation functions.

UNIT V   GRAPH THEORY   **9**
Introduction – Basic Definitions – Degree of a vertex – Some Special Simple Graphs – Matrix Representation of Graphs – Paths, Cycles and Connectivity – Eulerian and Hamiltonian Graphs – Connectedness in Directed Graphs – Shortest Path Algorithms (Dijkstra's Algorithm, Warshall's Algorithm) – Trees – Spanning Trees – Minimum Spanning Tree – Rooted and Binary Tree – Binary Tree – Tree Traversal – Expression Trees.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Application of Discrete Maths in software development and hardware design – Clustering of web documents using graph model - Modeling sensor networks as graph.

TUTORIAL: 15
TOTAL: 60

TEXT BOOKS
1. Tremblay J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
2. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Seventh Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2011.

REFERENCES
1. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fifth Edition, Pearson Education Asia, Delhi, 2003.
2. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", sixth edition , Pearson Education Pvt Ltd., New Delhi, 2008.
3. Thomas Koshy, "Discrete Mathematics with Applications", Elsevier Publications, 2006.

13CS404	ANALOG AND DIGITAL COMMUNICATION	3	0	0	3

OBJECTIVES
- To gain knowledge about the analog communication and digital communication
- To gain knowledge about various design techniques

OUTCOMES
At the end of the course the student should be able
- To design a system for analog and digital communication
- To analyze the existing design techniques for modern communication
- To solve the problems in multiple access techniques.

UNIT I   FUNDAMENTALS OF ANALOG COMMUNICATION   9
Principles of amplitude modulation - AM envelope - frequency spectrum and bandwidth - modulation index and percent modulation - AM Voltage distribution - AM power distribution - Angle modulation - FM and PM waveforms - phase deviation and modulation index - frequency deviation and percent modulation - Frequency analysis of angle modulated waves - Bandwidth requirements for Angle modulated waves.

UNIT II   DIGITAL COMMUNICATION   9
Introduction - Shannon limit for information capacity - digital amplitude modulation - frequency shift keying - FSK bit rate and baud - FSK transmitter - BW consideration of FSK - FSK receiver - phase shift keying - binary phase shift keying - QPSK - Quadrature Amplitude modulation - bandwidth efficiency - carrier recovery - squaring loop - Costas loop – DPSK.

UNIT III   DIGITAL TRANSMISSION   9
Introduction, Pulse modulation - PCM - PCM sampling -sampling rate - signal to quantization noise rate – companding - analog and digital - percentage error - delta modulation - adaptive delta modulation - differential pulse code modulation - pulse transmission - Inter symbol interference - eye patterns.

UNIT IV   SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES   9
Introduction - Pseudo-noise sequence - DS spread spectrum with coherent binary PSK - processing gain - FH spread spectrum - multiple access techniques - wireless communication -TDMA and CDMA in wireless communication systems -source coding of speech for wireless communications.

UNIT V   DATA COMMUNICATIONS   9
Introduction - History of Data communications - Standards Organizations for data communication - data communication circuits - data communication codes - Error control - Error Detection - Error correction - Data communication Hardware - serial and parallel interfaces - data modems - Asynchronous modem - Synchronous modem - low-speed modem -medium and high speed modem - modem control.

UNIT VI   STATE OF THE ART/ ADVANCES (NOT FOR EXAMINATION)
Advanced Data Communication, Ultra HD via wireless , Software Defined Radio

TOTAL: 45

TEXT BOOKS
1. Wayne Tomasi, "Advanced Electronic Communication Systems", 6/e, Pearson Education, 2007.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons., 2001.

REFERENCES
1. H.Taub,D L Schilling ,G Saha ,"Principles of Communication"3/e,2007.
2. B.P.Lathi,"Modern Analog And Digital Communication systems", 3/e, Oxford University Press, 2007
3. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
4. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, PHI, 2002.
5. B.Sklar,"Digital Communication Fundamentals and Applications"2/e Pearson Education 2007.
6. http://nptel.tvm.ernet.in

13CS405	DESIGN AND ANALYSIS OF ALGORITHMS	4	0	0	4

OBJECTIVES
- To understand the basic concepts of algorithms.
- To learn about mathematical aspects and analysis of algorithms.
- To study different algorithmic techniques.
- To understand the different problem solving techniques and select an efficient algorithm for a problem.

OUTCOMES
At the end of the course the student should be able to
- Solve problems using different algorithmic techniques.
- Design different algorithms for a problem.
- Analyze the algorithms developed.
- Use efficient algorithms for obtaining optimal solutions for a problem.

UNIT I   INTRODUCTION   12
Algorithm: Analysis - Time Space Trade-off - Asymptotic Notations - Properties - Basic Efficiency Classes - Iterative and Recursive algorithms - Recurrence equations - Introduction to NP-Hard and NP-Completeness.

UNIT II   DIVIDE AND CONQUER AND GREEDY METHODS   12
Divide and Conquer: General Method - Finding Maximum and Minimum - Binary Search - Merge Sort - Quick Sort - Strassen's Matrix multiplication, Greedy Algorithms: General Method - Container Loading - Knapsack Problem.

UNIT III   DYNAMIC PROGRAMMING   12
Dynamic Programming: General Method - Multistage Graphs - All-Pair shortest paths - Optimal binary search trees - 0/1 Knapsack - Travelling Salesperson Problem.

UNIT IV   BACKTRACKING   12
Backtracking: General Method - 8 Queens Problem - Sum of Subsets - Graph Coloring - Hamiltonian problem - Knapsack problems.

UNIT V   BRANCH AND BOUND   12
Branch and Bound: General Methods - FIFO & LC - 0/1 Knapsack problem using FIFO and LC - Travelling Salesperson Problem.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Optimization Algorithms for Scheduling - Compression and Huffman Coding - Sub Linear-Time

Algorithms - Randomized Algorithms - De-Randomization - Computational Geometry.

TOTAL:60

TEXT BOOKS
1. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", 3rd Edition, Pearson Education Ltd, 2011.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Publications Pvt. Ltd., 2010.

REFERENCES
1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", 2nd Edition, PHI Pvt. Ltd., 2001.
2. Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", 3rd Edition, Pearson Education Asia, 2003.
3. A.V. Aho, J.E. Hopcroft and J. D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education Asia, 2009.
4. http://nptel.ac.in/courses/106101060/

13EC408   MICROPROCESSORS AND MICROCONTROLLERS   3   0   0   3

OBJECTIVES
- To understand the architecture and Instruction set of 8085 and 8086.
- To develop assembly language programs in 8085 and 8086.
- To design and understand multiprocessor configurations.
- To know about different peripheral devices and their interfacing to 8085/8086.
- To understand the architecture and programming of 8051 microcontroller.

OUTCOMES
At the end of the course the student should be able to
- Obtain knowledge in microprocessor architectures and assembly language programming
- Design a microprocessor /microcontroller based system for an application.

UNIT I   8085 MICROPROCESSOR   9
Introduction to 8085 – Microprocessor architecture – Instruction set – Programming the 8085 –Timing diagram

UNIT II   8086 SOFTWARE ASPECTS   9
Intel 8086 microprocessor – Architecture – Instruction set and assembler directives – Addressing modes – Assembly language programming – Procedures – Macros – Interrupts and interrupt service routines.

UNIT III   8086 SYSTEM DESIGN   9
8086 signals and timing – MIN/MAX mode of operation – Addressing memory and I/O – Multiprocessor configurations-Co-processor configuration- Closely coupled – loosely coupled configuration   – System design using 8086

UNIT IV   I/O INTERFACING   9
Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – Timer – Keyboard /display controller – Interrupt controller – DMA controller

UNIT V   MICROCONTROLLERS   9
Architecture of 8051 – Signals – Operational features – Memory and I/O addressing – Instruction set-Interrupts – Simple Programming.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Intel, AMD and ARM Processors

TOTAL : 45

TEXT BOOKS

1. Ramesh S.Gaonkar, "Microprocessor - Architecture, Programming and Applications with the 8085", Penram International publishing private limited, fifth edition, 2002.
2. A.K. Ray &K.M.Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing", second edition, TMH, 2002 reprint.

REFERENCES

1. Douglas V.Hall, "Microprocessors and Interfacing: Programming and Hardware", TMH, Third edition, 2006
2. Yu-cheng Liu, Glenn A.Gibson, "Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design", PHI 2003
3. Mohamed Ali Mazidi, Janice GillispieMazidi, "The 8051 microcontroller and embedded systems", Pearson education, 2004.
4. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors %20and%20Microcontrollers/New_index1.html
5. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/microcontrollers/micro/ui /Course%20Objective.html

13CS411   **ALGORITHMS LABORATORY**   **0   0   3   1**

OBJECTIVES
At the end of the course the student should be able
- To understand the mathematical aspects of analyzing algorithms.
- To study and develop algorithms for different problems..
- To learn the implementation of programs for various problems.
- To understand the complexity of an algorithm and choose the best.

LIST OF EXPERIMENTS
Suggested experiments not limited to:
1. Implementation of recursive algorithms - Fibonacci and Factorial.
2. Implementation of sorting algorithms with analysis of time and space complexities - Bubble Sort, Insertion Sort and Selection Sort.
3. Implementation of searching algorithms with analysis of time and space complexities - Linear Search and Binary Search.
4. Implementation of problems using Divide-and-Conquer technique - Merge sort, Quick Sort, Finding Maximum and Minimum.
5. Implementation of problems using Greedy techniques - Change making problem, Knapsack Problem.
6. Implementation of problems using Dynamic Programming techniques - Floyd's Algorithm, 0/1 Knapsack problem.
7. Implementation of Backtracking - 8 Queens Problem and Sum of Subsets Problem.
8. Implementation of Branch-and-Bound technique - Travelling Salesman Problem.

TOTAL: 45

13IT412   **DIGITAL LABORATORY**   **0   0   3   1**

OBJECTIVES
- To design and to implement the combinational & sequential circuits using logic gates, flip-flops, MSI devices.

- To design and verify combinational & sequential circuit using Hardware Description Language.

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions
3. Design and implementation of code converter using logic gates
4. Design and implementation of 4-bit binary adder / subtractor using IC7483.
5. Design and implementation of parity generator / checker using basic gates.
6. Design and implementation of magnitude comparator
7. Design and implementation of Boolean function using multiplexers
8. Design and implementation of Shift registers
9. Design and implementation of Synchronous and Asynchronous counters
10. Coding combinational circuits using Hardware Description Language
11. Coding sequential circuits using Hardware Description Language

TOTAL: 45

13EC414   MICROPROCESSORS AND MICROCONTROLLERS   0   0   3   1
LABORATORY

OBJECTIVES
- To implement 8085 program for developing arithmetic and bit manipulations.
- To demonstrate basic instructions with 8086 microprocessor based operations using Assembler.
- To interface 8085/8086 using 8255,8279.
- To develop simple programs using 8051.

LIST OF EXPERIMENTS

1. Programming with 8085 – Arithmetic operations,
2. Programming with 8085 - bit manipulation.
3. Programming with 8085 –code conversion.
4. Programming with 8086 – String manipulation-search, find and replace. (PC Required).
5. Using BIOS/DOS calls: Keyboard control, display, (PC Required)
6. Programming with 8086: copy operations, sorting. (PC Required)
7. Interfacing with 8085/8051 – 8255
8. Interfacing with 8085/8051 – 8279
9. Interfacing with 8051 - Stepper motor/ADC
10. Programming with 8051- simple Assembly language programs.

TOTAL: 45

SEMESTER V

13MA501   PROBABILITY AND QUEUING THEORY   3   1   0   4

OBJECTIVES
- To understand and have a well – founded knowledge of standard distributions which can describe real life phenomena.
- To understand the various skills in handling situations involving more than one random variables.
- To study the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

OUTCOMES
At the end of the course the student should be able to
- Use distributions in cluster analysis of similar binary variables.
- Analyze standard score from a given set of data.
- Use queuing theory in networks

UNIT I   RANDOM VARIABLE AND STANDARD DISTRIBUTIONS   9
Random variable - Probability mass function - Probability density function - Properties Distributions - Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions

UNIT II   TWO DIMENSIONAL RANDOM VARIABLES   9
Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Central limit theorem

UNIT III   RANDOM PROCESSES AND MARKOV CHAINS   9
Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains - Transition probabilities - Limiting distributions.

UNIT IV   MARKOVIAN QUEUING MODELS   9
Applications of Queuing models-Basic characteristics of a queuing model- $(M / M /1):(\infty / FIFO)$ and $(M / M /1): (N / FIFO)$ single server   Poisson queuing models - $(M / M / C) : (\infty / FIFO)$ and $(M / M / C) : (N/FIFO)$ multi-server Poisson queuing models.

UNIT V   NON-MARKOVIAN QUEUES AND QUEUE NETWORKS   9
Series queue with blocking – Two-stage tandem queues-Open Jackson Networks-Closed Jackson Networks.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Bulk service queuing models – Neut's bulk service rule – M/M(a,b)/1 queuing model without vacation – M/M(a,b)/1 queuing model with repeated vacation.

                                                                                TUTORIAL: 15
                                                                                TOTAL: 60

TEXT BOOKS
1. Gupta, S.C., & Kapoor, V.K., Fundamentals of Mathematical Statistics, Sultan Chand & Sons, Reprint 2011.
2. Gross, D. and Harris, C.M., "Fundamentals of Queuing theory", John Wiley and Sons, third Edition, New York, 2004.

REFERENCES
1. Medhi J., "Stochastic Processes", New Age Publishers, New Delhi, 3rd Edition 2009.
2. Ross. S., "A first Course in Probability", ninth Edition, Pearson Education, Delhi, 2014.
3. Palaniammal .S. "Probability and Queuing theory", PHI Learning pvt. ltd, New Delhi, 2012.
4. Veerarajan, T., "Probability, Statistics and Random Processes", Tata McGraw-Hill, 2nd Edition, New Delhi, 2010.
5. Allen, A.O, "Probability, Statistics and Queuing Theory with Computer Applications", Elsevier, California, 2nd Edition, 2005.

13CS502   THEORY OF COMPUTATION   4   0   0   4

OBJECTIVES
- To have an understanding of finite state and pushdown automata.
- To have a knowledge of regular languages and context free languages.

- To make a study of the programming capabilities of Turing machines.

OUTCOMES
At the end of the course the student should be able to
- Design automata to solve problems
- Write regular expressions and Context Free Grammar to represent languages
- Prove a language is not regular
- Prove a language is not context-free

UNIT I   FINITE AUTOMATA   **12**
Mathematical preliminaries and notations – Central concepts of automata theory – Finite automata -
Deterministic Finite Automata - Nondeterministic Finite Automata – Equivalence of DFA and NFA –
Finite Automata with Epsilon transitions - Application of FA.

UNIT II   REGULAR EXPRESSIONS   **12**
Regular languages: Regular Expressions – Finite Automata and Regular Expressions –Applications of
Regular Expressions - Regular Grammars.

UNIT III   REGULAR LANGUAGES   **12**
Properties of regular languages: Pumping lemma for regular languages – Closure properties of regular
languages –Equivalence and Minimization of Finite Automata.

UNIT IV   CONTEXT FREE GRAMMAR   **12**
Context Free languages: Context Free Grammars – Parse Trees - Ambiguity in Grammars and languages
– Applications of Context Free Grammars – Pushdown automata (PDA) – Languages of a PDA -
Equivalence of PDA's and CFG's

UNIT V   CONTEXT FREE LANGUAGES AND TURING MACHINES   **12**
Properties of Context Free Languages: Normal Forms (CNF, GNF) for Context Free Grammars -
Pumping lemma for CFL's - Closure properties of CFL - Turing Machines- Simple examples.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Advanced Turing machines,   Post Correspondence Problem

TOTAL:60

TEXT BOOKS
1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and
   Computations", 3rd Edition, Pearson Education, 2011.
2. J.Martin, "Introduction to Languages and the Theory of Computation", 3rd Edition, TMH, 2007.

REFERENCES
1. H.R.Lewis and C.H.Papadimitriou, "Elements of the theory of Computation", 2nd Edition, Pearson
   Education/PHI, 2003
2. Micheal Sipser, "Theory and Computation", 7th Edition, Thomson Course Technology, 2008

13CS503   **ARTIFICIAL INTELLIGENCE**   **3   0   0   3**

OBJECTIVES
- To understand the problem solving and searching techniques in Artificial Intelligence
- To learn the concepts of knowledge representing and its grammar related applications

OUTCOMES
At the end of the course the student should be able to
- Apply the techniques and methods of AI in applications which involve perception, reasoning and learning.
- Analyze the Robotic science and apply the knowledge of learning techniques in expert systems.

UNIT I   INTRODUCTION   9
Intelligent Agents – Agents and environments – Good behavior – The nature of environments –structure of agents – Problem Solving - problem solving agents – example problems – searching for solutions – uniformed search strategies - avoiding repeated states – searching with partial information.

UNIT II   SEARCHING TECHNIQUES   9
Informed search and exploration – Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments – Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems – Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an element of chance.

UNIT III   KNOWLEDGE REPRESENTATION   9
Introduction to Logical Agents- First order logic – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining – Resolution – Knowledge representation – Ontological Engineering - Categories and objects

UNIT IV   LEARNING   9
Learning from observations – forms of learning – Inductive learning – Learning decision trees – Ensemble learning – Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming – Statistical learning methods – Learning with complete data - Learning with hidden variable – EM algorithm – Instance based learning – Neural networks – Reinforcement learning – Passive reinforcement learning – Active reinforcement learning – Generalization in reinforcement learning.

UNIT V   APPLICATIONS   9
Communication – Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation –Discourse understanding – Grammar induction – Probabilistic language processing – Probabilistic language models – Information retrieval – Information Extraction – Machine translation.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Cognitive Computing – Robotics in space Mission – Intelligence in Computing

TOTAL: 45

TEXT BOOK
1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", 3rd Edition, Pearson Education / Prentice Hall of India, 2013

REFERENCES
1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw-Hill , 2003.
3. George F. Luger, "Artificial Intelligence-Structures and Strategies for Complex Problem Solving", Pearson Education / PHI, 2002.

13CS504   **JAVA PROGRAMMING**   **3   0   0   3**

OBJECTIVES
- To study basics of java data types
- To understand about objects and constructors
- To study different packages
- To learn the usage of multithreading and applet

OUTCOMES
At the end of the course the student should be able to
- Design and demonstrate the use of good Object Oriented design principles
- Use Java standard libraries and classes
- Design user interface with graphics control using AWT and APPLET
- Design, write and debug multithreaded java programs

UNIT I   INTRODUCTION   **8**
Introduction to Java Programming-Features of Java-Variables and Data types –Type Conversions and
Casting - Arrays – Fundamentals of Class and Objects – Assigning Object Reference Variables –
Methods – Constructors-Parameterised and overloaded – Java Keywords - this,static,final — Passing
Objects as parameters- Returning Objects – Access Specifiers-Nested Classes – Inner Classes – Classes
with command line arguments.

UNIT II   INHERITANCE AND PACKAGES   **8**
Inheritance :-Single,Multiple,Multilevel and Hierarchial–Usage of Super Keyword – Method overriding -
Abstract Classes – Interfaces -Packages – Access Protection – Importing Packages —Lang Package:-
Usage of String Class – Character Extraction – String Comparison – Modification of String – String
Buffer.

UNIT III   EXCEPTIONS AND I/O HANDLING   **9**
Exception Types – Uncaught Exceptions – Handling Exception - Try and Catch – Multiple Catch –
Nested Try – throw- throws- finally – Built in Exceptions- Thread Model – Character Streams – Stream
I/O – Serialization – Files

UNIT IV   APPLETS, AWT AND EVENT HANDLING   **10**
Applet Architecture – Skeleton- Simple Applet Display Methods- HTML APPLET tag – Passing
Parameters to the Applet – Audio Clip and AppletStub Interface – AWT-Fundamentals – AWT Classes:
– Buttons,Textarea,Choice,Color,Graphics and Menubar – Events- Delegation Event Model – Event
Classes

UNIT V   APPLICATION DEVELOPMENT   **10**
Collection Interfaces – Collection Classes – Iterators – Maps-String Tokenizer – BitSet – Calendar –
Gregorian – TimeZone – Locale – Random – Currency-Database Connectivity – Case studies – Real
time application development – Debugging the application – Testing the application.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Graphics Programming – Images: Creation and Loading – Simple Animation
                                                                                 TOTAL: 45

TEXT BOOK
   1. D.Norton and H. Schildt, "Java 2 the complete Reference" 7th Edition, TMH, 2007 (Reprint 2009)

REFERENCES
   1. Kathy Sierra, Bert Bates, "Head First Java", 2nd Edition, O'Reilly Media, 2005.
   2. M.Deitel and Deitel, "Java How To Program" 9th Edition, Prentice Hall Publications,2011.
   3. Paul Deitel , Harvey M Deitel, Java for Programmers, 2nd Edition, Pearson, 2010.

4. Black Book, "Java 6 Programming,2009
5. http://www.learnjavaonline.org/

13CS505   **COMPUTER NETWORKS**   **3   0   0   3**

OBJECTIVES
- To understand the concepts of data communications.
- To gain knowledge about the functions of different layers.
- To gain knowledge about IEEE standards employed in computer networking.
- To implement different protocols and network components.

OUTCOMES
At the end of the course the student should be able to
- Use basic computer network technology.
- Analyse data communications system and its components.
- Analyse the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP.
- Identify the different types of network devices and their functions within a network. Also use the basic protocols of computer networks, and they can be used to assist in network design and implementation.

UNIT I   OVERVIEW OF DATA COMMUNICATIONS AND PHYSICAL LAYER   8
Topology- Protocols- Network models: OSI - TCP/IP
Physical Layer: Data rate limits - Performance -Line Coding: Line Coding Schemes -Transmission Media: Guided - Unguided - Switching: Datagram and Virtual Circuit networks.

UNIT II   DATA LINK LAYER   10
Error: Detection and correction -Types of Errors - Block Coding - Cyclic Codes - Framing - Protocols for Noiseless and Noisy Channels - Point-to-Point Protocol - CSMA/CD - CSMA/CA - Ethernet Standards - IEEE 802.11 - Connecting devices.

UNIT III   NETWORK LAYER   9
Logical Addressing: IPv4 and IPv6 addresses -Address mapping -Protocols: ARP and RARP - ICMP - IGMP - Distance Vector and Link state Routing.

UNIT IV   TRANSPORT LAYER   9
Process-to-Process Delivery -UDP - TCP - Congestion: Congestion control - QoS - Techniques to improve QoS - Integrated and Differentiated Services.

UNIT V   APPLICATION LAYER   9
Domain Name Space (DNS) -Electronic Mail -WWW and HTTP- SNMP - Cryptography: Symmetric and Asymmetric - Network Security: Security Services - Message Authentication - Digital Signatures.

UNIT VI   STATE OF THE ART (NOT FOR EXAMINATION)
High speed networks -Software defined networking – 4G Networks
                                                                    TOTAL: 45

TEXT BOOK
1. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw-Hill, 4th Edition 2007.

REFERENCES
1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach", Pearson Education-Addison Wesley, 5th Edition,2010.
2. Larry L.Peterson and Peter S. Davie, "Computer Networks", Harcourt Asia Pvt. Ltd., 4th Edition,2007
3. William Stallings, "Data and Computer Communication", 9th Edition, Pearson Education, 2011.

4.   W. Richard Stevens. "TCP/IP Illustrated", Volume 1: The Protocols, Addison Wesley,2004

13CS506   COMPUTER GRAPHICS AND MULTIMEDIA   4   0   0   4

OBJECTIVES
   • To study the graphics techniques and algorithms.
   • To study the multimedia concepts and various I/O technologies.

OUTCOMES
At the end of the course the student should be able to
   •   Design 2D and 3D images
   •   Analyze different compression techniques

UNIT I   INTRODUCTION TO COMPUTER GRAPHICS AND GRAPHICS SYSTEMS   12
Overview of computer graphics-Raster Scan, Random Scan displays, Flat Panel Displays, Plotters, printers, digitizers, Light pens, Graphics Software. Output Primitivies: - Points & lines, Line drawing algorithms-DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm

UNIT II   2D AND 3D TRANSFORMATIONS   12
Basic transformations: translation, rotation, scaling, reflection shear; Matrix representations & homogeneous coordinates, transformations between coordinate systems; Three Dimensional Concepts, 3D transformation: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane. Window to viewport co-ordinate transformation, clipping operations:- point clipping , line clipping, polygon, Color Models and Animation.

UNIT III   3D CONCEPTS AND SURFACE IDENTIFICATIONS   12
3D Object Representations : - Polygon surfaces, Curved Lines and Surfaces, Spline Represenations, B-spline curves, Bezier curves and surfaces, Sweep Representations, CSG methods and Oct trees. 3D viewing:- Projections, View Volumes, Visible Surface Identification Methods : - Back face, Depth Buffer methods, Scan Line, Depth sorting method, Area sub division and Ray casting methods-OpenGL operations,simple OpenGL programming

UNIT IV   MULTIMEDIA SYSTEM DESIGN   12
Introduction to Multimedia: Concepts, Multimedia applications, Multimedia Architecture, Evolving technologies for multimedia, Data Interface Standards, File formats, Multimedia Input and Output Technologies and Multimedia databases.

UNIT V   MULTIMEDIA COMPRESSION   12
 Image, video and audio standards. Digital voice and Audio, MIDI. Compression and Decompression : - Compression through spatial and temporal redundancy, inter-frame and intraframe compression; Text Compression-Huffman, Arithmetic, LZW ,Image Compression - JPEG, Video: MPEG compression, Multimedia Authoring and User Interfaces and Hypermedia Messaging.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Game Programming and Design- Human Computer Interaction-WebGL- Multimedia in Ubiquitous Computing world

                                                                          TOTAL:60
TEXT BOOKS
   1.   Hearn, Baker – " Computer Graphics (C version 2nd Ed.)" – Pearson education
   2.   Z. Xiang, R. Plastock – " Schaum's outlines Computer Graphics (2nd Ed.)" – TMH
   3.   Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI
   4.   Multimedia Systems Design-prabhat K. Andleigh, Kiran Thakrar-PHI
   5.   Buford J. K. – "Multimedia Systems" – Pearson Education

6. Donald D.Hearn,M.Pauline Baker-Computer graphics with openGL,Pearson(3rd Ed).

REFERENCES
1. Foley, Vandam, Feiner, Hughes – "Computer Graphics principles (2nd Ed.) – Pearson Education.
2. W. M. Newman, R. F. Sproull – "Principles of Interactive computer Graphics" Tata Mc Graw Hill.
3. Elsom Cook – "Principles of Interactive Multimedia" – McGraw Hill
4. http://en.wikipedia.org/wiki/Computer_graphics
5. http://graphics.ucsd.edu/courses/cse167_f06/CSE167_05.ppt
6. http://www.b-u.ac.in/sde_book/multi_system.pdf

13CS511 **COMPUTER NETWORKS LABORATORY** **0   0   3   1**

OBJECTIVES
- To understand the basic concepts of Networking, Networking devices.
- To implement protocols like ARP, SW, BG and HTTP.
- To write and execute programs for CRC and Chat application.
- To gain knowledge about the network simulation tools

LIST OF EXPERIMENTS
1. Socket Programming with TCP/UDP
2. Develop a Client – Server application for chat.
3. Simulation of ARP / RARP.
4. Implementation of bit stuffing and CRC Computation.
5. Simulation of Sliding-Window protocol.
6. Simulation of BGP / OSPF routing protocol.
7. Develop a Client that contacts a given DNS Server to resolve a given host name.
8. Write a Client to download a file from a HTTP Server.
9. Evaluate MAC and network protocols using network simulation software tools such as NS-2 / OPNET/Qualnet/MiniNET/FledLight
10. Evaluate the performance of network routing protocols using NS-2 / OPNET/Qualnet/MiniNET/FledLight

TOTAL: 45

13CS512   **COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY**   **0   0   3   1**

OBJECTIVES
At the end of the course the student should be able
- To learn and develop primitive drawing algorithms.
- To learn and develop applications using 2D and 3D transformations.
- To understand text and image compression algorithms.
- To learn animation and perform basic operations.

LIST OF EXPERIMENTS
1. Implementation of Bresenham's algorithms for line, circle and ellipse drawing.
2. Implementation of 2D Transformations such as translation, rotation, scaling, reflection and sharing.
3. Implementation of Cohen-Sutherland 2D clipping.
4. Implementation of Cohen-Sutherland window-viewport mapping.
5. Implementation of 3D Transformations such as translation, rotation and scaling.
6. Design of basic graphics primitives using openGL
7. Design of 3D objects using GLUT
8. Performing Animation using OpenGL
9. Implementation of projections of 3D images.
10. Implementation of color model conversions
11. Implementation of text compression algorithm.

12. Performing animation and morphing effects using MOHO software.
13. Implementation of basic operations on image using GIMP software.

TOTAL: 45

13CS513   **JAVA PROGRAMMING LABORATORY**   **0   0   3   1**

OBJECTIVES
At the end of the course the student should be able
- To understand the usage of interface and abstract classes
- To understand different types of event handling mechanisms
- To learn the usage of multithreaded programs
- To learn for implementing data transfer operations using Input and Output
- To understand the database connectivity concepts using JDBC

LIST OF EXPERIMENTS
1. Implementation of student mark analysis system using Class and Objects
2. Demonstrate method overloading and overriding using Java
3. Develop staff management system for demonstrating the concept of Hierarchial Inheritance
4. Implementation of Single and Multilvel Inheritance for library management systems
5. Implementation of Multiple Inheritance using Interface
6. Design Java Package for numbers. Develop two different classes that belongs to two package, one to check whether the given string is palindrome or not and the other to check whether the given number is odd or even and access these package using one main file.
7. Develop Applet Programming for loading graphic components
8. Implementation of Menus and Menubar creation using Applet
9. Implementation of exception handling mechanism using try and catch block
10. Implementation of Action and Mouse events.
11. Design of AWT controls with event handlers for validation of registration forms
12. Implementation of Multithreaded programming
13. Implementation of Files operations and I/O Streams
14. Design of scientific calculator using Swings.
15. Implementation of tourism information system using Swing and JDBC.

TOTAL: 45

SEMESTER VI

13MA401/13MA601   **NUMERICAL METHODS**   **3   1   0   4**

OBJECTIVES
- To study the concept of calculating the roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- To study the concept of constructing approximate polynomial to represent the given numerical data and to find the intermediate values.
- To learn the methods of finding the solution of ordinary differential equations and partial differential equations as most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations.

OUTCOMES

At the end of the course the student should be able to

- Find the numerical solutions of nonlinear (algebraic or transcendental) equations, simultaneous equations.
- Use numerical methods to solve differential equations and partial differential equations.
- Solve integral equations numerically.

UNIT I   SOLUTIONS OF EQUATIONS   9

Solutions of non linear equations by Iteration method, Regula - Falsi method and Newton Raphson method – Solutions of linear system of equations by Gauss Elimination, Gauss Jordan, Gauss Jacobian and Gauss Seidel methods – Inverse of a matrix by Gauss Jordan.

UNIT II   INTERPOLATION AND APPROXIMATION   9

Equal Intervals - Newton's Forward and Backward difference formulas - Unequal intervals - Newton's' Divided difference formula , Lagrangian and inverse Lagrangian polynomials.

UNIT III   NUMERICAL DIFFERENTIATION AND INTEGRATION   9

Newton's Forward and Backward Differences to compute derivatives- -Trapezoidal rule – Simpson's 1/3 rule, Simpson's 3/8 rule (both Single and Double integral) -– Two and three point Gaussian quadrature formulas.

UNIT IV   INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS   9

Taylor series method- Euler and modified Euler method – Fourth order Runge-Kutta method for solving first order equations- Milne's and Adam's Predictor and Corrector methods.

**UNIT V   BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL   9
                        DIFFERENTIAL EQUATIONS**

Finite difference solution of second order ordinary differential equations- Finite difference solutions of one dimensional heat equation – Bender - Schmidt method – Crank Nicolson method - One dimensional wave equation -Two dimensional Laplace and Poisson equations.

UNIT VI   STATE-OF-THE-ART/ADVANCES (NOT FOR EXAMINATION)

Solutions of transcendental and algebraic equations – differential equations – integral equations using mathematical software.

<div align="right">

TUTORIAL:15
TOTAL: 60

</div>

TEXT BOOKS

1. Grewal, B.S., Numerical methods in Engineering and Science. 9th edition, Khanna Publishers, 2007.
2. VenkataramanM.K, "Numerical Methods", National Publishing Company, 2000.

REFERENCES

1. Rajasekaran S., Numerical methods in Science and Engineering – A Practical Approach, 2nd edition,Wheeler Publishing, 1999.
2. Jain M.K. Iyengar, K & Jain R.K., "Numerical Methods for Scientific and Engineering Computation", New Age International (P) Ltd, Publishers 2003.
3. Sankara Rao. K., "Numerical Methods for Scientists and Engineers", PHI Pvt Ltd, New Delhi, 3rd Edition, 2007.

13MB502/13MB602   PRINCIPLES OF MANAGEMENT   3   0   0   3

OBJECTIVES

- To study the basic managerial functions such as planning, organizing, leading, and controlling resources to accomplish organizational goals.
- To understand different types of management theories, models and principles

- To learn the various levels of management

OUTCOMES

At the end of the course the student should be able to

- Apply management functions such as planning, organizing and budgeting.
- Analyze the role of the managers and resources they use.
- Evaluate different management approaches.

UNIT I   MANAGING   9

Management : Definition –Nature & Scope- Functions- Evolution- Managerial roles and Styles - Decision making approach – Management & Society.

UNIT II   PLANNING   9

Nature and purpose of planning - Planning process - Types of plans – Objectives - Managing by Objective (MBO) Strategies - Types of strategies - Policies - Planning premises- Forecasting- Decision Making - Types of decision - Decision Making Process.

UNIT III   ORGANIZING & STAFFING   9

Nature and Purpose of Organizing - Organization Structure - Formal and Informal Organization - Line and Staff Authority – Departmentation – Line/Staff authority, Empowerment and Decentralization - Staffing - Selection and Recruitment – Selection Process-Techniques– Training –Feed Back- Performance Appraisal.

UNIT IV   DIRECTING   9

Human Factors and Motivation - Motivation Theories - Leadership Styles -Leadership Traits- Leadership Theories - Communication – Communication Process- Barriers to Effective Communication .

UNIT V   CONTROLLING   9

Process of Controlling - Types of Control - Control Techniques - Managing Productivity - Cost Control - Purchase Control – Maintenance Control - Quality Control - Planning Operations.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)

Social Responsibility of Business - Ethics- Value Chain of Business- Creativity and Innovation- Globalization of Business- Management of Big Data.

TOTAL: 45

TEXT BOOKS
1. Harold Koontz and Heinz Weihrich, "Essentials of Management", Tata McGraw Hill ,2009.
2. Tripathy and Reddy, Principles of Management, Tata McGraw Hill,2008

REFERENCES
1.   Rao and Hari Krishna, Management: Text and Cases, Excel Books, 2008.
2. Aswathappa and Karminder Ghuman, Management : Concept and Cases, McGraw Hill, 2010
3. Karuppasamy and Saravnan, Principles of Management, Sci Tech,2010

13CS603   **COMPILER DESIGN**   4   0   0   4

OBJECTIVES

- To understand, design and implement a lexical analyzer and parser.
- To design DFA & NFA with different conversion techniques.
- To implement code generation schemes.
- To perform optimization of codes and gain knowledge about runtime environments.
- To Understand Lex and YACC tools.

OUTCOMES

At the end of the course the student should be able to
- Design a scanner to identify the tokens in a program
- Design a parser through the application of grammar
- Implement a semantic analyzer for a programming language
- Design, analyze, implement and test a working compiler for a small language

UNIT I   INTRODUCTION TO COMPILING AND LEXICAL ANALYSIS   12

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools - Lexical Analysis - Role of Lexical Analyzer – Input Buffering – Specification of Tokens. Recognition of Tokens- A language for Specifying Lexical Analyzer, Finite Automata - From a regular expression to an NFA and DFA

UNIT II   SYNTAX ANALYSIS   12

Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing - Recursive Descent Parsing - Predictive Parsing – Bottom-up parsing - Shift Reduce Parsing – Operator Precedence Parsing - LR Parsers - SLR Parser - Canonical LR Parser - LALR Parser. YACC- parser generators

UNIT III   INTERMEDIATE CODE GENERATION AND TYPE CHECKING   12

Syntax- Directed definitions, Construction of Syntax Trees. Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Type system-Type checker- Type expression –Type conversion.

UNIT IV   CODE GENERATION   12

Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – A simple Code generator – DAG representation of Basic Blocks- peephole optimization.

UNIT V   CODE OPTIMIZATION   12

Introduction– Principal Sources of Optimization – Optimization of basic Blocks – Loops in flow graph – Introduction to Global Data Flow Analysis.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)

Just in time compiler -Compiler Optimization -Dynamic Compilation-Compilers for multi core programming

TOTAL: 60

TEXT BOOK
1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", 2nd Edition, Pearson Education Asia, 2007.

REFERENCES
1. Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2003.
2. C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C",1stEdition,Benjamin   Cummings, 2008.
3. J.P. Bennet, "Introduction to Compiler Techniques", 2nd Edition, Tata McGraw- Hill, 2003.
4. HenkAlblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 2001.
5. Kenneth C. Louden, "Compiler Construction: Principles and Practice", 2nd Edition,Thompson Learning, 2003.
6. http://nptel.ac.in/syllabus/syllabus.php?subjectId=106108113

13CS604   OBJECT ORIENTED ANALYSIS AND DESIGN   3   0   0   3

OBJECTIVES
- To study the concept of Object Oriented Life Cycle.

- To understand how to Identify Objects, Relationships, Services and Attributes.
- To learn the working of Object Oriented Design Process and UML diagrams.
- To study the concept of OO Databases and Implementation Modeling.

OUTCOMES
At the end of the course the student should be able to
- Analyze information systems in real-world settings
- Solve different types of prototyping methods
- Use an object-oriented method for analysis and design

UNIT I   INTRODUCTION TO OBJECT ORIENTED SYSTEM DEVELOPMENT   8
 Object basics – object oriented systems development life cycle - link and association concepts - generalization and inheritance - a sample class model - navigation of class models - Practical Tips

UNIT II   OBJECT ORIENTED METHODOLOGIES   10
Rumbaugh methodology - Booch methodology - Jacobson methodology - patterns – frameworks – unified approach – unified modeling language diagrams

UNIT III   OBJECT ORIENTED ANALYSIS   9
Identifying   use cases - object analysis - classification – identifying object relationships -attributes and methods

UNIT IV   OBJECT ORIENTED DESIGN   9
Design axioms - Designing Classes – Access Layer - Object Storage – Object Interoperability- Design Patterns

UNIT V   IMPLEMENTATION   9
Implementation modeling - overview of implementation – fine-tuning classes - fine tuning generalizations - realizing associations - OO languages - implementing structure and functionality – OO databases - object-oriented style – reusability - extensibility – robustness - programming in large

UNIT VI   STATE OF THE ART /ADVANCES(NOT FOR EXAMINATION)
Dynamic and Static Object Modeling, Object Constraint Language, Mapping design to Code

TOTAL: 45

TEXT BOOKS
1. Object Oriented System Development, Ali Bahrami, McGraw-Hill International Edition,1999
2. Object-Oriented Modeling and Design with UML, Michael Blaha, James Rumbaugh, 2nd Edition, Pearson Education,2004.

REFERENCES
1. Object Oriented analysis and Design, Booch G, Addison-Wesley Publishing company, 3rd Edition, 2007
2. http:// trainingetc.com/PDF/TE1802eval.pdf
3. http://burks.bton.ac.uk/burks/pcinfo/progdocs/oocourse/oocnotes.htm
4. http://www.iturls.com/English/SoftwareEngineering/SE_6.asp
5. http://learningpatterns.com/courses/x_ooad.jsp

13EC507/13EC607   DIGITAL SIGNAL PROCESSING   3   1   0   4

OBJECTIVES
- To understand the basic concepts of signals and systems.
- To implement Fourier Transformations- DFT & FFT.
- To understand the structure and design of IIR & FIR filters.

- To know the various applications of DSP.

OUTCOMES
At the end of the course the student should be able to
- Analyze and design a discrete LTI system
- Design IIR Filters
- Design FIR Filters

UNIT I   SIGNALS AND SYSTEMS   9
Basic elements of digital signal Processing-Classifications of Signals–Concept of frequency in continuous time and discrete time signals –Discrete time signals: Classifications of DTS, Manipulation of DTS-Discrete time systems : Input/Output descriptions of DTS, Classifications of Discrete time System.

UNIT II   FAST FOURIER TRANSFORMS   9
FFT algorithms– Radix-2 FFT algorithms – Decimation in Time, Decimation in Frequency algorithms – Application of FFT: Use of FFT algorithms in Linear Filtering and correlation

UNIT III   IIR FILTER DESIGN   9
Structure of IIR – System Design of Discrete time IIR filter from continuous time filter – IIR filter design by Impulse Invariance, Bilinear transformation , Approximation derivatives – Design of Digital Butterworth filter

UNIT IV   FIR FILTER DESIGN   9
Structure of FIR-Symmetric & Antisymmteric FIR filters – Design of Linear phase filter using Rectangular Window techniques — Design of Linear phase filter using Frequency sampling techniques.

UNIT V   APPLICATIONS OF DSP   9
Role of DSP for 3G mobile Communication Systems-DSP function in GSM Mobile Station-DSP function in Base station –-Image processing: Compression, Enhancement, JPEG Standard- DSP trends in wireless : Multiplexing, Echo Control, Power dissipation.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Signal Processing in Cloud computing-DSP in 4K-TV and UHD TV, Signal processing in Nano Scale technology

TUTORIAL: 15
TOTAL: 60

TEXT BOOK
1. John G Proakis and Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", 4th edition, PHI/Pearson Education, 2009.

REFERENCES
1. Alan V Oppenheim, Ronald W Schafer and John R Buck, "Discrete Time Signal Processing", 3rd edition,PHI/Pearson Education, 2009.
2. JohnyR.Johnson, "Introduction to Digital Signal Processing", Prentice Hall of India/Pearson Education, 2002.
3. SanjitK.Mitra, "Digital Signal Processing: A Computer – Based Approach", Second Edition, Tata McGraw- Hill, 2006.
4. http://nptel.ac.in/courses/117102060/http://meseec.ce.rit.edu/eecc722-fall2003/722-10-8-2003.pdf
5. http://researchtrend.net/ijet/5%20SHIVI.pdf

13EN512/13EN612   COMMUNICATION SKILLS LABORATORY   1   0   3   2

OBJECTIVES
- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their job.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

Theory   **15**
Presentation Skills –Group Discussion-Body Language-Team Work- Time Management-Stress Management –Interview Skills

A. English Language Lab   **18**
1. Listening Comprehension:
Listening and typing – Listening and sequencing of sentences – Filling in the blanks -Listening and answering questions.

2. Reading :
Reading Newspapers- Skimming –Scanning -Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

3. Speaking:
Phonetics: Intonation – Ear training - Correct Pronunciation – Sound recognition exercises –Common Errors in English.

Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation

4.Writing
Correction of Errors- Sequencing of Sentences - Letter Writing-Resume-Technical Reports –Minutes of meeting –E mail Communication

B. Viewing and discussing audio-visual materials /Practice Sessions   **27**

1. Resume / Report Preparation / Letter Writing
Structuring the resume / Report - Letter writing / Email Communication.

2. Presentation skills:
Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language

3. Soft Skills:
Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management & Poise
4. Group Discussion:
GD a part of selection process - Structure of GD – Moderator –Types of GD- Strategies in GD – Team work - Body Language - Mock GD - Technical seminar

5. Interview Skills:
Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews.
                                                                                TOTAL: 60

13CS613   **COMPILER DESIGN LABORATORY**   **0   0   3   1**

OBJECTIVES
- To learn the concept of token separation.
- To understand the construction and conversion of NFA and DFA.
- To study the working of LEX and YACC tools.
- To understand the construction of various types of parsers.

LIST OF EXPERIMENTS
1. Implementation of lexical analyzer.
2. Construction of NFA from a given regular expression.
3. Construction of DFA from a given regular expression.
4. Implementation of Predictive parsing.
5. Implementation of Shift Reduce Parsing Algorithm.
6. Implementation of LR parsing.
7. Implement the front end of a compiler that generates the three address code for a simple language with: one data type integer, arithmetic operators, relational operators, variable declaration statement, one conditional construct, one iterative construct and assignment statement.
8. Implement the back end of the compiler which takes the three address code as input and produces assembly language instructions that can be assembled and run using an 8086 assembler. The target assembly instructions can be simple move, add, sub, and jump.

   LEX & YACC:
1. Study of LEX and YACC.
2. Implementation of lexical analyzer using LEX.
3. Implement a calculator that takes an expression with digits, + and * and computes & prints its value, using YACC.
4. Use YACC and LEX to implement a parser.

TOTAL: 45

13CS515/13CS615   **CASE TOOLS LABORATORY**   **0   0   3   1**

OBJECTIVES
At the end of the course the student should be able
- To understand and apply the principles of software development
- To use CASE tools for software development
- To model a system using different diagram
- To test any application

LIST OF EXPERIMENTS
Solve simple problems using CASE tools and prepare the following documents for the experiments listed.

1. Program Analysis and Project Planning
   Thorough study of the problem – Identify Project Scope, Objectives, Infrastructure
2. Software Requirement Analysis
   Describe the individual Phases / Modules of the Project, Identify Deliverables
3. Data Modeling
   Use work products – Data Dictionary, Use case diagrams and Activity diagrams
4. Build Class diagrams, Sequence diagrams and add interface to Class diagrams.
5. Software Development and Debugging
6. Software Testing
   Prepare Test Plan, Perform Validation Testing, Coverage Analysis, Develop Test Case Hierarchy.

Suggested List of Applications:

1. Payroll system
2. Online shopping
3. Banking system
4. Text editor
5. Online voting system
6. Library automation system
7. Student Marks Analyzing System
8. Quiz System
9. Online Ticket Reservation System
10. Course Registration System
11. Expert Systems
12. ATM System
13. Stock Maintenance

TOTAL: 45

SEMESTER VII

13CS701   **OPEN SOURCE SOFTWARE**   3   0   0   3

OBJECTIVES
- To understand the need of open source software
- To know about various open source programming languages
- To develop dynamic web page applications
- To develop integrated development environment & GUI

OUTCOMES
At the end of the course the student should be able to
- Design a web page using open source languages
- Use open source software in different applications
- Analyze the commercial aspects of open source software

UNIT I   INTRODUCTION TO LINUX SYSTEMS   **9**
Need of Open Sources – Advantages of Open Sources – Applications – FOSS – FOSS usage - Free Software Movement, Commercial aspects of Open Source movement - Certification courses issues - global and Indian. Application of Open Sources. Open Source Operating Systems: LINUX – Kernel mode and User mode process. Linux Advanced Concepts: Scheduling, Time Accounting – Personalities – Cloning and Backup– Signals – Development with Linux. Linux Networking: Configuration Files – Red Hat Linux network GUI configuration tools– Assigning an IP address – Subnets – Route – Tunneling — Enable Forwarding

UNIT II   PHP   **9**
Introduction:PHP - Basic Syntax of PHP – programming in web environment - Common PHP Script Elements - Using Variables - Constants – Data types - Operators ; Statements - Working With Arrays - Using Functions – OOP - String Manipulation and Regular Expression. File and Directory Handling - Including Files - File Access. Working With Forms -Processing Forms -Form Validation

UNIT III   MySQL   **9**
Introduction - Setting up an account - Starting, Terminating and writing your own MySQL Programs - Record Selection Technology - Working with Strings - Date and Time - Sorting Query Results - Generating Summary - Working with Metadata - Using Sequences – MySQL and Web. PHP and SQL database: PHP and LDAP ; PHP Connectivity; Sending and receiving emails-PHP Database Connectivity: Retrieving data from MySQL - Manipulating data in MySQL using PHP

UNIT IV   PYTHON   **9**

Basic features of Python: Overview- Variables and Strings: Data types - Operators – Decision Control - Conditional Statements - Loops – Example Programs Sequences: Lists: Introduction –Fixed size lists and arrays – Lists and Loops – Assignment and references - Identity and equality – Sorted lists – Tuples– String functions - Unordered Collections –   Dictionaries– File Handling -Exception – Handling exception- - Functions

UNIT V   WEB SERVER   **9**

Apache Web server – Working with web server – Configuring and using apache web server- Open Source Software tools and Processors : Introduction – Eclipse IDE Platform – Compilers – Model driven architecture tools – Selenium ID – Features and uses-CASE STUDY: Government Policy toward Open Source (E- Governance) – Wikipedia as an open Source Project

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)

Advances in Perl parsing rules- Subroutines, Packages, and Modules

                                                                                        TOTAL: 45

TEXT BOOKS
1. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2007
2. Wesley J. Chun, "Core Phython Programming", Prentice Hall, 2006
3. Vikram Vaswani, "MYSQL: The Complete Reference", 2nd Edition, Tata McGraw- Hill Publishing Company Limited, Indian Reprint 2009.

REFERENCES
1. Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
2. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003
3. http://it.toolbox.com/blogs/madgreek/10-reasons-why-you-need-an-open-source-strategy-18891
4. http://eu.conecta.it/paper/Advantages_open_source_soft.html
5. http://www.smashingapps.com/2008/08/12/19-most-essential-open-source-applications-that-you-probably-want-to-know.html
6. http://www.codecademy.com/tracks/python
7. http://www.w3schools.com/php/default.asp

13IT702   **MOBILE COMPUTING**   **3   0   0   3**

OBJECTIVES
- To learn the concepts of telecommunication networks.
- To study the basic concepts of Mobile IP.
- To understand session initiation protocol.
- To understand mobile middleware and mobile operating system.

OUTCOME
At the end of the course the student should be able to
- Design and develop mobile content applications

UNIT I   TELECOMMUNICATION NETWORKS   **9**

Telecommunication systems - Spread spectrum techniques – GSM – GPRS – DECT – 3G Wireless Systems-UMTS core Network Architecture – Satellite Networks -   Basics – Parameters and Configurations

UNIT II   MOBILE NETWORK LAYER   **9**

Introduction to Mobile IP – Components of mobile IP network- Agent Discovery- Registration-tunneling – security- Dynamic Host Configuration Protocol - Routing – DSDV – DSR- Alternative Metrics-Capacity Allocation – FAMA and DAMA

UNIT III   TRANSPORT AND APPLICATION LAYERS   **9**
Traditional TCP – Classical TCP improvements – Introduction to SIP, SIP Architecture, Applications, Services

UNIT IV   MOBILE MIDDLEWARE   **9**
Mobile middleware, Middleware for Application development, Adaptation, Mobile Agents, Service Discovery Middleware, Services, Garbage Collection, Eventing, Security.

UNIT V   MOBILE OPERATING SYSTEMS   **9**
Android OS –Architecture- security - ios- Palm OS - Windows CE - Symbion OS - Linux for Mobile Devices

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Wimax Networks-Introduction to 5G Networks-Near Field Communication-Mobile Cloud Computing

TOTAL: 45

TEXT BOOKS
1. Jochen Schiller, "Mobile Communications", PHI/Pearson Education, 2nd Edition, 2008.
2. Frank Adelstein, Sandeep K S Gupta, Golden G Richard, Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing,"Tata Mc-Graw Hill Education   Pvt. Ltd., New Delhi, 2005.

REFERENCES
1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", PHI/Pearson Education, 2003.
2. Raj Kamal, "Mobile Computing", Oxford University Press, New Delhi, 2007.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, New York, 2003.
4. Hazysztof Wesolowshi, "Mobile Communication Systems", John Wiley and Sons Ltd, 2002.

13CS703   WEB TECHNOLOGY   3   0   0   3

OBJECTIVES
- To learn about the fundamental aspects of various Scripting Languages.
- To understand latest developments in Web Technologies.
- To learn interactive and dynamic websites
- To understand the techniques involved to support real-time Software development.

OUTCOMES
At the end of the course the student should be able to
- Design interactive web pages using html and style sheets
- Design and develop web applications that incorporate database connectivity and data retrieval from relational database.
- Design, write and debug java Servlets programs that use client server technology to implement distributed systems.
- Use java mail packages for creating email applications

UNIT I   XHTML   **9**
Introduction to XHTML: Headers – Linking – Images–Unordered Lists – Nested and Ordered Lists – Tables–Forms – Frames– Cascading Style Sheets.

UNIT II   JAVA NETWORK PROGRAMMING   **9**
Looking up Internet Address – Socket programming – Client/Server programs – E – mail client – SMTP – POP3 programs – web page retrieval – protocol handlers – Security issues in Internet programming

UNIT III   JAVA SCRIPT   9

 Introduction to JavaScript: Control structures – Functions – Arrays – objects

UNIT IV   JAVA SERVLET   9

Servlets: Introduction, Architecture, Lifecycle   – Working with Servlets –   Handling HTTP GET Requests – Handling HTTP GET Requests Containing Data – Handling HTTP POST Requests – Redirecting Requests to Other Resources – Multi – Tier Application (JDBC).

UNIT V   WEB DATA REPRESENTATION AND SERVICES   9

Introduction – Representing web data:-XML Documents and vocabularies-AJAX-XSLT-Displaying XML documents in browser – Web Services: JAX-RPC Concepts-SOAP Technology-Open Source Environment -PHP and MYSQL.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)

Java Beans, Malware Detection and Web Security , Web Search, Email Tools

TOTAL: 45

TEXT BOOKS
1. Harvey M. Deitel and Paul J. Deitel, "Internet & World Wide Web How to Program", 4th Edition, Pearson Prentice Hall, 2008.
2. Deitel Deitel Goldberg, "Internet and World Wide Web – How to program", 3rd Edition, Prentice Hall Publishers, 2004.
3. Elliotte Rusty Harold, "Java Network Programming", 3rd Edition , O'Reilly Publishers.,2004

REFERENCES
1. Thomas A. Powell, "The Complete Reference HTML and XHTML", 5th Edition, Tata McGraw Hill, 2010.
2. Herbert Schildt, "The Complete Reference – Java2", Tata McGraw – Hill, 5th Edition, 2002
3. Black Book, " Java Server Programming ", Dreamtech Press, 2007
4. Ivan Bayross,Vaishali Shah,Sharanam Shah,Cynthia Bayross ,"Java Server Programming for Professionals: Covers Java EE 5", 1st Edition, Shroff Publishers
5. http://www.w3schools.com/
6. http://www.webbasedprogramming.com.
7. https://xwss.java.net/

13CS704   DATA WAREHOUSING AND MINING   3   0   0   3

OBJECTIVES
*   To study the overall architecture of a data warehouse and techniques and methods for data gathering and data pre-processing using OLAP tools.
*   To learn classification and clustering techniques
*   To understand various data mining models and techniques
*   To learn data mining and data warehousing applications in inter disciplinary areas

OUTCOMES
At the end of the course the student should be able to
*   Apply different data mining techniques: mining frequent pattern, association, correlation, classification, prediction, and cluster analysis in real world problems.
*   Evaluate the performance of different data mining algorithms
*   Design and implement systems for data mining
*   Interpret the contribution of data warehousing and data mining to the decision support level of organizations

UNIT I   INTRODUCTION TO DATA WAREHOUSING AND MINING   9

Introduction to Data Mining – Data Mining Functionalities – Classification of Data Mining Systems -

Major issues in Data Mining -   Data Warehouse - Multidimensional Data Model - Data Warehouse Architecture – Implementation - Further Development - Data Warehousing to Data Mining

UNIT II   DATA   OBJECTS AND PREPROCESSING   9
 Data Objects – Attribute types – statistical descriptions of data – Data Visualization – Measuring Data Similarity and Dissimilarity
PRE PROCESSING :
Need for Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization

UNIT III   ASSOCIATION RULE MINING   8
Association Rule Mining – Basic concepts – frequent Itemset Mining Methods – Pattern Evaluation Methods – Pattern Mining in Multilevel and Multidimensional Space

UNIT IV   CLASSIFICATION AND CLUSTERING   11
CLASSIFICATION : Basic concepts - Decision Tree Induction - Bayesian Classification Methods - Rule Based Classification – Model Evaluation and selection – Improving Classification accuracy Bayesian Belief Networks - Classification by Back propagation – Support Vector Machine - Classification using Frequent Patterns – Lazy Learners - Other Classification Methods
CLUSTERING: Cluster Analysis - Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of Clustering

UNIT V   DATA MINING TRENDS AND APPLICATIONS   8
Mining Complex Data Types – Methodologies of Data Mining – Applications – Data Mining and Society

UNIT VI   STATE OF THE ART /ADVANCES (NOT FOR EXAMINATION)
Big Data Mining – Statistical Learning and Data Mining – Business Intelligence – CBIR - Minimum Description Length Principle (MLD)

TOTAL: 45

TEXT BOOKS
1. Jiawei Han, Micheline Kamber, Jian Pei "Data Mining: Concepts and Techniques", 3rd Edition, Morgan Kauffman, 2012.
2. W.H.Inmon, "Building the Data Warehouse", 4th Edition, Wiley, 2005.

REFERENCES
1. Jiawei Han, Micheline Kamber, Pei "Data Mining: Concepts and Techniques", 3rd Edition, Morgan Kauffman, 2001.
2. Sam Anahory, Dennis Murry, "Data Warehousing in the real world", Pearson Education,   2009.
3. Alex Berson, Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", 1st Edition,McGraw-Hill Edition, 2004.
4. Paulraj Ponniah, "Data Warehousing Fundamentals For IT Professionals", 2nd Edition Wiley Interscience Publication, 2010.
5. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
6. http://www.cise.ufl.edu/~jhammer/online-bib.htm
7. slidewiki.org/deck/1472_data-miningtdwi.org/

13CS711   OPEN SOURCE SOFTWARE LABORATORY   0   0   3   1

OBJECTIVES
- To gain knowledge on kernel configuration and installation
- To gain knowledge on Linux network configuration
- To understand and apply open source programming languages
- To develop web applications

- To create GUI applications

LIST OF EXPERIMENTS

1. Kernel configuration, compilation and installation : Download /access the latest kernel source code from kernel.org,compile the kernel and install it in the local system.Try to view the source code of the kernel
2. To learn about the various build systems used like the auto* family, cmake, ant etc. instead of just running the commands. This could involve the full process like fetching from a cvs and also include autoconf, automake etc.,
3. Basic Linux networking commands
4. Configuring Multiple IP address on a single Network interface card
5. Configuring Linux server as a router and configure IP forwarding
6. a) Write a PHP script for performing array functions such as merging two arrays, removing and inserting array elements
   b) Write a PHP script which displays all the numbers between 200 and 300 that are divisible by 4
7. a) Create a simple 'birthday countdown' PHP script, the script will count the number of days between current day and birth day
   b) Write a PHP script to calculate number of days between two dates
8. a) Write a simple PHP program to check that emails are valid.
   b) Write a PHP script to perform file operations.
9. Apache server configuration, compilation and installation
10. a) Write a PHP script to connect MySQL database and to perform database operations.
    b) Create a simple HTML form and accepts login details , validates authorized user using PHP   code
11. a) Write a python program for performing various operations on python objects
    b) Write a python program for multiple & multilevel inheritance of python
12. a) Write a python program for implementing module and file handling concept
    b) Write a python program for implementing operator overloading concept

TOTAL: 45

13CS712   **WEB TECHNOLOGY LABORATORY**   **0   0   3   1**

OBJECTIVES
- To understand basic scripting languages
- To learn for developing real-time applications using servlets
- To learn interactive and dynamic websites
- To understand client side and server side technologies
- To learn for using graphics controls using applet

LIST OF EXPERIMENTS

1. Create a web page with the following using HTML
   a. To embed an image map in a web page
   b. To fix the hot spots
   c. Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Client Side Scripts for Validating Web Form Controls using DHTML
4. Write programs in Java to create applets incorporating the following features:
   a) Create a color palette with matrix of buttons
   b) Set background and foreground of the control text area by selecting a color from color palette.
   c) In order to select Foreground or background use check box control as radio buttons to set background images
5. Write programs in Java using Servlets:
   i) To invoke servlet from HTML forms

ii) To invoke servlet from Applets
6. Write programs in Java to create three-tier applications using JSP and Databases
   i) For conducting on-line examination.
   ii) For displaying student mark list. Assume that student information is available in a database which has been stored in a database server.

TOTAL: 45

ELECTIVES

PROGRAMMING, ARCHITECTURE AND OPERATING SYSTEM DESIGN

13CS001   **C# & .NET FRAMEWORK**   3   0   0   3

OBJECTIVES
- To understand the fundamental aspects of C#
- To gain knowledge about the oops paradigms in C#
- To gain programming skills in C# both in basic and advanced levels.
- To develop simple applications based on .NET

OUTCOMES
At the end of the course the student should be able
- To design a program in fundamental programming concepts such as variables, conditional statements, looping constructs and methods in C#
- To apply inheritance mechanism in C#
- To develop web applications using .NET
- To develop a program that demonstrate the concepts of .NET frameworks

UNIT I   INTRODUCTION TO C#   **8**
Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

UNIT II   OBJECT ORIENTED ASPECTS OF C#   **9**
Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

UNIT III   APPLICATION DEVELOPMENT ON .NET   **8**
Building Windows Applications, Accessing Data with ADO.NET.

UNIT IV   WEB BASED APPLICATION DEVELOPMENT ON .NET   **8**
Programming Web Applications with Web Forms, Programming Web Services.

UNIT V   THE CLR AND THE .NET FRAMEWORK   **12**
Assemblies, Versioning, Attributes, Reflection, Viewing Metadata, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Automated test code generation system,Managed codes for bioimaging on ASP.NET,Security vulnerabilities and leaks in ASP.NET websites, Webpage trojan horse in IIS Server.

TOTAL: 45

TEXT BOOKS
1. E. Balagurusamy,"Programming in C#", 2nd Edition, Tata McGraw-Hill, 2004.
2. J. Liberty,"Programming C#", 5th Edition, O'Reilly, 2002.

3. Christian Nagel et al. ―Professional C# 2005 with .NET 3.0‖, Wiley India , 2007

REFERENCES
1. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2010.
2. Robinson et al, "Professional C#", 3rd Edition, Wiley Publications, 2004.
3. Andrew Troelsen, "C# 2008and the .NET 3.5 Platform", 4th Edition, A Press, 2007.
4. S.Thamarai Selvi, R. Murugesan, "A Textbook on C#", Pearson Education, 2003.

13CS002   **ADVANCED JAVA PROGRAMMING**   **3   0   0   3**

OBJECTIVES
- To understand advanced Java programming concepts like reflection, native code interface, threads, etc.
- To study the basic network programs in Java
- To understand Concepts needed for distributed and multi-tier applications
- To understand issues in enterprise applications development.

OUTCOMES
At the end of the course the student should be able to
- Use the existing standard java class libraries to develop advanced java programs
- Design and develop java applications that incorporate java database connectivity and data retrieval from relational database.
- Design, write and debug java programs that use client server technology to implement distributed systems.
- Design, write and debug enterprise applications

UNIT I   CLASSIC DATA STRUCTURES AND SWINGS   **9**
Enumeration-Stacks,Queues-LinkedList-HashMap-Vector-BitSet-Dictionary-HashTable-Collection Interfaces- GUI development using Swing.

UNIT II   NETWORK PROGRAMMING IN JAVA   **9**
Sockets – Secure Sockets – Custom sockets – TCP Sockets - UDP Datagrams – Multicast Sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Java Messaging services

UNIT III   APPLICATIONS IN DISTRIBUTED ENVIRONMENT   **9**
Remote Method Invocation – activation models – RMI custom sockets – Object Serialization – RMI – IIOP implementation – IDL technology – Naming Services – CORBA programming Models - JAR file creation

UNIT IV   MULTI--TIER APPLICATION DEVELOPMENT   **9**
Server side programming – Servlets – Java Server Pages - Applet to Applet communication – Applet to Servlets communication – Usage of BLOB and CLOB objects – storing Multimedia data into databases – Multimedia streaming applications – Java Media Framework.

UNIT V   ENTERPRISE APPLICATIONS   **9**
Server Side Component Architecture – Introduction to J2EE – Java Bean:-Creating Session Beans, Entity Beans – Persistent Entity Beans

UNIT VI : STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Firewall security, Security policies for Applet Programming, Java Mail Packages.

TOTAL: 45

TEXT BOOKS
1. Elliotte Rusty Harold, "Java Network Programming", 3rd Edition, O'Reilly publishers, 2004 (UNIT II)
2. Ed Roman, "Mastering Enterprise Java Beans", 3rd Edition, John Wiley & Sons Inc., 2009. (UNIT III , UNIT V)
3. Hortsmann & Cornell, "Core Java 2 Advanced Features, Vol II", 8th Edition, Pearson Education, 2008. (UNIT I and UNIT IV)

REFERENCES
1. Patrick Naughton, "Complete Reference: Java 2", Tata McGraw-Hill, 2003.
2. tomcat.apache.org
3. http://docs.oracle.com/javase/tutorial/
4. http://www.java-made-easy.com/java-programming-tutorials.html

13CS003   **ADVANCED COMPUTER ARCHITECTURE**   **3   0   0   3**

OBJECTIVES
- To understand processor design concepts in modern computer architecture.
- To understand Organization and Instruction Set Architecture
- To understand Main and cache memory organization and design issues
- To understand the ILP, Superscalar architecture and TLP performance
- To understand different IO and Interconnection structures

OUTCOMES
At the end of the course the student should be able to
- Describe the principles of computer design
- Classify instruction set architectures
- Describe modern architectures such as RISC, Super Scalar, VLIW (very large instruction   word), and multi-core and multi-cpu systems
- Compare the performance of different architectures
- Develop applications for high performance computing systems

UNIT I   INSTRUCTION LEVEL PARALLELISM AND ITS EXPLOITATION   **9**
ILP – Concepts and challenges – Review of hardware techniques – Compiler techniques for exposing ILP – Static branch prediction – VLIW & EPIC – Advanced compiler support – Hardware support for exposing parallelism – Hardware versus software speculation mechanisms – IA64 and Itanium processors – Limits on ILP.

UNIT II   MULTIPROCESSORS AND THREAD LEVEL PARALLELISM   **9**
Symmetric and distributed shared memory architectures – Performance issues – Synchronization – Models of memory consistency – Introduction to Multithreading.

UNIT III   MEMORY AND I/O   **9**
Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system.

UNIT IV   MULTI-CORE ARCHITECTURES   **9**
Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture

UNIT V   PARALLEL PROGRAMMING AND MULTITHREADED APPLICATION DEVELOPMENT   **9**
Parallel programming models – Shared memory programming – Message passing paradigm – Message Passing Interface – Parallel Virtual Machine – Algorithms, Program development and performance tuning.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Microprocessor architecture from VLIW to TTA, A layered MIMD communication processor Design classification model, Network Communication architecture - Network on chip - Typical ARM - AMBA Bus systems, Computer architecture with hardware based malware detection

TOTAL: 45

TEXT BOOKS
1. John L. Hennessey and David A. Patterson, "Computer architecture – A quantitative approach", Morgan Kaufmann / Elsevier Publishers, 5th. edition, 2011.
2. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2006.

REFERENCES
1. David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture : A hardware software approach" , Morgan Kaufmann /Elsevier Publishers, 1999.
2. Michael J Quinn, Parallel programming in C with MPI and OpenMP, Tata McGraw Hill, 2008.
3. Kai Hwang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw Hill, New Delhi, 2003.

13CS004   UNIX INTERNALS   3   0   0   3

OBJECTIVES
- To have thorough understanding of the kernel.
- To understand the file organization and management.
- To learn the various system calls.
- To have knowledge of process architecture, process control & scheduling, I/O Sub system and memory management.

OUTCOMES
At the end of the course the student should be able to
- Design the kernel
- Solve the file organization and management
- Use the various system calls.
- Design the process architecture, process control & scheduling, I/O Sub system and memory management

UNIT I   GENERAL OVERVIEW OF THE SYSTEM   9
History – System structure – User perspective – Operating system services – Assumptions about hardware. Introduction to the Kernel: Architecture of the UNIX operating system – Introduction to system concepts – Kernel data structures – System administration.

UNIT II   BUFFER CACHE   9
Buffer headers – Structure of the buffer pool –Scenarios for retrieval of a buffer-Advantages and disadvantages of the buffer cache. Internal representation of files: Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Other file types

UNIT III   SYSTEM CALLS FOR FILE SYSTEM   9
Open – Read – Write – File and record locking – Adjusting the position of file I/O –LSEEK – Close – File creation – Creation of special files – Pipes – Dup – Mounting and unmounting file systems

UNIT IV   THE STRUCTURE OF PROCESSES   9
Process states and transitions – Layout of system memory – The context of a process – Saving the context of a process. Process Control: Process creation – Signals – Process termination – Awaiting process termination – The user ID of a process – Changing the size of a process – The shell – System boot and the INIT process

UNIT V   PROCESS SCHEDULING AND MEMORY MANAGEMENT POLICIES   9
Process Scheduling: Algorithm – Parameters – Examples – Controlling process priorities – Fair share scheduler. Memory Management Policies: Swapping. The I/O Subsystem: Driver Interfaces– Disk Drivers-Terminal Drivers

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Interprocess Communication: Pipes - Shared Memory & Semaphores - UNIX IPC: Message Queues - Unix Sockets: UDP & TCP/IP – Accessing Unix Documents Using X Windows.

TOTAL: 45

TEXT BOOKS
1. Maurice J. Bach, "The Design of the Unix Operating System", Prentice Hall of India, 2009.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH, 2006. Second Edition TMH

REFERENCES
1. Uresh Vahalia, "UNIX Internals: The New Frontiers", Pearson Education Inc, 2008.
2. S. J. Leffler, M. K. Mckusick, M. J. Karels and J. S. Quarterman., "The Design and Implementation of the 4.3 BSD Unix Operating System", Addison Wesley, 1998.
3. Daniel P. Bovet & Marco Cesati, "Understanding the Linux Kernel", O'REILLY, Shroff Publishers & Distributors Pvt. Ltd, 2000.
4. http://nptel.tvm.ernet.in

13CS005   ADVANCED OPERATING SYSTEM   3   0   0   3

OBJECTIVES
- To get a comprehensive knowledge of the architecture of distributed systems.
- To understand the deadlock and shared memory issues and their solutions in distributed environments.
- To know the security issues and protection mechanisms for distributed environments.
- To get a knowledge of multiprocessor operating system and database operating systems.

OUTCOMES
At the end of the course the student should be able to
- Design Assembler, Linker, and Loader and Macro processor.
- Analyze the various types of Operating System.
- Use the concepts of CPU scheduling, memory management and file management of Operating system.

UNIT I   DISTRIBUTED SYSTEM ARCHITECTURE   9
Architectures of Distributed Systems - System Architecture types - Issues in distributed operating systems - Communication Networks – Communication primitives. Theoretical Foundations – Inherent limitations of a distributed system – Lamp ports logical clocks – Vector clocks – Casual ordering of messages – global state – cuts of a distributed computation – termination detection. Distributed Mutual Exclusion – The classification of mutual exclusion and associated algorithms.

UNIT II   DISTRIBUTED PROCESS MANAGEMENT   9
Distributed Deadlock Detection -Introduction - Deadlock handling strategies in distributed systems – Issues in deadlock detection and resolution – control organizations for distributed deadlock detection – Centralized and Distributed deadlock detection algorithms –Hierarchical deadlock detection algorithms. Agreement protocols – the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture – mechanism for building distributed file systems – design issues – log structured file systems.

UNIT III   DISTRIBUTED RESOURCE MANAGEMENT   9
Distributed shared memory-Architecture– algorithms for implementing DSM – Memory coherence and

protocols – design issues. Distributed Scheduling – Introduction – Issues in load distributing – components of a load distributing algorithm – stability – Load distributing algorithm – Performance comparison – Selecting a suitable load sharing algorithm – Requirements for load distributing –Task migration and Associated issues. Failure Recovery and Fault tolerance: Classification of failures – Backward and forward error recovery- recovery in concurrent systems – Consistent set of check points – Synchronous and Asynchronous check pointing and recovery.

UNIT IV   PROTECTION AND SECURITY   9
Protection and Security - Preliminaries, the access matrix model and its implementations.- Safety in matrix model - Advanced models of protection. Data security – Cryptography: Model of cryptography, Conventional cryptography - Modern cryptography, Private key cryptography, Data encryption standard-Public key cryptography – Multiple encryption – Authentication in Distributed systems.

UNIT V   MULTIPROCESSOR OPERATING SYSTEM   9
Multiprocessor operating systems - Basic multiprocessor system architectures – Inter connection networks for Multiprocessor systems – Caching – Hypercube architecture. Multiprocessor Operating System - Threads process synchronization and scheduling. Database Operating systems: Requirements of a database operating system Concurrency control– a concurrency control model of database systems - the problem of concurrency control – Serializability theory - Distributed database systems, Concurrency control algorithms – basic synchronization primitives, lock based algorithms-timestamp based algorithms, Optimistic algorithms – concurrency control algorithms, Data replication.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Distributed File Systems-File Service Architecture-Sun Network File System - The Andrew File System.

TOTAL: 45

TEXT BOOK
1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating Systems: Distributed, Database and multiprocessor operating systems", TMH, 2001

REFERENCES
1. Andrew S.Tanenbaum, "Modern operating system",3rd Edition, PHI, 2009
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson Education, 2003.

SECURITY AND NETWORK PROGRAMMING

13CS021   **INFORMATION SECURITY**   **3   0   0   3**

OBJECTIVES
- To understand the basics of Information Security.
- To learn the aspects of risk management.
- To study the technological aspects of Information Security.

OUTCOMES
At the end of the course the student should be able
- To use the security techniques and policies on information
- To apply security standards on security systems
- To analyze the security of a system by assessing risks

UNIT I   INTRODUCTION TO INFORMATION SECURITY   9
Key information security concepts – Critical Characteristics of Information – CNSS Security Model – Components of an Information System – Securing the Components – Balancing information security and access –The Security SDLC

UNIT II   NEEDS AND ISSUES IN INFORMATION SECURITY   9
Business Needs – Threats – Attacks – Legal – Ethical and Professional Issues

UNIT III   RISK MANAGEMENT   9
Risk Identification and Risk Assessment, Risk control strategies – Selection strategy

UNIT IV   LOGICAL PLANNING   9
Blueprint for Security – Information Security Policy – Standards and Practices – ISO 17799/BS 7799 – NIST Models – VISA International Security Model – Design of Security Architecture – Planning for Continuity

UNIT V   SECURITY TECHNOLOGIES   9
IDS – Scanning and Analysis Tools – Cryptography – Access Control Devices – Physical Security – Security and Personnel

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Privacy and Authentication issues in Grid Computing and Cloud Computing

TOTAL: 45

TEXT BOOK
1. Michael E Whitman and Herbert J Mattord – "Principles of Information Security" – Vikas Publishing House – Fourth Edition –New Delhi – 2011

REFERENCES
1. Micki Krause – Harold F. Tipton – "Handbook of Information Security Management" – Vol 1-3 CRC Press LLC – Sixth Edition 2008.
2. Stuart Mc Clure – Joel Scrambray – George Kurtz – "Hacking Exposed" – Tata McGraw-Hill – 2003
3. Matt Bishop – "Computer Security Art and Science" – Pearson/PHI – 2002.
4. www.scmagazine.com
5. www.informaworld.com/uiss
6. http://www.springer.com/computer/securityandcryptology

13CS022   NETWORK SECURITY   3   0   0   3

OBJECTIVES
- To know the methods of conventional encryption.
- To understand the concepts of public key encryption and number theory
- To understand authentication and Hash functions.
- To know the network security tools and applications.
- To understand the system level security used.

OUTCOMES
At the end of the course the student should be able
- To design and conduct experiments to analyze and interpret data.
- To use Cryptography in different fields of Engineering and Mathematics.
- To analyze and select a suitable Cipher for an application.
- To use the best solution for a threat.
- To use efficient algorithms for obtaining optimal solutions for a problem.

UNIT I   INTRODUCTION TO CRYPTOGRAPHY   9
Basic concepts: confidentiality, integrity, availability, security policies, security mechanisms, assurance - Basic cryptography Historical background Transposition/Substitution, Caesar Cipher Introduction to Symmetric crypto primitives, Asymmetric crypto primitives.

UNIT II   SYMMETRIC CIPHERS   9

Traditional Symmetric ciphers - Substitution ciphers - Transposition ciphers - stream and block ciphers. Modern Symmetric key ciphers - Modern block and Stream ciphers - Data Encryption Standard - DES analysis - Structure - Multiple DES - Advanced data Encryption Standard -Transformation - Key Expansion – Analysis - Modern Block Ciphers - Stream Ciphers - other issues.

UNIT III   ASYMMETRIC CIPHERS   9

Mathematics of cryptography - Primality testing - factorization - Chinese remainder theorem - Quadratic congruence - exponentiation and logarithm - RSA Cryptosystem - Rabin Cryptosystem - Elgamal Cryptosystem - Elliptic cryptosystem.

UNIT IV   MESSAGE INTEGRITY AND MESSAGE AUTHENTICATION   9

Message integrity and Message authentication - Cryptographic hash functions - Digital signature - Key management - private and public - distribution - Kerberos - PGP - Security at application layer - Transport layer - Network layer - IKE-ISAKMP

UNIT V   ADVANCED NETWORK SECURITY   9

Security in GSM - Security in 3G - Security in Java and .Net - Operating Systems - Network Security - firewalls and VPN - Case studies - Single Sign On (SSO) - Denial of service (DoS) - Cross Site Scripting Vulnerability (CSSV).

UNIT VI   STATE OF THE ART /ADVANCES(NOT FOR EXAMINATION)

Attacks in 4G and 5G networks - Types - Solutions - Mathematical Analysis of Authentication and Digital Signature Algorithms.

TOTAL: 45

TEXT BOOKS
1. William Stallings, "Cryptography and Network security", Pearson Education, New Delhi 2007
2. Cryptography and Network security, Atul Kahate, Tata McGraw-Hill Pub company Ltd., 2nd Edition, New Delhi 2009.

REFERENCES
1. Behrouz A.Forouzan "Cryptography and Network Secuity", The McGraw-Hill Companies, 2007.
2. Roberta Bragg, Mark Rhodes- Ousley, Keith Strassberg "Network Security: The Complete Reference", Tata McGraw-Hill, 2008.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, "Network Security: PRIVATE Communication in a PUBLIC World", Prentice Hall. 2007.
4. http://ocw.mit.edu/courses/electrical-enginering-and-computer-science/6-875-cryptography-and-cryptanalysis-spring-2005/download-course-materials/

13CS023   NETWORK PROGRAMMING AND MANAGEMENT   3   0   0   3

OBJECTIVES

At the end of the course the student should be able
- To learn about Socket Programming.
- To understand the concepts of IPv4 and IPv6 interoperability.
- To understand the SNMP network management concepts.
- To understand the concepts of Management Information Base.

OUTCOMES

At the end of the course the student should be able to
- To design and conduct experiments on Socket Programming.
- To analyze and check the Server boundary conditions.
- To solve the Domain names using DNS.
- To use the concepts of SNMP and SNMP to monitor remote devices.

UNIT I   ELEMENTARY TCP SOCKETS   **9**
Introduction to Socket Programming – Overview of TCP/IP Protocols –Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write, close functions – Iterative Server – Concurrent Server.

UNIT II   TCP SERVER CLIENT COMMUNICATION   **9**
TCP Echo Server – TCP Echo Client – POSIX Signal handling – Server with multiple clients – boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown – I/O multiplexing – I/O Models – select function – shutdown function – TCP echo Server (with multiplexing) – poll function – TCP echo Client (with Multiplexing)

UNIT III   SOCKET OPTIONS, ELEMENTRY UDP SOCKETS   **9**
Socket options – Getsocket and Setsocket functions – Generic Socket options – IP Socket options – Socket options – TCP Socket options – Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP Sockets – Domain Name System – Get host byname function – Ipv6 support in DNS – gethostbyadr function – getservbyname and getservbyport functions.

UNIT IV   ADVANCED SOCKETS   **9**
IPv4 and IPv6 interoperability – threaded servers – thread creation and termination – TCP echo server using threads – Mutexes – condition variables – raw sockets – raw socket creation – raw socket output – raw socket input – ping program – trace route program.

UNIT V   SIMPLE NETWORK MANAGEMENT   **9**
SNMP network management concepts – SNMP management information – standard MIB's – SNMPv1protocol and Practical issues – introduction to RMON, SNMPv2 and SNMPv3.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Telecommunication Network Architecture - TMN management layers - Management information Model - Management servicing and functions - Cisco NetFlow - Syslog - CiscoWorks - Network Management Strategy - SLCs and SLAs - IP Service-Level Agreements - Content Networking Design.

                                                                              TOTAL: 45

TEXT BOOKS
1. W. Richard Stevens, "UNIX NETWORK PROGRAMMING Vol-I" 3rd Edition, PHI Pearson Education, 2003. (Units – I, II, III & IV.)
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", 3rd Edition, Addison Wesley, 1999. (Unit -V)

REFERENCE
1. D.E. Comer, "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), 4th Edition, PHI, 2006.

13CS024   WIRELESS SENSOR NETWORKS   3   0   0   3

OBJECTIVES
- To understand the basic concepts of wireless sensor networks and to assess the performance limits the coverage and best network configuration.
- To gain knowledge about the main characteristics such as Low power consumption, small sizes of the devices together with their low cost that this technology uses.
- To understand and know about the platforms and tools of wireless sensor network.

OUTCOMES
At the end of the course the student should be able to
- Design sensor networks for various application setups.
- Explore the design space and conduct trade-off analysis between performance and resources.
- Analyse coverage and conduct node deployment planning.
- Design appropriate data dissemination protocols and model links cost.

- Determine suitable medium access protocols and radio hardware also use commercial components to develop sensor networks.

UNIT I   INTRODUCTION TO WSN   9

Over view of sensor networks- Constraints and challenges – Advantages of sensor networks- Applications- Collaborative processing – Key definitions in sensor networks – Tracking scenario – Problem formulation –Distributed representation and interference of states – Tracking multiple objects – sensor models- Performance comparison and metrics.

UNIT II   NETWORKING SENSORS   9

Key assumption - Medium access control – S-MAC protocol – IEEE 802.15.4 standard and ZigBee - General Issues - Geographic, Energy – Aware Routing - Attribute based routing.

UNIT III   INFRASTRUCTURE ESTABLISHMENT   9

Topology control – Clustering -Time Synchronization – Localization – Task driven sensing – Role of sensor nodes – Information based tasking - Routing and aggregation.

UNIT IV   SENSOR NETWORK DATABASE   9

Sensor Database Challenges – Querying the physical environment – Interfaces – In-network aggregation – Data centric storage – Data indices and range queries – Distributed Hierarchical aggregation – Temporal data.

UNIT V   SENSOR NETWOR PLATFORMS AND TOOLS   9

Sensor Node Hardware – Sensor network programming challenges – Node level software platforms – Operating system TinyOS – Node level simulators – State centric programming –Applications and future directions.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)

Dynamic WSN, Industrial Sensor Networking, Swim Networks, E2 Protocols.

TOTAL: 45

TEXT BOOKS
1. Wireless Sensor Networks: an information processing approach – Feng zhao, Leonidas guibas, Elsivier publication, 2004.
2. Wireless Sensor Networks – C.S.Raghavendra Krishna, M.Sivalingam and Tarib znati, Springer publication, 2006.

REFERENCES
1. Wireless Sensor Networks: Architecture and protocol –Edgar H .Callaway, 1st Edition, CRC press 2003.
2. Protocol and Architecture for Wireless Sensor Networks –Holger Karl, Andreas willig, John wiley publication, Oct 2007.
3. http://nptel.tvm.ernet.in

13IT047   HIGH SPEED NETWORKS   3   0   0   3

OBJECTIVES
- To understand different types of networks
- To know different TCP congestion control and traffic management
- To study and understand performance of networks
- To know and understand integrated and differentiated services
- To study protocols for QOS support.

OUTCOMES
At the end of the course the student should be able
- To discuss the services of ATM(Asynchronous transfer mode)
- To analyze different congestion control techniques
- To analyze the need for integrated services
- To compare the use of TCP protocol for different applications
- To discuss different protocols used in the network

UNIT I   HIGH SPEED NETWORKS   8
Frame Relay Networks –ATM Protocol Architecture, ATM logical Connection-ATM Cell – ATM Service Categories – AAL-High Speed LANs: Ethernet- Fibre Channel – Wireless LAN

UNIT II   CONGESTION AND TRAFFIC MANAGEMENT   10
Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III   ISDN   11
Overview of ISDN – User interface , architecture and standards – Packet switched call over ISDN – B and D channels – Link access procedure (LAPD) – ISDN layered architecture – Signaling – Limitations of Narrow band ISDN(N-ISDN) and evolution of Broadband ISDN(B- ISDN).

UNIT IV   INTEGRATED AND DIFFERENTIATED SERVICES   8
Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT V   NETWORK MANAGEMENT AND APPLICATION   8
Network management- choosing a configuration method-MIB-SNMP-XMLCORBA-COPS-VPNS-mobile IP-voice over IP.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
A fairer and TCP friendlier congestion control protocol, fuzzy AR approach- Traffic modeling, prediction and congestion control-Fuzzy Q-learning flow control-Modified LMS algorithm in digital beam forming.

TOTAL: 45

TEXT BOOKS
1. William Stallings, "High Speed Networks And Internet", Pearson Education, Fourth Edition, 2005.
2. Behrouz A. Forouzan, "Data Communications and Networking", 4th edition, Tata McGraw-Hill, 2005.
3. Adrian Farrel," The Internet And Its Protocols", Elsevier Publications,2011.

REFERENCES
1. William Stallings, "High Speed Networks And Internet", Pearson Education, 2nd Edition, 2002.
2. Warland & Pravin Varaiya, "High Performance Communication Networks", Jean Harcourt Asia Pvt. Ltd., 2nd Edition, 2001.
3. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003
4. Stallings.W, "ISDN –B ISDN with Frame relay and ATM", Prentice Hall of India, 1995.

MULTIMEDIA, DATABASE AND ADVANCED COMPUTING

13CS041   **DIGITAL IMAGE PROCESSING**   **3   0   0   3**

OBJECTIVES
- To understand the image fundamentals and mathematical transforms necessary for image processing.
- To learn the image restoration procedures.
- To understand the image compression procedures, image segmentation and representation techniques.

OUTCOMES
At the end of the course the student should be able
- To Analyze various image processing techniques with reference to cases
- To design an image processing system for a real time application

UNIT I   DIGITAL IMAGE FUNDAMENTALS   9
Image formation - Image transforms - Fourier transforms - Walsh - Hadamard - Discrete cosine - Hotelling transforms.

UNIT II   IMAGE ENHANCEMENT & RESTORATION   9
Histogram modification techniques - Image smoothening - Image Sharpening - Image Restoration - Degradation Model – Noise models - Spatial filtering - Frequency domain filtering.

UNIT III   IMAGE COMPRESSION & SEGMENTATION   9
Compression Models - Elements of information theory - Error free Compression - Image segmentation - Detection of discontinuities - Edge linking and boundary detection - Thresholding - Region based segmentation - Morphology.

UNIT IV   REPRESENTATION AND DESCRIPTION   9
Representation schemes - Boundary descriptors - Regional descriptors - Relational Descriptors

UNIT V   OBJECT RECOGNITION AND INTERPRETATION   9
Patterns and pattern classes - Decision -Theoretic methods - Structural methods.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Image Processing in Medical field - Image processing in remote sensing satellites

                                                                        TOTAL: 45
TEXT BOOK
1. Gonzalez.R.C & Woods. R.E., "Digital Image Processing", 2nd Edition, Pearson Education, 2002.

REFERENCES
1. Sid Ahmed, Image Processing, McGraw Hill, New York, 1995.
2. http://poseidon.csd.auth.gr/EN/
3. http://www.olympusmicro.com/primer/resources/imageprocessing.html
4. www.stanford.edu
5. http://graphics.cs.cmu.edu/courses/15-463/2004_fall/www/463.html

13CS042   **KNOWLEDGE BASED DECISION SUPPORT**   **3   0   0   3**
                                  SYSTEMS
OBJECTIVES
- To develop a support system
- To learn the technologies related to Decision Support Systems
- To learn tools for Decision Making
- To develop Intelligent Decision System

- To know about the methods of Managing Knowledge

OUTCOMES
At the end of the course the student should be able
- To implement the different phases of decision making
- To apply concept of decision support systems in relation with knowledge management
- To use various techniques and tools of knowledge management for an organization benefits
- To develop intelligent system using interface techniques
- To analyze the major issues of management support systems

UNIT I   DECISION MAKING AND COMPUTERIZED SUPPORT   **9**
Management Support Systems: An Overview - Decision Making, Systems, Modelling and Support

UNIT II   DECISION SUPPORT SYSTEM DEVELOPMENT   **9**
Decision Making Systems – Modelling and Analysis – Business Intelligence – DataWarehousing, Data Acquisition - Data Mining. Business Analysis – Visualization - Decision Support System Development.

UNIT III   COLLABORATION TOOLS AND KNOWLEDGE MANAGEMENT   **9**
Collaborative Computing Technologies: Group Support Systems –Enterprise Information Systems - knowledge Management.

UNIT IV   INTELLIGENT SYSTEM DEVELOPMENT   **9**
Intelligent Support Systems – AI & Expert Systems – Knowledge based Systems – Knowledge Acquisition, Representation & Reasoning, Advanced intelligence system – Intelligence System over internet.

UNIT V   MANAGEMENT SUPPORT SYSTEMS   **9**
Electronic Commerce - Integration, Impacts, and the Future of the Management- Support Systems.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Knowledge management and web technology-Knowledge model and webGIS-Decision for fertilization-cybernetics-clinical decision support system for the diagnosis of alzheimer disease.

TOTAL: 45

TEXT BOOKS
1. Efrain Turban, Jay E.Aronson, "Decision Support Systems and Intelligent Systems" 6th Edition, Pearson Education, 2001.

REFERENCES
1. Ganesh Natarajan, Sandhya Shekhar, "Knowledge management – Enabling Business Growth", Tata McGraw-Hill, 2002.
2. George M.Marakas, "Decision Support System", Prentice Hall, India, 2003.
3. Efrem A.Mallach, "Decision Support and Data Warehouse Systems", Tata McGraw-Hill, 2002.

13CS043   PATTERN RECOGNITION   3   0   0   3

OBJECTIVES
- To understand different supervised and unsupervised learning techniques.
- To study the basics of Pattern recognition
- To learn the concept of Classification algorithm

OUTCOMES
At the end of the course the student should be able to
- Design a data mining tool

- Analyze the different aspects of clustering and classification algorithms
- Use the concept of fuzzy logic in classification

UNIT I   PATTERN CLASSIFIER   **9**

Overview of pattern recognition - Discriminate functions - Supervised learning - Parametric estimation - Maximum likelihood estimation - Bayesian parameter estimation - Perceptron algorithm - LMSE algorithm - Problems with Bayes approach - Pattern classification by distance functions - Minimum distance pattern classifier

UNIT II   UNSUPERVISED CLASSIFICATION   **9**

Clustering for unsupervised learning and classification - Clustering concept - C-means algorithm - Hierarchical clustering procedures - Graph theoretic approach to pattern clustering - Validity of clustering solutions

UNIT III   STRUCTURAL PATTERN RECOGNITION   **9**

Elements of formal grammars - String generation as pattern description - Recognition of syntactic description -Parsing - Stochastic grammars and applications - Graph based structural representation

UNIT IV   FEATURE EXTRACTION AND SELECTION   **9**

Entropy minimization - Karhunen - Loeve transformation - Feature selection through functions approximation -Binary feature selection

UNIT V   RECENT ADVANCES   **9**

Neural network structures for Pattern Recognition - Neural network based Pattern associators - Unsupervised learning in neural Pattern Recognition - Self organizing networks - Fuzzy logic – Fuzzy pattern classifiers -Pattern classification using Genetic Algorithms

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)

Image pattern recognition algorithms-Boundary descriptors in image segmentation

TOTAL: 45

TEXT BOOKS
1. R. O. Duda, P. E. Hart, D. G. Strok, Pattern Classification, Wiley, New York, 2001.
2. Robert J.Schalkoff, Pattern Recognition: Statistical, Structural and Neural Approaches, John Wiley &Sons Inc., New York, 2007.

REFERENCES
1. J. T. Tou, R. C. Gonzales, Pattern Recognition Principles, Wesley Publication Company, London, 2009.
2. Morton Nadier and P. Eric Smith, Pattern Recognition Engineering, John Wiley & Sons, New York, 2003.
3. http://digital.cs.usu.edu/~xqi/Teaching/CS5650F03/Notes/PRConcept.pdf
4. http://140.121.196.191/pdf/cv/Chapter%204%20Pattern%20Recognition%20Concepts.pdf
5. http://docs.oracle.com/cd/B28359_01/datamine.111/b28129/feature_extr.htm#BGBHJDID.

13CS044   **USER INTERFACE DESIGN**   **3   0   0   3**

OBJECTIVES
- To study the concept of menus, windows, interfaces.
- To understand the characteristics and components of windows.
- To study the concept of various controls for the windows.
- To learn the working concepts in windows design with color, text, graphics.
- To understand about the testing methods

OUTCOMES
At the end of the course the student should be able to
- Design and construct user interface solutions
- Analyze user interface solutions
- Solve user interface design and development technologies
- Use quality characteristics of user interface design and their manifestations in user interface solutions

UNIT I   INTRODUCTION   9
Introduction – Importance – Human – Computer interface – Characteristics of graphics interface – Direct manipulation graphical system – Web user interface – Popularity – Characteristic & Principles

UNIT II   HUMAN COMPUTER INTERACTION   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 – Structures of menus – Functions of menus – Contents of menu – Formatting – Phrasing the menu – Selecting menu choice – Navigating menus – Graphical menus.

UNIT III   WINDOWS   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 IV   MULTIMEDIA   9
Text for web pages – Effective feedback – Guidance & Assistance – Internationalization – accessibility – Icons – Image – Multimedia – Coloring.

UNIT V   WINDOWS LAYOUT – TEST   9
Prototypes – Kinds of tests – Retest – Information search – Visualization – Hypermedia – WWW – Software tools.

UNIT VI   STATE OF THE ART /ADVANCES(NOT FOR EXAMINATION)
WebGL – Servlet and JSP – Multimedia in e – learning technologies.

TOTAL: 45

TEXT BOOK
1. Wilbent. O. Galitz – "The Essential Guide to User Interface Design" – John Wiley& Sons – 3rd Edition – 2007

REFERENCES
1. Ben Sheiderman – "Design the User Interface" – Pearson Education – Designing the User Interface – 4th Edition – 2008.
2. Alan Cooper – "The Essential of User Interface Design" – Wiley – Dream Tech Ltd. – 2002.
3. en.wikipedia.org/wiki/User_interface
4. www.interaction – design.org/encyclopedia/human_computer_interaction_hci.html
5. www.behance.net
6. www.cse.lehigh.edu/~glennb/mm/06ui.doc
7. wiki.eclipse.org/User_Interface_Guidelines

13CS045   ADVANCED DATABASES   3   0   0   3

OBJECTIVES
- To identify the need for different databases.
- To know about different data models that can be used for these databases.

- To get familiarized with transaction management of the database
- To develop in-depth knowledge about web and intelligent database.
- To implement the way in which data can be stored in geographical information systems etc.

OUTCOMES
At the end of the course the student should be able to
- Design object oriented data model for real world problem domain
- Design a web database using XML query language.
- Analyze the effectiveness of various algorithms in mobile database application

UNIT I   DISTRIBUTED DATABASES   9
Distributed DBMS Concepts and Design – Introduction – Functions and Architecture of DDBMS – Distributed Relational Database Design – Transparency in DDBMS – Distributed Transaction Management – Concurrency control – Deadlock Management – Database recovery – The X/Open Distributed Transaction Processing Model – Replication servers – Distributed Query Optimization - Distribution and Replication in Oracle.

UNIT II   OBJECT ORIENTED DATABASES   9
Object Oriented Databases – Introduction – Weakness of RDBMS – Object Oriented Concepts Storing Objects in Relational Databases – Next Generation Database Systems – Object Oriented Data models – OODBMS Perspectives – Persistence – Issues in OODBMS – Object Oriented Database Management System Manifesto – Advantages and Disadvantages of OODBMS – Object Oriented Database Design – OODBMS Standards and Systems – Object Management Group – Object Database Standard ODMG – Object Relational DBMS –Postgres - Comparison of ORDBMS and OODBMS.

UNIT III   WEB DATABASES   9
Web Technology And DBMS – Introduction – The Web – The Web as a Database Application Platform – Scripting languages – Common Gateway Interface – HTTP Cookies – Extending the Web Server – Java – Microsoft's Web Solution Platform – Oracle Internet Platform – Semi structured Data and XML – XML Related Technologies – XML Query Languages

UNIT IV   INTELLIGENT DATABASES   9
Enhanced Data Models For Advanced Applications – Active Database Concepts And Triggers – Temporal Database Concepts – Deductive databases – Knowledge Databases.

UNIT V   TYPES OF DATABASES   9
Mobile Database – Geographic Information Systems – Genome Data Management – Multimedia Database – Parallel Database – Spatial Databases - Database administration – Data Warehousing and Data Mining.

UNIT VI   STATE OF ART/ADVANCES (NOT FOR EXAMINATION)
Information Retrieval - Introduction to Information Retrieval - Indexing for Text Search - Temporal Database - Active and Deductive Databases

TOTAL: 45

TEXT BOOK
1. Thomas M. Connolly, Carolyn E. Begg, "Database Systems - A Practical Approach to Design, Implementation, and Management", 5th Edition, Pearson Education, 2005.

REFERENCES
1. Ramez Elmasri & Shamkant B.Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson Education, 2010.
2. M.Tamer Ozsu, Patrick Ualduriel, "Principles of Distributed Database Systems", 2nd Edition, Pearson Education, 2003.
3. C.S.R.Prabhu, "Object Oriented Database Systems", PHI, 2nd Edition, 2005.

4. Peter Rob and Corlos Coronel, "Database Systems – Design, Implementation and Management", Thompson Learning, Course Technology, 5th Edition, 2003.
5. http://nptel.tvm.ernet.in

| **13CS046** | **PARALLEL COMPUTING** | **3** | **0** | **0** | **3** |

OBJECTIVES
- To identify the scalability and clustering issues and the technology necessary for implementing them.
- To understand the technologies enabling parallel computing.
- To know about different types of interconnection networks.
- To implement different parallel programming models.
- To identify the software support needed for shared memory programming

OUTCOMES
At the end of the course the student should be able to
- Apply the concepts of a Parallel Computer Architecture by creating a parallel program that will maximize the performance of the parallel program
- Design Threads to execute and efficient class of parallel computer architecture
- Analysis the computer performance problems
- Use different Memory management
- Understand message passing concepts

UNIT I   SCALABILITY AND PARALLEISM   9
Evolution of Computer Architecture – Dimensions of Scalability – Parallel Computer Models – Basic Concepts of Clustering – Scalable Design Principles – Parallel Programming Overview – Processes, Tasks and Threads – Parallelism Issues – Interaction / Communication Issues – Semantic Issues in Parallel Programs.

UNIT II   HARDWARE TECHNOLOGIES   9
System Development Trends – Principles of Processor Design – Microprocessor Architecture Families – Hierarchical Memory Technology – Cache Coherence Protocols – Shared Memory Consistency – Distributed Cache Memory Architecture – Latency Tolerance Techniques – Multithreaded Latency Hiding.

UNIT III   SYSTEM INTERCONNECTS   9
Basics of Interconnection Networks – Network Topologies and Properties – Buses, Crossbar and Multistage Switches, Software Multithreading – Synchronization Mechanisms.

UNIT IV   PARALLEL PROGRAMMING   9
Paradigms and Programmability – Parallel Programming Models – Shared Memory Programming.

UNIT V   MESSAGE PASSING PROGRAMMING   9
Message Passing Paradigm – Message Passing Interface – Parallel Virtual Machine.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Cloud and Grid computing - GPUS and Heterogeneous process - Message Passing Interface (MPI) - Single-core optimization.

TOTAL: 45

TEXT BOOK
1. Kai Hwang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw-Hill, New Delhi, 2003.

REFERENCES
1. David E. Culler & Jaswinder Pal Singh, "Parallel Computing Architecture: A Hardware/Software Approach", Morgan Kaufman Publishers, 2010.
2. Michael J. Quinn, "Parallel Programming in C with MPI & OpenMP", Tata McGraw-Hill, New Delhi, 2004.
3. Kai Hwang, "Advanced Computer Architecture" Tata McGraw-Hill, New Delhi, 2003.
4. http://www.ereading.co.uk/chapter.php/143358/205/Tanenbaum_Distributed_operating_systems.html

13CS047   **SOFT COMPUTING**   3   0   0   3

OBJECTIVES
- To study Neural networks.
- To learn the genetic algorithm and fuzzy logic.
- To understand the neuro- fuzzy model of a system.

OUTCOMES
At the end of the course the student should be able to
- Analyze the fundamentals of neural networks applied for imaging
- Use and solve the various optimization techniques and its essentials
- Design the neural based fuzzy system

UNIT I   INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS   9
Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II   GENETIC ALGORITHMS   9
Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

UNIT III   NEURAL NETWORKS   9
Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

UNIT IV   FUZZY LOGIC   9
Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making

UNIT V   NEURO-FUZZY MODELING   9
Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Anomaly Detection, Applications In Signal Processing And Pattern Recognition Using MATLAB, Moving Window Based Neural Models, Modelling And Control Applications, Applications In Computer Grapics, Imaging And Vision

TOTAL: 45

TEXT BOOKS
1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.

3. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.

REFERENCES
1. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
2. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.
3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2007.
4. S.N.Sivanandam, S.N.Deepa, " Introduction to Genetic Algorithms", Springer, 2007.
5. Jacek M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishers, 1992.

SOFTWARE ENGINEERING, CLOUD AND DISTRIBUTED COMPUTING

13IT042   **GRID COMPUTING**   **3   0   0   3**

OBJECTIVES
- To understand resource sharing across networks.
- To integrate heterogeneous computing systems and data resources with the aim of providing a global computing space.
- To understand the technology and tool kits that facilitates the grid computing.

OUTCOMES
At the end of the course the student should be able to
- Utilise grid computing and clustering middleware, such as Parallel Virtual Machine (PVM), Message Passing Interface (MPI), HPC Portals, and Peer-to-Peer networks for implementing virtual super computing resources
- Install a grid computing environment
- Design and implement Grid computing applications using Globus or similar toolkits

UNIT I   CONCEPTS AND ARCHITECTURE   9
Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing-Anatomy and Physiology of Grid-Review of Web Services-OGSA-WSRF.

UNIT II   GRID MONITORING   9
Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE– JAMM - MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridMon

UNIT III   GRID SECURITY AND RESOURCE MANAGEMENT   9
Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS and LSF-Grid Scheduling with 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-First Generation Grid Portals-Second Generation Grid Portals.

UNIT V   GRID MIDDLEWARE   9
List of globally available grid Middlewares - Case Studies-Current version of Globus Toolkit and gLite – Architecture - Components and Features.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Genegrid - Open Molgrid Grid Middleware - ProActive - Unicore - Vishwa- Globus Tool Kit(GTK)-

OpenStack,Open Compute

TOTAL: 45

TEXT BOOK
1. Maozhen Li, Mark Baker, The Grid: Core Technologies, John Wiley & Sons ,2005

REFERENCES
1. Joshy Joseph & Craig Fellenstein, "Grid Computing", PHI, 2004.
2. Ahmar Abbas, "Grid Computing: A Practical Guide to technology and Applications", Charles River media, 2005.
3. Ian Foster & Carl Kesselman, The Grid 2 – Blueprint for a New Computing Infrastructure , Morgan Kaufman – 2004
4. Fran Berman, Geoffrey Fox, Anthony J.G.Hey, Grid Computing: Making the Global Infrastructure a Reality", John Wiley and Sons,2003
5. URLs : www.globus.org and glite.web.cern.ch (Unit V)
6. http://www.cs.kent.edu/~farrell/grid06/lectures/index.html.

13CS061   SOFTWARE QUALITY MANAGEMENT   3   0   0   3

OBJECTIVES
- To study the various hierarchical model for software metric
- To learn different types of documentation in software quality assurance.
- To understand the various aspects in quality control and reliability.
- To study the different ISO 9000 series of quality management standards for software development.

OUTCOMES
At the end of the course the student should be able to
- Design different types of quality measures and standards for web based application.
- Use six sigma concepts for software development
- Analyze Reliability growth models for software quality assessment

UNIT I   INTRODUCTION TO SOFTWARE QUALITY   9
Software Quality – Hierarchical models of Boehm and McCall – Quality measurement – Metrics measurement and analysis – Gilb's approach – GQM Model

UNIT II   SOFTWARE QUALITY ASSURANCE   9
Quality tasks – SQA plan – Teams – Characteristics – Implementation – Documentation – Reviews and Audits

UNIT III   QUALITY CONTROL AND RELIABILITY   9
Tools for Quality – Ishikawa's basic tools – CASE tools – Defect prevention and removal – Reliability models – Rayleigh model – Reliability growth models for quality assessment

UNIT IV   QUALITY MANAGEMENT SYSTEM   9
Elements of QMS – Rayleigh model framework – Reliability Growth models for QMS – Complexity metrics and models – Customer satisfaction analysis.

UNIT V   QUALITY STANDARDS   9
Need for standards – ISO 9000 Series – ISO 9000-3 for software development – CMM and CMMI – Six Sigma concepts.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Role of Statistical Methods in Software Quality – Transforming Requirements into test cases – Trends in

the Quality Assurance Area - Mobile Application Testing - Business Intelligence Testing

TOTAL: 45

TEXT BOOKS
1. Allan C. Gillies, "Software Quality: Theory and Management", Thomson Learning, 2003. (UI: Ch 1-4; UV: Ch 7-8)
2. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education (Singapore) Pte Ltd., 2003. (UI : Ch 3-4; UIII : Ch 5-8 ; UIV : Ch 9-11)

REFERENCES
1. Norman E. Fenton and Shari Lawrence Pfleeger, "Software Metrics" Thomson, 2003
2. Mordechai Ben – Menachem and Garry S.Marliss, "Software Quality", Thomson Asia Pte Ltd, 2003.
3. Mary Beth Chrissis, Mike Konrad and Sandy Shrum, "CMMI", Pearson Education (Singapore) Pte Ltd, 2003.
4. ISO 9000-3 "Notes for the application of the ISO 9001 Standard to software development".

13CS062   **SOFTWARE TESTING**   **3   0   0   3**

OBJECTIVES
- To know and understand different types of testing
- To learn about different testing tools
- To understand the concept of debugging

OUTCOMES
At the end of the course the student should be able
- To implement white box and black box testing
- To test object oriented applications
- To use different testing tools

UNIT I   INTRODUCTION TO SOFTWARE TESTING   **8**
Purpose of testing- Dichotomies- A model for testing-testing levels- unit testing – integration testing-performance testing- regression testing-acceptance testing- field testing- installation testing

UNIT II   BLACK BOX AND WHITE BOX TESTING   **9**
Static and dynamic testing- Equivalence partitioning- data testing- state testing- other black box testing techniques-formal reviews – coding standards and guidelines-code review checklist

UNIT III   HIGHER ORDER TESTING   **9**
Function testing – System testing- test planning and control- test completion criteria- Extreme testing

UNIT IV   SPECIALIZED TESTING   **9**
Object Oriented Testing- System testing – unit testing of classes- testing web applications

UNIT V   DEBUGGING AND TESTING TOOLS   **10**
Debugging Process (brute force , induction , deduction, backtracking , testing) – Debugging principles – Software Testing Tool: An Overview- SQA Robot – Jmeter – Source Code testing utilities (GNU tools, Timing of Programs, Profiler, Code optimization, Productivity tools, portability testing tool)

UNIT VI   STATE OF THE ART /ADVANCES(NOT FOR EXAMINATION)
Test Documentation , Testing roles, Test metrics, Software Quality assurance , Testing certifications

TOTAL: 45

TEXT BOOKS
1. Arun Kumar Khannur, "Software Testing, techniques and applications", 2011, Pearson (Unit I).

2. Ron Patton ,"Software Testing", second edition, Pearson, 2011.(Unit II)
3. Glenford J.Myers, "The art of Software Testing", second edition ,2009, Wiley (Unit III & V)
4. Louise Tamres , "Software Testing", 2003 , Pearson(Unit IV)
5. K.V.K.K. Prasad, "Software Testing Tools",2012, Dreamtech Press(Unit V)

REFERENCES
1. William E.Perry , "Effective methods for Software Testing", second edition , 2005, Wiley
2. Boris Beizer,"Software Testing Techniques", DreamTech Press, 2010.
3. http://www.qaforums.com/
4. http://www.stickyminds.com/
5. http://www.utest.com/resources#caseStudies
6. http://www.testinginstitute.com/
7. http://www.inf.ed.ac.uk/teaching/courses/st/2011-12/Resource-folder/

13CS063   **SERVICE ORIENTED ARCHITECTURE**   **3   0   0   3**

OBJECTIVES
- To understand the importance of Service Oriented Architecture.
- To understand the implementation of SOA in the Java and .NET frameworks.
- To understand the advanced features of SOA.

OUTCOMES
At the end of the course the student should be able
- To implement a service oriented application.
- To design a web service.
- To manage SOA for Business

UNIT I   INTRODUCTION TO SOA   **9**
Introduction – Service Oriented Enterprise – Service Oriented Architecture (SOA) – SOA and Web Services – Multi-Channel Access – Business Process management – Extended Web Services Specifications – Overview of SOA – Concepts – Key Service Characteristics – Technical Benefits – Business Benefits

UNIT II   XML SERVICES   **9**
SOA and Web Services – Web Services Platform – Service Contracts – Service-Level Data Model – Service Discovery – Service-Level Security – Service-Level Interaction patterns – Atomic Services and Composite Services – Proxies and Skeletons – Communication – Integration Overview – XML and Web Services - .NET and J2EE Interoperability – Service-Enabling Legacy Systems – Enterprise Service Bus Pattern

UNIT III   SOA FOR BUSINESS   **9**
Multi-Channel Access – Business Benefits – SOA for Multichannel Access – Tiers – Business Process Management – Concepts – BPM, SOA and Web Services – WSBPEL– Web Services Composition.

UNIT IV   SOA MANAGEMENT   **9**
Metadata Management – Web Services Security – Advanced Messaging – Transaction Management

UNIT V   ADVANCED CONCEPTS   **9**
Designing SOA – Designing web Services for SOA - Writing interoperable WSDL definitions – Challenges – Guidelines - Java EE &.NET integration using web services.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Securing Service oriented systems - Testing of service oriented systems - SOA Modeling - SOA certifications - SOA Quality Assurance - SOA Standards

                                                                        TOTAL: 45

TEXT BOOKS
1. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education, 2005
2. Matjaz B. Juric, Ramesh Loganathan, Poornachandra Sarang, Frank Jennings, "SOA approach to integration", Packt Publishing, 2007. (Unit 5).

REFERENCES
1. William A.Brown, Robert G.Laird, Clive Gee, Tilak Mitra, "SOA Governance Achieving and sustaining Business and IT agility", Pearson Education, 2010.
2. Nicolai M.Josuttis, "SOA in Practice, The art of Distributed System Design", Orielly, 2007.
3. Ben Margolis, "SOA for the Business Developer", SPD, 2007.
4. http://soaschool.com/courses
5. http://www.oracle.com/technetwork/middleware/soasuite/learnmore/default-427190.html
6. http://tutorials.jenkov.com/soa/index.html
7. http://msdn.microsoft.com/en-us/library/bb833022.aspx
8. http://www.ibm.com/developerworks/webservices/library/ws-top10/
9. http://www.pnmsoft.com/resources/bpm-tutorial/soa-tutorial/

13CS064   **COMPONENT BASED TECHNOLOGY**   **3   0   0   3**

OBJECTIVES
- To learn the working of JAVA, COM and .Net Components
- To understand the fundamental properties of components, technology and architecture and middleware.
- To study the concept of Component Frameworks and Development.

OUTCOMES
At the end of the course the student should be able to
- Use knowledge of mathematics, science, and engineering
- Use the techniques, skills, and modern engineering tools necessary for engineering practice
- Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

UNIT I   INTRODUCTION   9
Software Components – Objects – Fundamental Properties Of Component Technology – Modules – Interfaces – Callbacks – Directory Services – Component Architecture – Components And Middleware –Components versus Generative programming

UNIT II   JAVA BASED COMPONENT TECHNOLOGIES   9
Threads – Java Beans – Events and connections – Properties – Introspection – JAR files– Basic Java Services– Reflection – Object Serialization – Java Naïve Interface– Enterprise Java Beans – Distributed Object models – RMI and RMI–IIOP

UNIT III   COM COMPONENT TECHNOLOGIES   9
COM – Distributed COM –DCOM Services –Naming in DCOM –DCOM Activation Framework – Persistence Service and Monikers-Security Services –Transaction Services(MTS) –Messaging Service(MSMQ)– Object Reuse – Interfaces And Versioning – Dispatch Interfaces – Connectable Objects – OLE Containers And Servers

UNIT IV   . NET BASED COMPONENT TECHNOLOGIES   9
.Net Framework – Common Language Infrastructure –Exemplary .NET language-C# –Visual studio .NET–Assemblies -the .NET software components–Common language frameworks – Appdomains – Contexts – Reflection – Remoting–Windows Forms,data,Management–Web Services with .NET

UNIT V   COMPONENT FRAMEWORKS AND DEVELOPMENT   9
Connectors – Contexts – EJB Containers – CLR Contexts And Channels – Black Box Component Framework – Directory Objects – Cross–Development Environment – Component–Oriented Programming – Component Design And Implementation Tools – Testing Tools – Assembly Tools – Component System Diagnosis and Maintenance.

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Com+ : The Next Generation, Component based   implementation technologies–XPCOM–XPLC– UNO–Component based Software Framework – ESMF – SOAP IDL–Web Services – REST–Zope

TOTAL: 45

TEXT BOOKS
1. Clemens Szyperski, "Component Software: Beyond Object–Oriented Programming", Pearson Education publishers, 2011
2. Ed Roman, "Mastering Enterprise Java Beans3.0", John Wiley & Sons Inc., 2006
3. G.Sudha Sadasivam,"Component Based Technology", Wiley India,2008

REFERENCES
1. Mowbray, "Inside CORBA", Pearson Education, 2003.
2. Freeze, "Visual Basic Development Guide for COM & COM+", BPB Publication, 2001.
3. Hortsamann, Cornell, "CORE JAVA Vol–II" Sun Press, 2002.
4. http://www.earthsystemmodeling.org
5. http://www.oracle.com/technetwork/articles/javase/index–137171.html

13CS065   DISTRIBUTED COMPUTING   3   0   0   3

OBJECTIVES
- To differentiate between distributed computing system, Network operating systems and time distributed systems
- To know about Communications in distributed systems with RPC
- To know about the general architecture, design and implementation issues of Distributed shared memory
- To gain knowledge about distributed DBMS architecture and distributed file system

OUTCOMES
At the end of this course, students should be able to
- Understand major issues related to the design of a distributed system
- Design and implement prototypical distributed computing applications
- Analyze the security issues for building, deploying and managing distributed computer systems
- Understand Remote procedure call(RPC) model and its communications
- Design and implementation of Distributed shared memory

UNIT I   INTRODUCTION TO DISTRIBUTED COMPUTING SYSTEM   9
Introduction - Hardware concepts - Switched Multiprocessor – Bus based Multicomputers - Switched Multicomputer - Software concepts - Network Operating Systems -True distributed systems. Design Issues: Transparency - Flexibility - Reliability - Performance and scalability

UNIT II   REMOTE PROCEDURE CALL   9
RPC - Communications in Distributed systems - The client/ server model - Implementation – RPC model - Implementing RPC mechanism - Communication protocols for RPCs - Exception handling - special types of RPC - Stub generation - Client - server binding - exception handling - RPC in heterogeneous environments.

UNIT III   SYNCHRONIZATION AND DISTRIBUTED SHARED MEMORY   9
General architecture of Distributed shared memory - Design and implementation issues of DSM - Granularity - Thrashing- structure of shared memory space - Advantages of DSM – synchronization in distributed systems - Clock synchronization - mutual exclusion - election algorithms – Atomic transactions - Deadlock distributed system- Threads - Thread usage and implementation of thread packages - processor allocation.

UNIT IV   DISTRIBUTED FILE SYSTEM AND SECURITY   9
File service interface - Semantics of file sharing-Security Introduction-Potential Attacks to Computer Systems-Cryptography - Authentication

UNIT V   DISTRIBUTED DATABASES   9
Distributed DBMS architecture - Sorting data in a distributed DBMS - Distributed catalog management - Distributed query processing - Updating distributed data - Distributed transaction management - Distributed concurrency control - Recovery.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
 No SQL – Big Data – Multicore Architecture - Distributed Operating system.

TOTAL: 45

TEXT BOOKS
1. Andrew S. Tannenbaum, "Distributed Operating systems", Pearson Education, 2011.
2. Pradeep K.Sinha, "Distributed Operating Systems Concepts and Design", PHI, 2007.
3. Raghu Ramakrishnan, "Data base management systems", McGraw Hill, 2007.

REFERENCES
1. G. R. Andrews, "Distributed systems", 2002
2. Mukesh Singal and Shivaratu N.G., "Advanced Concepts in Operating Systems", McGraw Hill, Newyork, 2001.
3. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems, Concepts and Design", 2nd Edition, Pearson Education, 2000.
4. http://www.ereading.co.uk/chapter.php/143358/205/Tanenbaum_Distributed_operating_sys tems.html
5. http://www.cs.rutgers.edu/~pxk/417/notes/deadlock.html
6. http://www.cs.rutgers.edu/~pxk/rutgers/notes/content/04-dfs-intro-slides-6up.pdf
7. http://www.cs.uic.edu/~ajayk/Chapter10.pdf

13CS067   E-COMMERCE   3   0   0   3

OBJECTIVES
- To recognize how information technologies (IT) influence businesses and how they provide competitive advantages.
- To gain knowledge about various electronic payment methods.
- To identify desirable properties of secure communication and ways to achieve them.
- To know about management's role in information security

OUTCOMES
At the end of the course the student should be able to
- Analyze the impact of E-commerce on business models and strategy
- Use critical thinking, problem-solving, and decision-making skills in evaluating e-commerce technologies.
- Assess electronic payment systems
- Analyze e-commerce concepts and terminology, and the processes and management decisions that are involved in launching, operating and managing business activity on the World Wide Web

UNIT I   INTRODUCTION TO E-COMMERCE   8
Networks and Commercial Transactions - Internet and Other Novelties - Electronic Transactions Today - Commercial Transactions - Establishing Trust - Internet Environment - Internet Advantage -World Wide Web.

UNIT II   SECURITY TECHNOLOGIES   9
Why Internet Is Unsecured - Internet Security Holes - Cryptography: Objective - Codes and Ciphers - Breaking Encryption Schemes - Data Encryption Standard - Trusted Key Distribution and Verification - Cryptographic Applications - Encryption - Digital Signature – Non repudiation and Message Integrity.

UNIT III   ELECTRONIC PAYMENT METHODS   9
Traditional Transactions : Updating - Offline and Online Transactions - Secure Web Servers -Required Facilities - Digital Currencies and Payment Systems - Protocols for the Public Transport - Security Protocols - SET - Credit Card Business Basics.

UNIT IV   ELECTRONIC COMMERCE PROVIDERS   9
Online Commerce Options - Functions and Features - Payment Systems: Electronic, Digital and Virtual Internet Payment System - Account Setup and Costs - Virtual Transaction Process -InfoHaus - Security Considerations – Cyber Cash: Model - Security - Customer Protection – Client Application - Selling through Cyber Cash.

UNIT V   ONLINE COMMERCE ENVIRONMENTS   10
Servers and Commercial Environments - Payment Methods - Server Market Orientation – Netscape Commerce Server - Microsoft Internet Servers - Digital Currencies - Dig Cash - Using E-cash – Ecash Client Software and Implementation - Smart Cards - The Chip - Electronic Data Interchange -Internet Strategies, Techniques and Tools

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Agent Based E-Commerce Systems - E-Business Models - Electronic Auctions - E-Servicing – E bxml – Edi-Smart Cards – E-Marketing.

TOTAL: 45

TEXT BOOK
1. Pete Loshin, "Electronic Commerce", 4th Edition, Firewall media, An imprint of laxmi publications Pvt. Ltd., New Delhi, 2004.

REFERENCES
1. Jeffrey F.Rayport and Bernard J. Jaworski, "Introduction to E-Commerce", 2nd Edition, Tata Mc-Graw Hill Pvt., Ltd., 2003.
2. Green stein, "Electronic Commerce", Tata Mc-Graw Hill Pvt., Ltd., 2000.
3. http://www.tutor2u.net/blog/index.php/business-studies/C165
4. http://manajntu.com/e-commerce-book-notesstudy-materials/

13CS068   CLOUD COMPUTING   3   0   0   3

OBJECTIVES
- To understand basic architecture and service models of cloud computing
- To understand the concepts of Virtualization and Cloud architecture
- To study cloud platforms and applications

OUTCOMES
At the end of the course the student should be able to
- Analyze the problems and solutions to cloud application development.
- Apply principles of best practice in cloud application design and management.
- Design cloud applications and assess their importance

UNIT I   INTRODUCTION TO CLOUD COMPUTING   9
Vision of cloud computing – Defining a cloud – Cloud computing reference model –Characteristics
and benefits – Challenges   –   Historical developments: Distributed systems, Virtualization, Web 2.0,
Service – oriented computing, Utility – oriented computing   –   Building cloud computing environments:
Application development, Infrastructure and system development, Computing platforms and
technologies

UNIT II   VIRTUALIZATION   9
 Characteristics of virtualized environments – Taxonomy of virtualization techniques Virtualization and
cloud computing – Pros and cons of virtualization – Technology examples: Xen: Para virtualization,
VMware: full virtualization, Microsoft Hyper – V.

UNIT III   CLOUD COMPUTING ARCHITECTURE AND SERVICES   9
Cloud reference model – Architecture – Infrastructure – and hardware as a service – Platform as a
service – Software as a service – Types of clouds: Public, Private, Hybrid, Community Clouds –
Economics of the cloud – Open Challenges

UNIT IV   USING CLOUD SERVICES   9
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   INDUSTRIAL PLATFORMS AND NEW DEVELOPMENTS   9
Cloud Platforms in Industry: Amazon web services – Amazon EC2, Amazon S3 – Google AppEngine,
– Third Party Cloud Services: MetaCDN, SpotCloud– Cloud Applications :Healthcare, Business and
Consumer Applications

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)
Energy efficient and green cloud computing architecture – Cloud and Big Data Analytics –   Social
Networking-Open Stack-Open Compute.

                                                                                                                TOTAL: 45

TEXT BOOKS
    1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, "Mastering Cloud Computing", Tata
          McGraw Hill, New Delhi, India, 2013.
    2. Michael Miller, " Cloud Computing", Pearson Education, New Delhi, 2009

REFERENCES
    1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel
          Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
    2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and
          Security", CRC Press, 2010.
    3. Toby Velte, Anthony Velte and Robert Elsenpeter "Cloud Computing – A Practical Approach", Tata
          McGraw Hill, 2010.
    4. Jeorge Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the
          Cloud", O'Reilly Applications, 2009.
    5. www.manjrasoft.com
    6. www.openstack.org
    7. www.eucalyptus.com

GENERAL

13GE001   **INTELLECTUAL PROPERTY RIGHTS**   **3 0 0 3**

OBJECTIVES
- To learn about the patents and intellectual property rights
- To understand professional and ethical responsibility

OUTCOMES
At the end of the course the student should be able to
- Evaluate the various process for applying patents and intellectual property rights
- Use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Know the method of applying for patents, copyrights, trademarks.

UNIT I   INTRODUCTION TO CREATIVITY/INTELLECTUAL PROPERTY   9
Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property).

UNIT II   COMPONENTS   9
IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated Circuits – Protection of Geographical Indications at national and International levels – Application Procedures.

UNIT III   POLICIES AND REGULATION   9
International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).

UNIT IV   LEGISLATIONS   9
Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V   CASE STUDIES   9
Case Studies on Patents, Copyright and related rights, Trade Marks, geographic indications, Protection against unfair competition (General and department specific) – Basmathi Case study

UNIT VI   STATE-OF-THE-ART/ADVANCES (NOT FOR EXAMINATION)
Intellectual Property Trends and Developments in China - The Securitization of Intellectual Property Assets - Protecting Intellectual Property Rights in a Global Economy: Current Trends and Future Challenges- IPR and Human Rights.

TOTAL: 45

TEXT BOOKS
1. Subbaram N.R, S.Viswanathan "Handbook of Indian Patent Law and Practice", (Printers and Publishers) Pvt. Ltd., 1998.
2. Eli Whitney, United States Patent Number: 72X, Cotton Gin.

REFERENCES
1. Susan K.Sell, "Private power, public law: The globalization of intellectual property rights", (Cambridge studies in International relations), Cambridge university press, 2003.
2. Dr.B.L.Wadehra, "Law relating to Intellectual property", Edition 4, University law publishing company pvt ltd, 2010.

WEBSITES
1. ubiquity.acm.org

2. www.astratech.com
3. www.uspto.gov

13GE002   **TOTAL QUALITY MANAGEMENT**   **3   0   0   3**

OBJECTIVES
- To study various concepts of Quality Management.
- To understand the types of Quality management tools.
- To learn analyzing quality of organizations using Management tools and suggests implement able solutions to those.

OUTCOMES
At the end of the course the student should be able to
- Use quality management philosophies and frameworks in real world scenarios.
- Analyze and use various tools and techniques of quality management in both manufacturing and service industry
- Solve the quality management issues in the industry and organizations using the management tools.

UNIT I   INTRODUCTION TO QUALITY MANAGEMENT   **9**
Need for Quality-Evaluation of Quality-Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT II   TQM PRINCIPLES   **9**
Leadership, Strategic Quality Planning, Quality Statement, Customer satisfaction - Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement - Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement - Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership - Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures - Basic Concepts, Strategy, Performance Measure.

UNIT III   STATISTICAL PROCESS CONTROL (SPC)   **9**
The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT IV   TQM TOOLS   **9**
Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) - House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) - Concept, Improvement Needs and FMEA – Stages of FMEA.

UNIT V   QUALITY SYSTEMS   **9**
Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System - Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 - Concept, Requirements and Benefits.

UNIT VI   STATE OF THE ART /ADVANCES(NOT FOR EXAMINATION)
Pie charts – Histograms - Run chart - Pareto charts - Force field Analysis - Focus Groups - Brainstorming & Affinity Diagrams - Tree Diagrams - Flowcharts and modeling diagrams - Scatter diagrams - Relations Design - Root Cause Analysis - Fishbone Diagram
                                                                         TOTAL: 45

TEXT BOOK
1. Dale H.Besterfiled, et al., "Total Quality Management", 3rd Edition, Pearson Education, Inc. 2011

REFERENCES
1. James R.Evans & William M.Lidsay, The Management and Control of Quality, 6th Edition, South-Western (Thomson Learning), 2010 (ISBN 0-324-06680-5).
2. V.Narayana and N.S.Sreenivasan, "Managing Quality: Concepts & Tasks", 1st Edition, New Age International, 2005.
   Feigenbaum.A.V. "Total Quality Management, 3rdedition,McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management text with testcases",3rd edition, Butterworh Heinemann Oxford Ltd,2011.
4. Zeiri. "Total Quality Management for Engineers", Wood Head Publishers, 1991.
5. www.learningace.com/doc/total-quality-management
6. freevideolectures.com/Course/2688/Human...Management
7. http://www.school-for-champions.com/tqm/resources.htm

13GE004   PROFESSIONAL ETHICS AND HUMAN VALUES   3   0   0   3

OBJECTIVES
- To understand the importance of engineering ethics in an organizational setting.
- To learn the various ethics and human values in workplace.
- To understand the features of moral reasoning, moral explanations and the role of moral theories.

OUTCOMES
At the end of the course the student should be able to
- Analyze professional ethics and responsibilities.
- Practice professional responsibilities and rights.
- Solve moral dilemmas faced by professionals using ethical values.

UNIT I   HUMAN VALUES   9
Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality

UNIT II   ENGINEERING ETHICS   9
Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas – moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT III   ENGINEERING AS SOCIAL EXPERIMENTATION   9
Engineering as experimentation - engineers as responsible experimenters - codes of ethics – a balanced outlook on law - the challenger case study

UNIT IV   SAFETY, RESPONSIBILITIES AND RIGHTS   9
Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island and Chernobyl case studies. Collegiality and loyalty - respect for authority – collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights – employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT V   GLOBAL ISSUES   9
Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors –moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE),India, etc

UNIT VI   STATE OF THE ART/ADVANCES (NOT FOR EXAMINATION)

Ethics in IT industries – Behavior of Software engineering in Society – Growth and Ethics inter dependence in the industry world

TOTAL: 45

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York, 2005
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available).
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
5. www.edunotes.in

13CS081   MANAGEMENT INFORMATION SYSTEMS   3   0   0   3

OBJECTIVES

- To have an understanding of Information system and organization.
- To be able to analyze system structure.
- To know the various applications of Information System.
- To make the students to get familiarized with development and maintenance of Information systems.

OUTCOMES

At the end of the course the student should be able to

- Define the concepts and definition of the information systems
- Differentiate between several types of information system
- Identify the threats of information security also protect information resources
- Differentiate between transaction processing system and functional area information system
- Analyse to protect information system

UNIT I   INFORMATION SYSTEM AND ORGANIZATION   9

Matching the information system plane in to the organizational strategic plan – identifying key Organizational Objective and processes and Developing an information System Development – User role in Systems Development process – Maintainability and Recoverability in System Design.

UNIT II   REPRESENTATION AND ANALYSIS OF SYSTEM STRUCTURE   9

Models for Representing Systems Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics – Decomposition and aggregation – Information architecture – Application of System Representation to Case Studies.

UNIT III   SYSTEMS, INFORMATION AND DECISION THEORY   9

Information theory – Information content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty – Identifying information needed to support to decision Making – Human Factors – problem characteristics and Information System Capabilities in Decision Making.

UNIT IV   INFORMATION SYSTEM APPLICATION   9

Transaction Processing Application – Basic Accounting Application – Applications for Budgeting and planning – other use of information Technology: Automation – Word processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – Systems and Selection – Cost Benefit –Centralized vs.

Decentralized Allocation Mechanism.

UNIT V   DEVELOPMENT AND MAINTANANCE OF INFORMATION SYSTEMS   9
Systems Analysis and Design – System development life cycle – Limitation – End user development – Managing End users of the shelf software packages – Outsourcing – Comparison of different methodologies.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
MIS Tools, Power Management Information, Trends In Information Technology Systems, Sub-Systems Of Management Information Systems.

TOTAL: 45

TEXT BOOKS
1. K.C. Laudon, J.P. Laudon,"Management Information Systems: Managing the Digital Firm", Pearson Education, 2011.
2. K.C. Laudon, J.P. Laudon,"Management Information Systems-Organization and Technology in the Networked Enterprise", 6th Edition, Prentice Hall, 2000.

REFERENCES
1. E.F.Turban, R.K.Turban, R.E.Potter,"Introduction to Information Technology", 2004.
2. Jeffrey A. Hoffer, Joey F. George and Joseph S.Valachich,"Modern System analysis and Design", 5th Edition, Pearson education, 2009.
3. http://nptel.tvm.ernet.in

13CS082   SYSTEMS MODELING AND SIMULATION   3 0 0 3

OBJECTIVES
- To understand types of simulation
- To understand different types of Mathematical models
- To analyze the simulated data
- To verify and validate the Mathematical models
- To understand Simulation Programming languages

OUTCOMES
At the end of the course the student should be able to
- Classify various simulation models and give practical examples for each category
- Construct a model for a given set of data and motivate its validity
- Generate and test random number variates and apply them to develop simulation models
- Analyze output data produced by a model and test validity of the model

UNIT I   INTRODUCTION TO SIMULATION   9
Introduction – Simulation Terminologies - Application areas – Model Classification –Types of Simulation - Steps in a Simulation study - Concepts in Discrete Event Simulation - Simulation Examples

UNIT II   MATHEMATICAL MODELS   9
Statistical Models - Concepts – Discrete Distribution- Continuous Distribution – Poisson Process-Empirical Distributions - Queuing Models – Characteristics - Notation – Queuing Systems – Markovian Models - Properties of random numbers - Generation of Pseudo Random numbers - Techniques for generating random numbers -Testing random number generators- Generating Random – Variates - Inverse Transform technique – Acceptance - Rejection technique – Composition & Convolution Method.

UNIT III   ANALYSIS OF SIMULATION DATA   9
Input Modeling - Data collection - Assessing sample independence – Hypothesizing distribution family with data - Parameter Estimation - Goodness-of-fit tests – Selecting input models in absence of data - Output analysis for a Single system – Terminating Simulations – Steady state simulations.

UNIT IV   VERIFICATION AND VALIDATION   9
Model Building – Verification of Simulation Models – Calibration and Validation of Models – Validation of Model Assumptions – Validating Input – Output Transformations.

UNIT V   SIMULATION OF COMPUTER SYSTEMS AND CASE STUDIES   9
Simulation Tools – Model Input – High level computer system simulation – CPU –Memory Simulation – Comparison of systems via simulation – Simulation Programming techniques - Development of Simulation models.

UNIT VI   STATE OF THE ART/ADVANCES(NOT FOR EXAMINATION)
Simulation of inventory system - Manual simulation using event scheduling - Markov models for multiple bus multiprocessor systems - system modeling in software engineering - system modeling in ATM - system modeling in Microwave oven

TOTAL: 45

TEXT BOOKS
1. Jerry Banks and John Carson, "Discrete Event System Simulation", Fifth Edition, PHI, 2010.
2. Geoffrey Gordon, "System Simulation", Second Edition, PHI, 2006 (Unit – V).

REFERENCES
1. Frank L. Severance, "System Modeling and Simulation", Wiley, 2011.
2. Averill M. Law and W.David Kelton, "Simulation Modeling and Analysis, Third Edition, McGraw Hill, 2006.
3. Jerry Banks, "Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice", Wiley, 1998.
4. http://www.slideshare.net/qwerty626/system-simulation-modeling-notessjbit
5. http://www.cs.ccsu.edu/~stan/classes/CS530/Slides11/Ch5.pdf
6. http://www.slideshare.net/koolkampus/system-models-in-software-engineering-se7
7. http://www.ics.uci.edu/~taylor/ics52_fq01/2-sommerville.pdf