B.Tech

M.G University

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

Department of Computer Science & Engineering

RSET Vision

To evolve into a premier technological and research institution, moulding eminent professionals with creative minds, innovative ideas and sound practical skill, and to shape a future where technology works for the enrichment of mankind.

RSET Mission

To impart state-of-the-art knowledge to individuals in various technological disciplines and to inculcate in them a high degree of social consciousness and human values, thereby enabling them to face the challenges of life with courage and conviction.

Department Vision

To become a Centre of Excellence in Computer Science & Engineering, moulding professionals catering to the research and professional needs of national and international organizations.

Department Mission

To inspire and nurture students, with up-to-date knowledge in Computer Science & Engineering, ethics, team spirits, leadership abilities, innovation and creativity to come out with solutions meeting the societal needs.

PROGRAM SPECIFIC OUTCOMES (PSOs)

A graduate of the Computer Science and Engineering Program will demonstrate:

PSO1: Computer Science Specific Skills:

- The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of computer science and thereby engage in national grand challenges.

PSO2: Programming and Software Development Skills

- The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry.

PSO3: Professional Skills:

- The ability to apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **(Level 3)**

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **(Level 6)**

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. **(Level 6)**

4. **Conduct investigations of complex problems:** Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **(Level 5)**

5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. **(Level 6)**

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice. **(Level 5)**

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. **(Level 3)**

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. **(Level 3)**

9. **Individual and Team work:** Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings. **(Level 3)**

10. **Communication:** Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions. **(Level 6)**

11. **Project management and finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments. **(Level 5)**

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change. **(Level 5)**

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MAHATMA GANDHI UNIVERSITY

COURSE REGULATIONS OF B.TECH. DEGREE COURSES (REVISED)

(WITH EFFECT FROM 2010 ADMISSIONS)

1. CONDITIONS FOR ADMISSIONS

Candidates for admission to the B.Tech. Engineering degree course shall be required to have passed the Higher Secondary Examination of State Board of Kerala or 12th Standard V.H.S.E., C.B.S.E., I.C.S.E. or examinations recognized equivalent by any Universities of Kerala thereto with mathematics, physics and chemistry as optional subjects, with 50% marks in Mathematics and 50% marks in Physics, Chemistry, and Mathematics put together. Candidates belonging to scheduled caste and scheduled tribe need only a pass in the qualifying examination.

Candidates have to qualify the State Level Entrance examination conducted by the Commissioner of Entrance Examinations or State level/National level Entrance Examination approved by the Government of Kerala as equivalent. They shall also satisfy the conditions regarding age and physical fitness as prescribed by the Mahatma Gandhi University.

Criteria for selection and method of admission to merit/management seats for Engineering degree courses conducted by Government/Aided/Self-financing colleges affiliated to Mahatma Gandhi University shall be governed by the rules/regulations framed by the Commissioner of Entrance Examinations or other competent authority appointed by the Government of Kerala, in consultation with the University and without contravening with the stipulation of the All India Council for Technical Education (AICTE). In all matters related to selection and admission, the decisions of the University shall be final. The students admitted by affiliated colleges violating the above regulations will not be eligible for registration to University Examinations and contravention of the regulations shall lead to withdrawal/suspension of affiliation.

2. ADMISSION TO DIPLOMA HOLDERS

A candidate who has a diploma in engineering awarded by the State Board of Technical Examination or an examination recognized equivalent by the State Board of Technical Education after undergoing regular course of 3 years in an institute approved by AICTE, securing a cumulative minimum of 50% marks in the second and third years diploma examination shall be eligible to be admitted to the first year B.Tech. programme of the Mahatma Gandhi University (hereafter, the University, unless otherwise specified) if he/she has qualified the entrance examination conducted by the Commissioner of

Entrance Examinations or State level/National level Entrance Examination approved by the Government of Kerala as equivalent.

Diploma holders with 60% marks (50% in case of SC/ST) are also eligible for admission to the 3rd semester (regular full-time batch) engineering degree course (B.Tech.) under the lateral entry scheme provided they qualify the Entrance Examination conducted for the lateral entry scheme by the state Government. These students are not required to study any deficiency papers of the combined first and second semesters.

Admission of all candidates under the lateral entry scheme shall be completed latest by commencement of 3rd semester classes.

3. SUBJECTS OF STUDY

The subjects of study, both theory and practical, shall be in accordance with the prescribed scheme and syllabi of each branch of study.

4. DURATION OF THE COURSE

The course for the B.Tech degree shall extend over a period of four academic years comprising of eight semesters. The first and second semesters shall be combined; the scheme and syllabi for combined first and second semesters (S_1&S_2) will be common for all branches of study. The maximum duration permissible for taking the B.Tech. Degree is fixed as 8 years. For lateral entry students maximum duration permissible for taking the B.Tech. Degree is fixed as 7 years.

Classes of combined first and second semesters shall be started latest by 1st August in all affiliated engineering colleges of Mahatma Gandhi University; however admission to first year shall be completed by 31st August.

The minimum number of working days in combined first and second semesters shall be 150 days. In 3rd to 8th semesters, there shall be minimum 90 working days.

5. BRANCHES OF STUDY

1. Civil Engineering (CE)

2. Mechanical Engineering (ME)

3. Electrical and Electronics Engineering (EE)

4. Electronics and Communication Engineering (EC)

5. Electronics & Instrumentation Engineering (EI)

6. Instrumentation and Control Engineering (IC)

7. Applied Electronics and Instrumentation Engineering (AI)

8. Computer Science and Engineering (CS)

9. Information Technology (IT)

10. Polymer Engineering (PO)

11. Automobile Engineering (AU)

12. Aeronautical Engineering (AN)

13. Production Engineering (PE)

6. COURSE CALENDAR

The course calendar, published by the University, shall be followed by all affiliated engineering colleges. Within a week after the commencement of classes of each semester, Head of each Institution should forward the list of faculty members working in the college along with their qualification and years of teaching experience, to the University. This is a mandatory requirement which should be strictly followed by Head of each Institution. Head of each Institution shall ensure the availability of sufficient number of regular faculty members having experience and qualifications (as per AICTE guidelines) in the institution.

7. ASSESSMENT OF STUDENTS

Assessment of students for each subject will be done by internal continuous assessment and Semester-End examinations. Internal assessment shall be conducted throughout the semester. It shall be based on internal examinations, assignments (such as home work, problem solving, group discussions, quiz, literature survey, seminar, term project, software exercises, etc.) as decided by the faculty handling the course, and regularity in

the class. Assignments of every semester shall preferably be submitted in Assignment Book, which is a bound book similar to laboratory record.

Semester-End examinations of theory and practical subjects will be conducted by the University. Semester-End examinations of combined first and second semesters and 3rd to 6th semesters will be conducted only once in a year; failed or improvement candidates will have to appear for the Semester-End examinations along with regular students. However, Semester-End examinations of 7th and 8th semesters will be conducted once in every semester. Head of institution should take necessary steps to prevent any malpractices in the Semester-End examinations. If any such instances are detected, they should be reported to the University without any delay.

Internal assessment marks of each theory subject should have a class average limited to 80%. If the class average of internal assessment marks of any theory subjects is greater than 80%, existing normalization procedure should be applied to limit it to 80%. If the class average is not greater than 80%, absolute marks should be given.

For practical subjects, internal assessment marks and Semester-End examination marks individually should have a class average limited to 80%. If the class average of internal assessment marks or Semester-End examination marks of practical subjects is greater than 80%, the existing normalization procedure should be applied to limit the class average to 80%. If it is not greater than 80%, absolute marks should be given.

All the students in the nominal roll of the class on the closing day of semester should be considered for normalization of internal marks. All the students who have passed the Semester-End practical examination should be considered for normalisation of marks of Semester-End practical examinations.

Internal assessment marks of theory and practical subjects, both absolute and normalised, should be published in the college 10 days before sending it to the University so as to enable the students to report any corrections.

(a) Assessment in Theory Subjects

The marks allotted for internal continuous assessment and Semester-End university examinations shall be 50 marks and 100 marks respectively with a maximum of 150 marks for each theory subject.

The weightage to award internal continuous assessment marks should be as follows:

Test papers (minimum two) – 60%

Assignments (minimum two) such as home assignments, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

– 20%

Regularity in the class – 20%

The sessional marks awarded for attendance shall be awarded in direct proportion to the percentage of attendance secured by the candidate in the subject. Full credit for regularity in the class can be given only if the candidate has secured minimum 90% attendance in the subject.

(b) Assessment in Practical Subjects

Internal continuous assessment and Semester-End practical examinations will have weightage in the student's performance of practical subjects, with 50 marks allotted for internal continuous assessment and 100 marks for Semester-End examinations.

The weightage to award internal continuous assessment marks should be as follows:

Test papers – 30%

Regular work/drawing/workshop record/lab record/Class performance – 50%

Regularity in the class – 20%

An external examiner and an internal examiner, appointed by the University, shall conduct the Semester-End examinations of practical subjects. These examiners should necessarily have minimum two years teaching experience at engineering degree level.

Award of marks in the Semester-End practical examinations (except Project) should be as follows:

Viva voce – 30%

Procedure and tabulation form, Conducting experiment, results and inference – 70%

No candidate will be permitted to attend the Semester-End practical examinations unless he/she produces certified record of the laboratory.

Strict measures will be taken by the University to monitor the laboratory facilities, laboratory experiments conducted, standard of Semester-End practical examinations, etc. in every affiliated engineering college. In this regard, an expert team comprising of at least three subject experts from government/government-aided engineering colleges from within/outside the University shall be formulated to assess these aspects in affiliated engineering colleges. This expert team should visit each engineering college at least once in a semester and submit a detailed report to the University regarding the laboratory facilities, laboratory experiments conducted, and standard of Semester-End practical examinations in each college.

8. PATTERN OF QUESTIONS FOR SEMESTER-END EXAMINATIONS OF THEORY SUBJECTS

The question papers of Semester-End examinations of theory subjects shall be able to perform achievement testing of the students in an effective manner. The question paper shall be prepared

(a) covering all sections of the course syllabus

(b) unambiguous and free from any defects/errors

(c) emphasizing knowledge testing, problem solving & quantitative methods

(d) containing adequate data/other information on the problems assigned

(e) having clear and complete instructions to the candidates.

Duration of Semester-End examinations will be 3 hours. The pattern of questions for theory subjects shall be as follows:

PART A: Short answer questions (one/two sentences) 5 x 3 marks=15 marks

All questions are compulsory. There should be at least one question from each module.

PART B: Analytical/Problem solving questions 5 x 5 marks=25 marks

All questions are compulsory. There should be at least one question from each module.

PART C: Descriptive/Analytical/Problem solving questions 5 x 12 marks=60 marks

Two questions from each module with choice to answer one question.

Maximum Total Marks: 100

Weightage for categories such as problem solving, descriptive, drawing, or diagrammatic questions shall be specified along with the syllabus of any subject, if necessary. Model question paper shall be prepared for each subject at the time of framing the syllabus. This same model question paper along with the syllabus must be sent to the question-paper setter every time for framing the questions. The model question paper shall be made available to students.

It is permitted to have an entirely different pattern of questions especially for subjects involving drawing, design, etc. However, the modified pattern to be followed shall be clearly specified along with the syllabus of the particular subject. All question paper setters should supplement the scheme and key for the evaluation

9. MINIMUM FOR PASS

A candidate shall be declared to have passed in an individual subject of a semester examination if he/she secures not less than 40% marks for the subject in the university examination and not less than 50% of the total marks of the subject *i.e. university examination marks and sessional marks in that subject put together.*

A candidate shall be declared to have passed in a semester examination in full in first appearance (first registration is considered as first appearance) if he satisfies the above criteria for each theory and practical subject.

Candidates will be assigned grades according to the marks scored.

For Seminar, Project, and Viva Voce (in 8th semester), the minimum for a pass shall be 50% of the total marks assigned to the respective examination.

If a candidate has passed all examinations of B.Tech. course (at the time of publication of results of eighth semester) except Viva-Voce in the eighth semester, a re-examination for the Viva-Voce should be conducted within one month after the publication of results. Each candidate should apply for this 'Save a Semester examination' within one week after the publication of eighth semester results.

10. CREDIT SYSTEM

Each subject shall have a certain number of credits assigned to it depending upon the academic load and the nature and importance of the subject. The credit associated with each subject will be shown in the prescribed scheme and syllabi. Each course shall have an integer number of credits, which reflects its weightage.

11. GRADING

The university shall award the letter grade to students based on the marks secured by them in both internal assessment and Semester-End examinations taken together in the subjects registered. Each letter grade indicates a qualitative assessment of the student's performance and is associated with a specified number of grade points. The grading system along with the grade points for each grade, applicable to passed candidates is shown below. All passed candidate will be allotted a grade S, A, B, C, D, or E according to the total marks scored by him/her.

If a candidate does not pass a subject as per the conditions given in Section (9), he/she will be assigned an Unsatisfactory grade 'U' irrespective of his/her total marks. If a student does not pass a subject in two attempts, the maximum grade he/she can get is

'C' when he/she passes the subject in any subsequent examination, whatever be the marks scored by him/her.

A student is considered to have completed a subject successfully and earned the credits if he/she secures a letter grade other than 'U' in that course. Letter grade 'U' has zero grade point and the candidate has to write the examination again to improve the grade. A

student's performance is measured by the number of credits that he/she has earned and by the cumulative grade point average (CGPA) maintained by him/her.

Total marks scored by the passed candidate	**Corresponding Grade allotted**	**Grade Points**
136-150	S	10
121-135	A	`9.0
106-120	B	8.0
91-105	C	7.0
83-90	D	6.0
75-82	E	5.5

Failed	U	0.0

12. SEMESTER GRADE POINT AVERAGE (SGPA) AND CUMULATIVE GRADE POINT AVERAGE (CGPA)

(a) A Semester Grade Point Average (SGPA*)* shall be computed for all the students for each semester, as follows:

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

where, n is the number of subjects registered during the semester, C_i is the number of credits allotted to i^{th} subject as per the scheme, and G_i is the grade points corresponding to the grade awarded to the student for the subject.

(b) A Cumulative Grade Point Average (CGPA) shall be computed for all the students at the end of each semester by taking into consideration their performance in the present and the past semesters as follows:

$$CGPA = \frac{\sum_{i=1}^{m} C_i G_i}{\sum_{i=1}^{m} C_i}$$

where, m is the number of courses registered up to that semester, C_i is the number of credits allotted to i^{th} subject as per the scheme, and G_i is the grade points corresponding to the grade awarded to the student for the subject.

An up-to-date assessment of overall performance of a student is obtained by calculating CGPA. CGPA is weighted average of the grade points obtained in all the subjects registered by the students since he entered the B.Tech. course.

(c) Both the SGPA and CGPA shall be rounded off to the second place of decimal and recorded as such for ease of presentation. Whenever the CGPAs are to be used for the purpose of determining the merit ranking in a group of students, only the rounded off values shall be made use of.

13. IMPROVEMENT

Candidates shall be allowed to improve the grade of any two theory subjects in a semester. This can be done only in the immediate subsequent chance. If the candidate gets more marks in the improvement chance, marks scored in the improvement chance will be considered for grading in the subject; otherwise marks scored in the first attempt will be retained. No candidate shall be permitted to improve the marks scored in practical examinations and internal continuous assessment.

14. ATTENDANCE

A candidate shall be permitted to appear for the Semester-End examinations only if he/she satisfies the following requirements:

(a) He/she must secure not less than 75% attendance in the total number of working periods during the first year and in each semester thereafter; and shall be physically present for a minimum of 60% of the total working periods. In addition, he/she also shall be physically present in at least 20% of total attendance for each subject.

(b) He/she must earn a progress certificate from the head of the institution stating that he/she has satisfactorily completed the course of study prescribed in the semester as required by these regulations.

(c) His/her conduct must be satisfactory

It shall be open to the Vice Chancellor to grant condonation of shortage of attendance on the recommendation of the head of the institution in accordance with the following norms.

- The shortage shall not be more than 10%
- Condonation will be permitted on medical grounds only.
- Shortage shall not be condoned more than twice during the entire course.
- Candidate who is not eligible for condonation of shortage of attendance shall repeat the semester.

15. ELIGIBILITY FOR PROMOTION TO HIGHER SEMESTER – PROCEDURE FOR COMPLETING THE COURSE

(a) A student who has secured 75% of attendance and has exhibited satisfactory progress in the class will be eligible for promotion to the next higher semester.

(b) However, before being admitted to the VIII semester classes, the student should have passed in all subjects in the combined first and second semester examination in full.

Note: As this is an academic prerequisite, no exemption should be granted in this case, whatever be the causes.

A candidate shall complete the programme and pass all examinations within Eight (8) years since his first admission to the B.Tech programme.

16. REGISTRATION FOR END SEMESTER EXAMINATION

Every candidate should register for all subjects of the Semester-End examinations of each semester. A candidate who does not register will not be permitted to attend the Semester-End examinations; he/she shall not be permitted to attend the next semester.

A candidate shall be eligible to register for any higher semester (i.e. 3rd semester onwards) if he/she has satisfactorily completed the course of study and registered for the examination of the immediate previous semester. He/she should register for the semester at the start of the semester before the stipulated date. University will notify the starting and closing dates for each semester.

17. ADDITIONAL REQUIREMENTS FOR THE DEGREE

In addition to the requirement prescribed for the award of B.Tech. degree, each student must complete compulsory social service for a total duration of 15 days during 3rd to 7th semesters of the course. A record is to be kept showing the details of social service activities undertaken and it should be approved by the Staff Advisor. Head of Institution should verify this compulsory requirement before permitting the student to register for the eighth semester.

Students are expected to undertake industrial training(s) of total 10 days minimum duration or industrial visits (to minimum 2 industries) for studying about the industries of importance to the branch concerned during 4th to 7th semester. Students may also undertake an educational tour, the tour period shall be considered as part of the working periods of a semester. The tour maybe conducted during the vacation/holidays taking not more than 3 working days, combined with the vacation/holidays if required, between 5th and 8th semesters for visiting industries (at least two) of importance to the branch concerned. Faculty members shall accompany the students for the industrial visits/educational tour. Each student shall submit detailed bound report(s) of the training/visit/tour to the Head of Department within two weeks after the programme. These bound report(s), signed by the staff advisor or faculty in charge of tour/training/visit and by the head of department, shall also be brought during the final Viva-Voce.

18. EXAMINATION MONITORING CELL

Head of the each institution should formulate an Examination Monitoring Cell at the institution for supervising all examinations, especially the internal examinations. This

cell, with a senior staff member as Convener, shall consist of minimum three members (one shall be a lady).

The collective responsibilities of the examination monitoring cell are

(a) officiate as the examination squad to keep a vigil on all Semester-End examinations.

If any malpractices are found/reported by invigilators, inform these to the Head of Institution along with a report about the incident. Head of Institution shall forward all such complaints to the University.

(b) schedule all examinations conducted as part of internal assessment of students.

(c) to receive any complaint from students regarding issues like out-of-syllabus questions, printing mistakes, etc. of Semester-End examinations of theory and practical subjects. The cell shall investigate these complaints and if necessary forward it to university with specific comments.

(d) to receive any complaints from students regarding internal examinations, enquire such incidents, and give a report to the Head of Institution for necessary action.

To conduct all the theory examinations, a Chief Superintendent and Senior Assistant Superintendent should be appointed internally by the Head of Institution. At least one external Additional Chief Superintendent from government/government-aided engineering colleges within the University should be appointed by the University for conducting theory examinations in all affiliated self financing Engineering Colleges.

19. ELECTIVES

All students shall choose four elective subjects, one in the sixth, one in the seventh and two in eighth semesters from a set of elective subjects prescribed in the syllabus and offered by the institution. There should be at least 25% students of the class for an elective subject to be offered. However, any student having a CGPA of not less than 7.5 shall be permitted to select an elective of his/her choice and register under a faculty subject to the permission from the faculty and Head of Department. The student will have to study this subject on his own (self-study mode) or the classes of this subject shall be taken during off-hours.

A student can opt for interdisciplinary electives, termed as global electives in the syllabus, maximum one during 8th semesters subject to the permission from both Heads of Departments and the faculty handling the elective subject. Minimum number of students for a global elective shall be 15 and maximum 60.

New electives may be introduced according to the needs of emerging fields in technology. The name of the elective and its syllabus should be approved by the university before the subject is offered as an elective.

20. CLASS COMMITTEE

Head of institution shall take necessary steps to form a class committee for each class at the start of classes of each semester. This class committee shall be in existence for the semester concerned. The class committee shall consist of the Head of Department, Staff Advisor of the class, a senior faculty member of the department, a faculty member from another department, and two student representatives (one of them should be a girl in a mixed class). There should be at least two meetings of the class committee every semester; it shall be the responsibility of the Head of Department to convene these meetings. The decisions of the Class Committee shall be recorded in a register for further reference. Each class committee will communicate its recommendations to the Head of Institution.

The responsibilities of the class committee are:

(a) to review periodically the progress and conduct of students in the class.

(b) to discuss any problems concerning any subjects in the semester concerned.

(c) to identify weaker students of the class and suggest remedial measures.

(d) to review teaching effectiveness and coverage of syllabus.

(e) discuss any other issue related to the students of the class.

21. ELIGIBILITY FOR THE DEGREE

No candidate shall be eligible for the B.Tech. degree unless he has undergone the prescribed course of study for a period of not less than four academic years in an

institution affiliated to the Mahatma Gandhi University and has passed all subjects as per the prescribed syllabus.

No candidate under lateral entry scheme shall be eligible for the B.Tech. degree unless he has undergone the prescribed course of study for a period of not less than three academic years in an institution affiliated to the Mahatma Gandhi University and has passed all subjects of 3rd to 8th semesters as per the prescribed syllabus.

22. CLASSIFICATION OF SUCCESSFUL CANDIDATES

(a) A candidate who qualifies for the degree, passing all the subjects of the eight semesters within 5 academic years after the commencement of his course of study and secures not less than a CGPA of 8.0 of all the semesters shall be declared to have passed the B.Tech. degree examination in First Class with Honours.

(b) A candidate who qualifies for the degree, passing all the subjects of the eight semesters within 5 academic years after the commencement of his course of study and secures not less than a CGPA of 6.5 of all the semesters shall be declared to have passed the B.Tech. degree examination in First Class.

(c) All other candidates who qualify for the degree passing all the subjects of the eight semesters and not covered as per Sections 22 (a) and (b) shall be declared to have passed the B.Tech. degree examination in second class.

(d) Classification of the lateral entry student can be given based on the CGPA of 3^{rd} to 8^{th} semesters. The final mark-list of lateral entry students should indicate that (i) the student was admitted through lateral entry scheme (ii) classification is based on CGPA of 3^{rd} to 8^{th} semesters. He/she should have passed all the subjects of the 3^{rd} to 8^{th} semesters within 4 academic years after the commencement of the course of study.

It may be indicated in each mark-list that the internal assessment marks and Semester-End examination marks of practical subjects are normalised.

23. GRIEVANCE CELL

Each college should setup a Grievance Cell with at least four faculty members to look into grievances of the students, if any.

24. ANTI-RAGGING CELL

Head of Institution shall take necessary steps to constitute anti-ragging committee and squad at the commencement of each academic year. The committee and the squad shall take effective steps as specified by the Honorable Supreme Court of India, to prevent ragging.

Notwithstanding all that has been stated above, the University has right to modify any of the above regulations from time to time as per University rules.

ANNEXURE

Equivalency of Diploma Streams for Part-Time B.Tech. Admission

Sl. No.	Specialisation in Diploma	Branch Equate for B.Tech. Admission
1.	Applied Electronics	Electronics and Communication Engineering
2.	Electronics	
3.	Medical Electronics	
4.	Electronics and Avionics	
5.	Telecommunication Technology	
6.	Telecommunication Technology	
7.	Electronics and Medical Instrumentation	
8.	Electronics Production Technology	
9.	Medical Instrumentation	
10.	Power Electronics	

11.	Biomedical Engineering	
12.	Civil	Civil Engineering
13.	Architecture	
14.	Quantity Survey and Construction Management	
15.	Mechanical	Mechanical Engineering
16.	Automobile	
17.	Tool and Die	
18.	Wood and Paper Technology	
19.	Computer Engineering	Computer Science and Engineering
20.	Computer Application and Business Management	
21.	Computer Hardware Maintenance	
22.	Information Technology	
23.	Electrical	Electrical and Electronics Engineering
24.	Instrument Technology	
25.	Chemical Engineering	Chemical Engineering

MAHATMA GANDHI UNIVERSITY

REVISED SCHEME FOR B TECH SYLLABUS REVISION 2010

COMPUTER SCIENCE & ENGINEERING

1st AND 2nd SEMESTERS (COMMON FOR ALL BRANCHES)

Code	Subject	Hours/Week			Marks		End-Sem duration – hours	Credits
		L	T	P/D	Inter-nal	End-Sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry &	1	1	-	50	100	3	4

	Environmental Studies							
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	0	-	3	50	-	3	1
EN010 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd SEMESTER

Code	Subject	Hours/Week			Marks		End-Sem duration – hours	Credits
		L	T	P/D	Inter-nal	End-Sem		
EN010 301B	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
CS010 303	Problem Solving and Computer Programming	2	2	-	50	100	3	4
CS010 304	Computer Organization	3	1	-	50	100	3	4
CS010 305	Switching Theory and Logic Design	3	1	-	50	100	3	4
CS010 306 (EC)	Electronics Devices and Circuits	3	1	-	50	100	3	4
CS010 307	Programming lab	-	-	3	50	100	3	2
CS010 308 (EC)	Logic Design lab	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th SEMESTER

Code	Subject	Hours/Week			Marks		End-Sem duration - hours	Credits
		L	T	P/D	Inter-nal	End-Sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4

CS010 402	Object Oriented Programming	3	1	-	50	100	3	4
CS010 403	Data Structures and Algorithms	2	2	-	50	100	3	4
CS010 404 (EC)	Communication Systems	3	1	-	50	100	3	4
CS010 405	Microprocessor Systems	3	1	-	50	100	3	4
CS010 406	Theory of Computation	3	1	-	50	100	3	4
CS010 407	Data Structures lab	-	-	3	50	100	3	2
CS010 408 (EC)	Electronic Circuits lab	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th SEMESTER

Code	Subject	Hours/Week			Marks		End-Sem duration - hours	Credits
		L	T	P/D	Inter -nal	End-Sem		
EN010 501B	Engineering Mathematics IV	2	2	-	50	100	3	4
EN010 502 (ME)	Principles of Management	3	1	-	50	100	3	4
CS010 503	Database Management Systems	2	2	-	50	100	3	4
CS010 504 (EC)	Digital Signal Processing	3	1	-	50	100	3	4
CS010 505	Operating Systems	3	1	-	50	100	3	4
CS010 506	Advanced Microprocessors & Peripherals	3	1	-	50	100	3	4
CS010 507 (P)	*Database Lab*	-	-	3	50	100	3	2
CS010 508 (P)	*Hardware & Microprocessors lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th SEMESTER

Code	Subject	Hours/Week			Marks		End-Sem duration - hours	Credits
		L	T	P/D	Inter -nal	End-Sem		
CS010 601	Design and Analysis of Algorithms	2	2	-	50	100	3	4
CS010 602	Internet Computing	2	2	-	50	100	3	4
CS010 603	System Software	3	1	-	50	100	3	4
CS010 604	Computer Networks	3	1	-	50	100	3	4
CS010 605	Software Engineering	3	1	-	50	100	3	4
CS010 606Lxx	Elective I	2	2	-	50	100	3	4
CS010 607	*Operating Systems Lab*	-	-	3	50	100	3	2
CS010 608	*Mini Project*	-	-	3	50	100	3	2

	Total	**15**	**9**	**6**				**28**

Elective I

CS010 606L01 – Distributed Systems
CS010 606L02 – Micro controller Based Systems
CS010 606L03 – User Interface Design
CS010 606L04 – Unix Shell Programming
CS010 606L05 – Embedded Systems
CS010 606L06 – Advanced Software Environments

7th SEMESTER

Code	Subject	Hours/Week			Marks		End-Sem duration – hours	Credits
		L	T	P/D	Inter-nal	End-Sem		
CS010 701	Web Technologies	2	2	-	50	100	3	4
CS010 702	Compiler Construction	2	2	-	50	100	3	4
CS010 703	Computer Graphics	2	1	-	50	100	3	3
CS010 704	Object Oriented Modelling & Design	2	1	-	50	100	3	3
CS010 705	Principles of Programming Languages	2	1	-	50	100	3	3
CS010 706Lxx	Elective II	2	2	-	50	100	3	4
CS010 707	*Systems Programming Lab*	-	-	3	50	100	3	2
CS010 708	*Networking lab*	-	-	3	50	100	3	2
CS010 709	Seminar	-	-	2	50	-	-	2
CS010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

CS010 706L01 – Real Time Systems
CS010 706L02 – Data Mining and Data Warehousing
CS010 706L03 – Operating System Kernel Design
CS010 706L04 – Digital image processing
CS010 706L05 – Data Processing and File Structures
CS010 706L06 – Client Server and Applications

8th SEMESTER

Code	Subject	Hours/Week			Marks		End-Sem duration – hours	Credits
		L	T	P/D	Inter-nal	End-Sem		
CS010 801	High Performance Computing	3	2	-	50	100	3	4
CS010 802	Artificial Intelligence	2	2	-	50	100	3	4
CS010 803	Security in Computing	2	2	-	50	100	3	4
CS010 804Lxx	Elective III	2	2	-	50	100	3	4
CS010 805Gxx	Elective IV	2	2	-	50	100	3	4

CS010 806	*Computer Graphics Lab*	-	-	3	50	100	3	2
CS010 807	Project	-	-	6	100	-	-	4
CS010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

CS010 804L01 – E-commerce
CS010 804L02 – Grid Computing
CS010 804L03 – Biometrics
CS010 804L04 – Optimization Techniques
CS010 804L05 – Mobile Computing
CS010 804L06 – Advanced Networking Trends

Electives IV

CS010 805G01 – Multimedia Techniques
CS010 805G02 – Neural networks
CS010 805G03 – Advanced Mathematics
CS010 805G04 – Software Architecture
CS010 805G05 – Natural Language Processing
CS010 805G06 – Pattern Recognition

MAHATMA GANDHI UNIVERSITY

COMPUTER SCIENCE & ENGINEERING(CS) B TECH SYLLABUS (REVISED)

(WITH EFFECT FROM 2010 ADMISSIONS)

SEMESTERS I & II

EN010 101 ENGINEERING MATHEMATICS – I

Teaching Scheme **Credits:** 5

2 hour lecture and 1 hour tutorial per week

Objectives

To impart mathematical background for studying engineering subjects

MODULE 1 (18 hours) - MATRIX

Elementary transformation – echelon form – rank using elementary transformation by reducing in to echelon form – solution of linear homogeneous and non – homogeneous equations using elementary transformation, Linear dependence and independence of vectors – eigen values and eigen vectors – properties of eigen values and eigen vectors(proof not expected) – Linear transformation – Orthogonal transformation – Diagonalisation – Reduction of quadratic form into sum of squares using orthogonal transformation – Rank, index, signature of quadratic form – nature of quadratic form

MODULE 2 (18 hours) - PARTIAL DIFFERENTIATION

Partial differentiation : chain rules – statement of Euler's theorem for homogeneous functions – Jacobian –Application of Taylors series for function of two variables – maxima and minima of function of two variables (proof of results not expected)

MODULE 3 (18 hours) - MULTIPLE INTEGRALS

Double integrals in cartesian and polar co-ordinates – change of order of integration area using double integrals – change of variables using Jacobian – triple integrals in cartesian, cylindrical and spherical co-ordinates – volume using triple integrals – change of variables using Jacobian – simple problems.

MODULE 4 (18 hours) - ORDINARY DIFFERENTIAL EQUATIONS

Linear differential equation with constant coefficients- complimentary function and particular integral – Finding particular integral using method of variation of parameters – Euler Cauchy equations- Legenders equations

MODULE 5 (18 hours) - LAPLACE TRANSFORMS

Laplace Transforms – shifting theorem –differentiation and integration of transform – Laplace transforms of derivatives and integrals – inverse transform – application of convolution property – Laplace transform of unit step function – second shifting theorem(proof not expected) – Laplace transform of unit impulse function and periodic function – solution of linear differential equation with constant coefficients using Laplace Transform.

REFERENCES

1. Erwin Kreyszig ;Advanced Engineering Mathematics Wiley Eastern Ltd
2. Grewal B.S ;Higher Engineering Mathematics ,Khanna Publishers
3. N. P. Bali ;Engineering Mathematics ,Laxmi Publications Ltd
4. Goyal & Gupta ; Laplace and Fourier Transforms
5. Dr. M.K.Venkataraman ;Engineering Mathematics Vol. I,National Publishing Co.
6. Dr. M.K.Venkataraman Engineering Mathematics Vol. 2, National Publishing Co
7. T.Veerarajan ,Engineering Mathematics for first year, Mc Graw Hill
8. S.S.Sastry Engineering Mathematics Vol. I,Prentice Hall India
9. S.S.Sastry Engineering Mathematics Vol. 2, Prentice Hall India
10. B.V. Ramana Higher Engineering Mathematics, Mc Graw Hill

EN010 102 ENGINEERING PHYSICS

Teaching Scheme **Credits:** 4

I hour lecture and 1 hour tutorial per week

Objectives

To provide students knowledge of physics of a problem and an overview of physical phenomena.

MODULE 1 (12 hours) LASERS AND HOLOGRAPHY

Lasers- Principle of laser- Absorption- Spontaneous emission- Stimulated emission- Characteristics of laser - Population inversion- Metastable states- Pumping- Pumping Methods- Pumping Schemes- 3 level and 4 level pumping- Optical resonator- Components of laser- Typical laser systems like Ruby laser- He-Ne laser- Semiconductor laser- Applications of laser-

Holography- Basic principle -Recording and reconstruction- comparison with ordinary photography-Applications of Hologram

MODULE 2 (12 hours) NANOTECHNOLOGY AND SUPERCONDUCTIVITY

Introduction to nanoscale science and technology- nanostructures-nanoring, nanorod, nanoparticle, nanoshells- Properties of nanoparticles- optical, electrical, magnetic, mechanical properties and quantum confinement- Classification of nanomaterials- C60, metallic nanocomposites and polymer nanocomposites- Applications of nanotechnology

B. Superconductivity- Introduction- Properties of super conductors- Zero electrical resistance- Critical temperature- Critical current- Critical magnetic field- Meissner effect- Isotope effect- Persistence of current- Flux quantization - Type I and Type II superconductors- BCS Theory (Qualitative study) – Josephson effect- D.C Josephson effect- A.C Joseph son effect- Applications of superconductors.

MODULE 3 (12 hours) CRYSTALLOGRAPHY AND MODERN ENGINEERING MATERIALS

A. Crystallography – Space lattice- Basis- Unit cell- Unit cell parameters- Crystal systems Bravais lattices- Three cubic lattices-sc, bcc, and fcc- Number of atoms per unit cell- Co-ordination number- Atomic radius- Packing factor- Relation between density and crystal lattice constants- Lattice planes and Miller indices-Separation between lattice planes in sc- Bragg's law- Bragg's x-ray spectrometer- Crystal structure analysis.

B. Liquid crystals- Liquid crystals, display systems-merits and demerits- Metallic glasses- Types of metallic glasses (Metal-metalloid glasses, Metal-metal glasses) – Properties of metallic glasses (Structural, electrical, magnetic and chemical properties)

Shape memory alloys- Shape memory effect, pseudo elasticity

MODULE 4 (12 hours) ULTRASONICS

A. Ultrasonics- Production of ultrasonics- Magnetostriction method – Piezoelectric method- Properties of ultrasonics- Non destructive testing- Applications

B. Spectroscopy- Rayleigh scattering (Qualitative) - Raman effect – Quantum theory of Raman effect- Experimental study of Raman effect and Raman spectrum- Applications of Raman effect

C. Acoustics- Reverberation- Reverbaration time- Absorption of sound- Sabine's formula (no derivation)- Factors affecting acoustics properties

MODULE 5 (12 hours) FIBRE OPTICS

Principle and propagation of light in optical fibre- Step index (Single Mode and Multi Mode fibre) and graded index fibre- N.A. and acceptance angle—Characteristics of optical fibres (Pulse dispersion, attenuation, V-number, Bandwidth-distance product) – **Applications of optical fibres**- Fibre optic communication system (Block diagram)- Optical fibre sensors (any five) – Optical fibre bundle.

REFERENCES

1) A Text book of Engineering Physics – M.N.Avadhanulu and P.G.Kshirsagar, S.Chand& Company Ltd.
2) Nanomaterials- A.K.Bandhopadyaya – New Age International Publishers
3) Engineering Physics – A. Marikani
4) Engineering materials –V Rajendran and Marikani-Tata McGraw-Hill Publishing Company Limited
5) Engineering physics- Dr. M Arumugam - Anuradha Agencies
6) Nano ; The Essentials- T. Pradeep
7) Material Science-M Arumugham- Anuradha Agencies
8) Lasers and Non-Linear optics By B.B Laud- New Age International (P) Limited

EN010 103 ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES

(Common to all branches)

Teaching scheme **Credits:**4

1hr lecture and 1hr tutorial per week (total 60 hrs)

Objectives

To impart a scientific approach and to familiarize the applications of chemistry in the field of technology

To create an awareness about the major environmental issues for a sustainable development

MODULE 1 ELECTROCHEMICAL ENERGY SYSTEMS (13 HRS)

Electrochemical cells - Galvanic cell - Daniel cell – EMF - determination by potentiometric method - Nernst equation – derivation- Single electrode potential-Types of electrodes- Metal/metal ion electrode, Metal/metal sparingly soluble salt electrode, Gas electrode and Oxidation/reduction electrode - Reference electrodes - Standard hydrogen electrode and Calomel electrode - Glass electrode – Determination of pH using these electrodes- Concentration cell – Electrolytic concentration cell without transfer - Derivation of EMF using Nernst equation for concentration cell - Cells and Batteries - Primary and secondary cells - Lead acid accumulator, Ni-Cd cell, Lithium–MnO_2 cell and Rechargeable Lithium ion cell – Polarization – Overvoltage - Decomposition potential - Numerical problems based on Nernst equations and pH determination.

MODULE 2 CORROSION **AND CORROSION CONTROL** (10 **HRS)**

Introduction - Types of corrosion – Chemical and Electrochemical corrosion – Chemical corrosion – Oxidation corrosion, By other gases and Liquid metal corrosion – Pilling-Bedworth rule - Electrochemical corrosion – Mechanism - absorption of O_2 and evolution of H_2 - Types of electrochemical corrosion- Galvanic corrosion, Concentration cell corrosion, Differential aeration corrosion, Pitting corrosion, Waterline corrosion and Stress corrosion - Factors influencing the rate of corrosion - Nature of the metal and Nature of the environment - Corrosion control methods – Selection of metal and proper design, Cathodic protection (Sacrificial anodic protection and Impressed current cathodic protection), Modifying the environment, corrosion inhibitors and Protective coating - Metallic coating – Anodic coating and cathodic coating - Hot dipping (Galvanizing and Tinning), Electroplating, Electroless plating, Metal spraying, Metal cladding Cementation- sheradizing - chromizing- calorizing and Vacuum metallization - Non-metallic coating – Anodization

MODULE 3 ENGINEERING MATERIALS (13 HRS)

High polymers – Introduction - Degree of polymerization – Functionality – Tacticity - Types of polymerization (mechanisms not required) – Addition, Condensation and Copolymerization - Glass transition temperature-(Tg) Definition only, Compounding and moulding of plastics - Compression, Injection, Extrusion, Transfer and Blow moulding. **Fiber Reinforced Plastics** - Glass reinforced plastics (GRP) - Manufacturing methods - Hand lay up, Spray up and Filament winding - properties and uses.

Conducting Polymers – Polyacetylene and Polyaniline - Applications (mechanism not required)

Rubber - Natural rubber – Properties – Vulcanization - Synthetic rubber - Preparation, properties and uses of Polyurethane rubber, NBR and Silicone rubber

Carbon Nanotubes - Single walled (SWCNT) and Multi walled (MWCNT) - Properties and uses

MODULE 4 ENVIRONMENTAL POLLUTION (12 HRS)

Pollution - Types of pollution – a brief study of the various types of pollution - Air pollution - Sources and effects of major air pollutants – Gases - Oxides of carbon, nitrogen and sulphur –

Hydrocarbons – Particulates -Control of air pollution - Different methods - Water pollution - Sources and effects of major pollutants - Inorganic pollutants- heavy metals cadmium , lead, mercury - Ammonia, Fertilizers and Sediments (silt) - Organic pollutants – Detergents, pesticides, food waste, - Radioactive materials - Thermal pollutants - Control of water pollution - General methods

Eutrophication - Definition and harmful effects Desalination of water - Reverse osmosis and Electrodialysis

MODULE 5 ENVIRONMENTAL ISSUES (12 HRS)

An overview of the major environmental issues - Acid rain – Smog - Photochemical smog - Green house effect - Global warming and climate change - Ozone layer depletion – Deforestation - Causes and effects - Wet land depletion – Consequences, Biodiversity – importance and threats, Soil erosion - Causes and effects, Solid waste disposal -Methods of disposal - Composting, Landfill, and Incineration, E-Waste disposal - Methods of disposal – recycle(recovery) and reuse

Renewable energy sources - Solar cells – Importance - Photo voltaic cell - a brief introduction

Bio fuels - Bio diesel and Power alcohol.

Note: This course should be handled and examination scripts should be evaluated by the faculty members of Chemistry

TEXT BOOKS

1. A text book of Engineering Chemistry - Shashi Chawla, Dhanpat Rai and Co.
2. A text book of Engineering Chemistry - Jain & Jain 15th edition .
3. A text book of Engineering Chemistry – S. S. Dhara.
4. Modern Engineering Chemistry – Dr. Kochu Baby Manjooran. S.

REFERENCES

1. Chemistry - John E. McMurry and Robert C. Fay, Pearson Education.
2. Polymer science –V. R. Gowariker, New Age International Ltd.
3. A text book of polymer - M. S. Bhatnagar Vol I, II,& III, S. Chand publications.
4. Nano materials – B. Viswanathan, Narosa publications.
5. Nano science & Technology – V. S. Muralidharan and A. Subramania, Ane Books Pvt. Ltd.
6. Nanotechnology - Er. Rakesh Rathi, S. Chand & Company Ltd.
7. Environmental Studies - Benny Joseph (2nd edition), Tata Mc Graw Hill companies.
8. Environmental Chemistry - Dr. B. K. Sharma, Goel publishers.
9. Environmental Chemistry – A. K. De, New age International Ltd.
10. Industrial Chemistry – B. K. Sharma, Goel publishers.
11. Engineering Chemistry – O. G. Palanna, Tata Mc Graw Hill Education Pvt. Ltd.

EN010 104 ENGINEERING MECHANICS

(Common to all branches)

Teaching Scheme **Credits:** 6

3 hour lecture and 1 hour tutorial per week

Objectives

To develop analytical skills to formulate and solve engineering problems.

MODULE 1 (23 HRS)

Introduction to Mechanics – Basic Dimensions and Units – Idealization of Mechanics – Rigid Body – Continuum – Point force – Particle – Vector and Scalar quantities.

Principles of Statics – Force Systems – Coplanar, Collinear, Concurrent and Parallel – Free body diagrams – Resolution of forces – Moment of a Force – Varignon's Theorem – Couple – Resolution of a force into force couple system – Conditions of static equilibrium of Rigid bodies – Solutions of problems using scalar approach

Force Systems in Space – Introduction to Vector approach – Elements of Vector algebra – Position vector – Moment of a Force about a Point and Axis – Resultant of Forces – Equilibrium of forces in space using vector approach

MODULE 2 (23 HRS)

Principle of Virtual work – Elementary treatment only – application of virtual work in beams, ladders

Centroid of Lines, Areas and Volumes – Pappus Guldinus Theorems

Moment of Inertia of laminas – Transfer theorems – radius of Gyration – problems

Centre of Gravity – Mass moment of Inertia of circular and rectangular plates – solid rectangular prisms – Cylinders – Cones

MODULE 3 (23 HRS)

Friction – Laws of friction – Contact friction problems – ladder friction – Wedge friction – Screw friction.

Introduction to Structural Mechanics – Types of Supports, loads, frames – Static Indeterminacy – Support reactions of beams – Analysis of perfect trusses by method of joints, method of sections.

MODULE 4 (28HRS)

Kinematics – Rectilinear motion of a particle under Variable Acceleration

Relative Velocity - problems

Circular motion with Uniform and Variable Acceleration – Relations between Angular and Rectilinear motion – Normal and Tangential accelerations

Combined motion of Rotation and Translation – Instantaneous centre of zero velocity – Wheels rolling without slipping

Introduction to Mechanical Vibrations – Free vibrations – Simple Harmonic motion

MODULE 4 (23 HRS)

Kinetics of particles – Newton's laws of Motion of Translation – D'Alembert's Principle – Motion of connected bodies – Work Energy Principle – Principle of Momentum and Impulse – Collision of Elastic bodies

Newton's laws of Rotational motion – Angular Impulse and Torque – Conservation of Angular Momentum – Centrifugal and Centripetal forces – Applications – Work done and Power by Torque and Couple.

REFERENCES

1. Engineering Mechanics – S. Timoshenko, D.H. Young – Mc Graw Hill International Edition

2. Engineering Mechanics – Statics and Dynamics – Irving H Shames, G Krishna Mohana Rao – Pearson Edutcation
3. S. Rajasekararn & G.Sankarasubramanian, Engineering Mechanics, Vikas Publishing Co.
4. Engineering Mechanics – Prof.J.Benjamin
5. Engineering Mechanics – G.S. Sawheney PHI Learning Pvt.Ltd, New Delhi
6. Engineering Mechanics – K. L. Kumar, Tata Mc Graw Hill, New Delhi

EN010 105 ENGINEERING GRAPHICS

Teaching Scheme **Credits:** 6

I hour lecture and 3 hour drawing per week

Objectives

To provide students of all branches of engineering with fundamental knowledge of engineering drawing

To impart drawing skills to students

MODULE 1 (24 hours)

Introduction to Engineering Graphics: Drawing instruments and their uses-familiarization with current BIS code of practice for general engineering drawing.

Scales-Plain scales-Diagonal Scales-Forward and Backward Vernier Scales.

Conic Sections:-Construction of conics when eccentricity and distance from directrix are given .Construction of ellipse (1) given major axis and foci (2) given major axis and minor axis (3)given a pair of conjugate diameters (4) by the four centre method.

Construction of parabola given the axis and base. Construction of hyperbola-(1) given the asymptotes and a point on the curve. (2) Given ordinate, abscissa and transverse axis.

Construction of rectangular hyperbola. Construction of tangents and normals at points on these curves.

Miscellaneous curves:-Cycloids, Inferior and superior Trochoids-Epicycloid- Hypocycloid-Involute of circle and plain figures-Archimedian Spiral and Logarithmic Spiral- Tangents and normals at points on these curves.

MODULE 2 (24 hours)

Orthographic projections of points and lines:-Projections of points in different quadrants-Projections of straight lines parallel to one plane and inclined to the other plane-straight lines inclined to both the planes-true length and inclination of lines with reference planes using line rotation and plane rotation methods – Traces of lines.

Orthographic projections of planes-Polygonal surfaces and circular lamina.

MODULE 3 (24 hours)

Orthographic projections of solids:-Projections of prisms , cones ,cylinders ,pyramids ,tetrahedron ,octahedron and spheres with axis parallel to one plane and parallel or perpendicular to the other plane-the above solids with their axes parallel to one plane and inclined to the other plane –axis inclined to both the reference planes-use change of position method OR auxiliary method.

Sections of solids:-Sections of prisms ,cones , cylinders ,pyramids ,tetrahedron and octahedron with axis parallel to one plane and parallel or perpendicular or inclined to the other plane with section planes perpendicular to one plane and parallel , perpendicular or inclined to the other plane –True shapes of sections.

MODULE 4 (24 hours)

Developments of surfaces of (1)simple solids like prisms ,pyramids , cylinder and cone (2) sectioned regular solids (3)above solids with circular or square holes with their axes intersecting at right angles.-Developments of funnels and pipe elbows.

Isometric Projections:-Isometric Scales-Isometric views and projections of plane figures,simple&truncated solids such as prisms, pyramids, cylinder, cone, sphere, hemisphere and their combinations with axis parallel to one the planes and parallel or perpendicular to the other plane.

MODULE 5 (24 hours)

Perspective projections:-Perspective projections of prisms,pyramids,cylinder and cone with axis parallel to one plane and parallel or perpendicular or inclined to the other plane by visual ray method OR vanishing point method

Intersection of surfaces:-Intersection of prism in prism &cylinder in cylinder-Axis at right angles only.

REFERENCES

1. Engineering Graphics-Unique Methods easy solutions-K.N Anilkumar
2. Engineering Graphics-P I Varghese.
3. Engineering Drawing-N D Bhatt
4. Engineering Graphics-P S Gill
5. Engineering Graphics-T S Jeyapoovan.

EN010 106 BASIC CIVIL ENGINEERING

(Common to all branches)

Teaching scheme **Credits:** 4

1 hour lecture and 1 hour tutorial per week

Objectives

To familiarize all engineering students with the basic concepts of civil engineering sothat they can perform better in this great profession "Engineering".

MODULE 1 (12 hours)

Introduction to civil engineering : various fields of civil engineering- Engineering materials: Cement – Bogues compounds, manufacture of Portland cement-wet and dry process, grades of cement, types of cement and its uses – steel– types of steel for reinforcement bars ,structural steel sections,built-up sections,light gauge sections.

Aggregates: Fine aggregate:- pitsand, riversand, M- sand--Coarse aggregate: natural and artificial , requirements of good aggregates. Timber: varieties found in Kerala – seasoning and preservation. Bricks**:** classification, requirements, tests on bricks.

MODULE 2 (12 hours)

Cement mortar- preparation and its uses– concrete –ingredients, grades of concrete – water cement ratio, workability, curing, ready mix concrete. Roofs - roofing materials -A. C, aluminium, GI, fibre, tile, reinforced concrete (brief description only)- reinforcement details of a one way slab, two way slab and simply supported beams.

MODULE 3 (12 hours)

Building Components: Foundation: Bearing capacity and settlement - definitions onlyfootings- isolated footing , combined footing - rafts, piles and well foundation , machine foundation (Brief description only).

Superstructure: Walls - brick masonry – types of bonds , English bond for one brick - stone masonry-Random Rubble masonry.

MODULE 4 (12 hours)

Surveying**:** Classification –principles of surveying- chain triangulation- instruments used, field work – bearing of survey lines –WCB and reduced bearing -Leveling: field work - reduction of levels - height of instrument method.

Introduction to total station- basic principles of remote sensing, GPS and GIS.

MODULE 5 (12 hours)

Site plan preparation for buildings (Sketch only) – Kerala Municipal Building Rules (1999)- general provisions regarding site and building requirements – coverage and floor area ratio – basic concepts of "intelligent buildings" and "green buildings"- disposal of domestic waste water through septic tank and soak pit. Classification of roads- basics of traffic engineering – road markings , signs, signals and islands, road safety-accidents, causes and remedies– (brief description only)

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)

20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

20% - Regularity in the class

REFERENCES

1. Jha and Sinha, Construction and foundation Engineering, Khanna Publishers
2. Punmia B. C., Surveying Vol –I, Laxmi Publications
3. Rangwala, Building Materials, Charotar Book stall
4. K. Khanna ,C. E. G. Justo., Highway Engineering, Khanna Publishers

5. Nevile., Properties of Concrete, Mc Graw Hill
6. B C Punmia.,Basic Civil Engineering, Khanna Publishers
7. Kerala Municipal Building Rules – 1999

EN010 107 BASIC MECHANICAL ENGINEERING

(Common to all branches)

Teaching scheme **Credits:** 4

1hour lecture and1hour tutorial per week

Objective

To impart basic knowledge in mechanical engineering

MODULE 1(12 hours)

Thermodynamics: Basic concepts and definitions, Gas laws, specific heat –Universal gas constant- Isothermal, adiabatic and polytrophic processes, work done, heat transferred, internal energy and entropy - Cycles: Carnot, Otto and Diesel- Air standard efficiency.

Basic laws of heat transfer (Fourier's law of heat conduction, Newton's law of cooling Steffen Boltzmann's law)

MODULE 2 (12 hours)

I.C. Engines: Classification of I.C Engines, Different parts of I.C engines, Working of two stroke and four stroke engines-petrol and diesel engines-air intake system, exhaust system, fuel supply system, ignition system, lubrication system, cooling system and engine starting system-Performance of I.C. engines, advantage of MPFI and CRDI over conventional system.

Refrigeration: Unit of refrigeration, COP, Block diagram and general descriptions of air refrigeration system, vapour compression and vapour absorption systems- Required properties of a refrigerant, important refrigerants– Domestic refrigerator- Ice plant.

Air conditioning system: Concept of Air conditioning, psychometry, psychometric properties, psychometric chart, psychometric processes, human comfort– winter and summer air conditioning systems (general description), air conditioning application.

MODULE 3 (12 hours)

Power transmission elements: Belt Drive - velocity ratio of belt drive, length of belt, slip in belt- simple problems– Power transmitted– Ratio of tensions– Centrifugal tension Initial tension– Rope drive, chain drive and gear drive-Types of gear trains (simple descriptions only)

MODULE 4 (12 hours)

Power plants: General layout of hydraulic, diesel, thermal and nuclear power plants non-conventional energy sources (general description only).

Hydraulic turbines and pumps : Classifications of hydraulic turbines –types of hydraulic turbines –runaway speed, specific speed, draft tube, cavitations, selection of hydraulic turbines .Classification of pumps– positive displacement and rotodynamic pumps (description only)- applications

Steam turbines: Classification of steam turbines, description of common types of steam turbines: Impulse and reaction, compounding methods.

MODULE 5 (12 hours)

Simple description of general purpose machines like lathe, shaping machines, drilling machines, grinding machines and milling machines, Basic concepts of CNC, DNC, CIM and CAD/CAM

Manufacturing Processes: Moulding and casting, forging, rolling, welding- arc welding-gas welding (fundamentals and simple descriptions only)

Internal continues assessment (Maximum Marks –50)

60% Test (minimum2)

20% Assignments (minimum 2) such as home work, quiz, seminar.

20% regulatory in class

TEXT BOOKS

1 P.L. Bellany, *Thermal Engineering,* Khnna Publishes
2 Benjamin J., *Basic Mechanical Engineering,* Pentx

REFERENCES

1 R.C.Patal, *Elements of heat engines,* Acharya Publishers -
2 G.R Nagapal, *Power plant engineering,* Khnna publishes
3 P.K.Nag, *Engineering Thermodynamics,* McGraw Hill
4 Dr.P.R Modi &Dr.M.S. Seth, *Hydraulics & Fluid Mechanics including Hydraulic Machines,* Standard Book House

EN010 108 BASIC ELECTRICAL ENGINEERING

(Common to all branches)

Teaching Scheme **Credits:** 4

I hour lecture and 1 hour tutorial per week

Objectives

To provide students of all branches of engineering with an overview of all the fields of electrical engineering

To prepare students for learning advanced topics in electrical engineering

MODULE 1 (10 hours)

Kirchhoff's Laws – Formation of network equations by mesh current method – Matrix representation– Solution of network equations by matrix method – Star delta conversion.

Magnetic circuits – mmf, field strength, flux density, reluctance, permeability – comparison of electric and magnetic circuits – force on current carrying conductor in magnetic filed.

MODULE 2 (12 hours)

Electromagnetic Induction – Faraday's laws – lenz's law – statically and dynamically induced emf – self and mutual inductance – coupling coefficient.

Alternating current fundamentals – generation of AC –frequency, period, average and r m s value, form factor, peak factor, phasor representation – j operator – power and power factor – solution of RLC series and parallel circuits.

MODULE 3 (13 hours)

DC machine – principle of operation of DC generator – constructional details – emf equation – types of generators

DC motor – principle of operation of DC motor – back emf – need for starter – losses and efficiency – types of motors – applications – simple problems.

Transformer – principle of operation – e m f equation Constructional details of single phase and three phase transformer – losses and efficiency – application of power transformer, distribution transformer, current transformer and potential transformer.

MODULE 4 (13 hours)

Three phase system – generation of three phase voltage – star and delta system – relation between line and phase voltages and currents – phasor representation of three phase system - balanced delta connected system – three wire and four wire system – simple problems. Three phase power measurement – Single wattmeter, two wattmeter and three wattmeter methods.

Induction motors – principle of operation of three phase induction motors – applications of cage and slip ring induction motor – single phase induction motors – capacitor start / run, shaded pole – universal motors - Applications.

Synchronous generator (Alternator) – principles of operation and types.

MODULE 5 (12 hours)

Generation of electric power – types of generation – hydroelectric, thermal and nuclear (Block schematic and layout only) - Non conventional energy sources – solar, wind, tidal, wave and geothermal.

Transmission – need for high voltage transmission – Transmission voltage – Distribution – Underground versus overhead – Feeder – Distributor – Service mains – conductor materials – one line diagram of typical power system.

Requirements of good lighting system – working principle of incandescent lamp, Fluorescent lamp and mercury vapour lamp-energy efficient lamps (CFL,LED lights) – need for energy management and power quality – home energy management.

TEXT BOOKS

1. D.P. Kothari & I.J. Nagrath – Basic Electrical Engineering – Tata McGraw Hill

2. D.C. Kulshreshta – Basic Electrical Engineering - Tata McGraw Hill
3. Hughes – Electrical and Electronic Technology – Pearson Education

REFERENCES

1. R.V. Srinivasa Murthy – Basic Electrical Engineering – Sunguine Technical
2. J.B.Gupta – Fundamentals of Electrical Engineering & Electronics – S.K.Kataria
3. V.K. Mehta, Rohit Mehta – Basic Electrical Engineering – S.Chand.
4. Bureau of Engineering Efficiency – Guide book for national certification examination for energy managers and auditors.
5. Rajendra Prasad – Fundamentals of Electrical Engineering, Prentice Hall India.
6. Soni, Gupta, Bhatnagar & Chackrabarty – A text book on power system engineering – Dhanapt Rai
7. Electrical Engineering Fundamentals – Vincent Del Toro, Pearson Education.

EN010 109 BASIC ELECTRONICS ENGINEERING AND INFORMATION TECHNOLOGY

(Common to all branches)

Teaching Scheme **Credits:** 5

2 hour lecture and 1 hour tutorial per week

Objectives

To provide students of all branches of engineering with an overview of all the fields of electronics engineering and information technology

MODULE 1 (18 hours)

Basic Circuit Components: *Diode:* Germanium, Silicon, Zener, LEDs (working principle only). Forward and reverse characteristics. [2hr.] *Rectifiers*: Half wave, fullwave , Bridge circuits, DC Power supply: Capacitor filter, Zener regulator. [3hrs.]

Transistors: Different configurations - CE characteristics-β and ∝, concept of Amplifiers: Common emitter RC coupled amplifier, Frequency response, Bandwidth.(No analysis required)

Comparison of BJT,FET,MOSFET, IGBT. [2hr.]. *Integrated circuits*: Advantages, classification of Linear and Digital ICs. Basics of Op-amps, inverting and non-inverting amplifiers.Family of IC's(Function diagram of 7400 & CD4011) [4hrs.] .Specifications of TTL and CMOS. –Comparison.

MODULE 2 (18 hours)

Basic communication Engineering: *Communication:* Frequency bands: RF, VHF, UHF, x, ku, ka, c. Modulation – need for modulation, basic principles of amplitude, frequency and pulse modulation. [6hrs.]. Block schematic of AM transmitter, Super-hetrodyne receiver, FM receiver.-function of each block.[3hrs.] .*Wireless communication*: *Satellite Communication*-Earth station, transponder and receiver.*Mobile Communication*: GSM-BSC, Cell structure, frequency re-use, hands-of, establishing a call.

MODULE 3 (18 hours)

Basic instrumentation and Consumer electronics: *Electronic instrumentation*: Transducers: Basic principles of Strain guage, LVDT, Thermistor, Photodiode, Typical moving coil microphones and Loud speaker.Block diagram of Digital Multimeter .[8hrs*].CONSUMER ELECTRONICS*: Basic principles of TV –Interlaced Scanning-Block Diagram of PAL TV receiver(color).Basic principles of DTH, brief descriptions of MP3,multichannel audio 5.1,7.1.

MODULE 4 (18 hours)

Introduction: Definition and Scope of IT-Digital Computer, Von Neumann Architecture-Basic Operational Concepts-CPU-single Bus and Multi Bus Organization, A typical Instruction set, Execution of Instructions. **Memory and I/O**-Main Memory, Virtual Memory-Cache memory-Secondary Memories-Printers, Plotters, Displays, Key board, Mouse, OMR and OCR-Device Interface-I/O Processor-I/O Channel

MODULE 5 (18 hours)

Computer software-System Software and Application Software- Machine Language-Assembly Language-High Level Language-Language Translators- Operating System, Procedural Programming and Object Oriented Programming.**Computer Networks**-Concepts of Networking-Network Topologies-WAN-LAN-MAN, Protocol- Internet-working concept, Internet Architecture, IP addresses, Routing, Domain Name System(Basic concepts only)

REFERENCES

1.Basic Electronics – Devices, Circuits and IT fundamentals.Santiram Kal,PHI(Module 1to 5)

2. Basic Electronics: Bernad Grob, Mc Graw Hill Publication(Module 1)
3. Electronic Devices: Floyd, Pearson Education (Module 1)
4. Electronic Devices and Circuits: J.B. Gupta,S.K.Kataria & Sons (Module 1 , 2,3)
5. Digital Principles: Malvino & Leach, Mc Graw Hill Publication(Module 1)
6. Electronic Instrumentation: H.S Kalsi, Mc Graw Hill Publication(Module 2)
7. Communication Systems: Sanjay Sharma, S.K.Kataria & Sons (Module 2)
8. Satellite Comunication : Robert M.Gagliardi,CBS Publishers & Distributors.(Module 2)
9.Basic Radio and TV; S.P. Sharma,Tata McGrawhill(Module 2 &3)
10.Wireless Communication; T.S. Rappaport, Pearson(Module 3)
11.Computer Organization, Hamacher, Vranesic and Zaky, Mc Graw Hill (Module 4)
12.Systems Programming, JJ Donovan ,Mc Graw Hill (Module 5)
13.Computer Networks,Andrew.S Tanenbaum,Pearson Education(Module 5)

EN010 110 MECHANICAL WORKSHOP

(Common to all branches)

Teaching scheme **Credits:** 1

3 hours practical per week

Objectives

To provide students of all branches of engineering in house experience of basic mechanical instruments and activities

Carpentry Planing – cutting – chiselling, marking – sawing – cross and tee joints – dovetail joints – engineering application, Seasoning, Preservation – Plywood and ply boards.

Fitting Practice in chipping – filing – cutting – male and female joints.

Smithy Forging of square and hexagonal prism. Study of forging principles, materials and operations

Foundry Preparation of simple sand moulds – moulding sand characteristics, materials, gate, runner, riser, core, chaplets and casting defects

Demonstration and study of machine tools – lathe, drilling, boring, slotting, shaping, milling and grinding machines, CNC machines and machining centers.

Demonstration and study of arc and gas welding techniques.

Note:

1. The minimum mark for a pass for EN010 110Mechanical workshop is 25 out of 50 in internal assessments.

2. If the student fails in securing minimum mark for pass mentioned above will be considered as failed in the respective workshop.

The candidate not satisfying the above mentioned condition may be given 'U' grade in the grade card. For the purpose of fixing grade, the marks are hypothetically escalated to 150. Other grades may be given as specified for other subjects.

The failed candidate has to attend the respective workshop classes in the subsequent semesters. The internal assessment will be made by repeating all workshop activities. The student has to register for EN010 110 Mechanical Workshop in the college by paying the fees prescribed by the college.

HOD in charge of workshop will allot a staff member to monitor the activities and awarding the internal marks. The internal marks should be submitted to the university.

EN010 111 ELECTRICAL AND CIVIL WORKSHOPS

(Common to all branches)

Teaching scheme **Credits:** 1

3 hours practical per 2 weeks for each

Objectives

To provide students of all branches of engineering in house experience of basic electrical and civil instruments and activities

Electrical Workshop

1. Wiring and estimation of one lamp and one plug, Control of two lamps in series and in parallel.
2. Staircase wiring.
3. Godown wiring.
4. Insulation megger - earth megger , measurement of insulation resistance and earth resistance .Study of volt meter, ammeter , watt meter and energy meter.
5. Working principle and wiring of Fluorescent , CFL and Mercury vapour lamp .
6. Study and wiring of distribution board including power plug using isolator, MCB and ELCB – Estimation of a typical 1BHK house wiring system.
7. Familiarization , soldering, testing and observing the wave forms on a CRO of a HW and FW Uncontrolled Rectifier (using diodes) with capacitor filter.
8. Observing the wave forms on a CRO of Experiment 7 without capacitor filter and find the average and RMS value of the voltage waveform.
9. Visit your college substation and familiarize the supply system, Transformer, HT Panel and Distribution etc.

Civil Workshop

Masonry : English bond – Flemish bond – wall junction – one brick – one and a half brick – two brick and two and a half brick – Arch setting.

Plumbing: Study of water supply and sanitary fittings – water supply pipe fitting – tap connections – sanitary fittings – urinal, wash basin – closet (European and Indian), Manholes.

Surveying: Study of surveying instruments – chain – compass – plane table – levelling – minor instruments. Demonstration of Theodolite and Total Station.

Familiarization of latest building materials : Flooring materials – Roofing materials – Paneling boards.

Note:

1. The minimum mark for a pass for EN010 111 Electrical and Civil workshop is 50 out of 100 in internal assessments.

2. If the student fails in securing minimum mark for pass mentioned above will be considered as failed in the respective workshop.

The candidate not satisfying the above mentioned condition may be given 'U' grade in the grade card. For the purpose of fixing grade, the marks are hypothetically escalated to 150. Other grades may be given as specified for other subjects.

The failed candidate has to attend the respective workshop classes in the subsequent semesters. The internal assessment will be made by repeating all workshop activities. The student has to register for EN010 111 Electrical and Civil Workshop in the college by paying the fees prescribed by the college.

HOD in charge of workshop will allot a staff member to monitor the activities and awarding the internal marks. The internal marks should be submitted to the university.

SEMESTER III

EN010 301B ENGINEERING MATHEMATICS II

(CS & IT)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives

• *To know the importance of learning theories and strategies in Mathematics and graphs.*

MODULE 1 Mathematical logic (12 hours)

Basic concept of statement , logical connectives, Tautology and logical equivalence – Laws of algebra of propositions – equivalence formulas – Tautological implications (proof not expected for the above laws , formulas and implications). Theory of inference for statements – Predicate calculus – quantifiers – valid formulas and equivalences – free and bound variables – inference theory of predicate calculus

MODULE 2 Number theory and functions (12 hours)

Fundamental concepts – Divisibility – Prime numbers- relatively prime numbers – fundamental theorem of arithmetic – g.c.d - Euclidean algorithm - properties of gcd (no proof) – l c m – Modular Arithmetic – congruence – properties – congruence class modulo n – Fermat's theorem – Euler's Totient functions - Euler's theorem - Discrete logarithm

Function – types of functions – composite functions – inverse of a function – pigeon hole principles

MODULE 3 Relations (10 hours)

Relations – binary relation – types of relations – equivalence relation –partition – equivalence classes – partial ordering relation – Hasse diagram – poset

MODULE 4 Lattice (14 hours)

Lattice as a poset – some properties of lattice (no proof) – Algebraic system – general properties – lattice as algebraic system – sublattices – complete lattice – Bounded Lattice - complemented Lattice – distributive lattice – homomorphism - direct product

MODULE 5 Graph Theory (12 hours)

Basic concept of graph – simple graph – multigraph – directed graph- Basic theorems (no proof) . Definition of complete graph , regular graph, Bipartite graph, weighted graph – subgraph – Isomorphic graph –path – cycles – connected graph.- Basic concept of Eulergraph and Hamiltonian circuit – trees – properties of tree (no proof) - length of tree – spanning three – sub tree – Minimal spanning tree (Basic ideas only . Proof not excepted for theorems)

References

1. S.Lipschutz, M.L.Lipson – Discrete mathematics –Schaum's outlines – Mc Graw Hill
2. B.Satyanarayana and K.S. Prasad – Discrete mathematics & graph theory – PHI
3. Kenneth H Rosen - Discrete mathematics & its Application - Mc Graw Hill
4. H. Mittal, V.K.Goyal, D.K. Goyal – Text book of Discrete Mathematics - I.K. International Publication
5. T. Veerarajan - Discrete mathematics with graph theory and combinatorics - Mc Graw Hill
6. C.L.Lieu - Elements of Discrete Mathematics - Mc Graw Hill
7. J.P.Trembly,R.Manohar - Discrete mathematical structures with application to computer science - Mc Graw Hill
8. B.Kolman , R.C.Bushy, S.C.Ross - Discrete mathematical structures- PHI
9. R.Johnsonbough - Discrete mathematics – Pearson Edn Asia

EN010 302 ECONOMICS AND COMMUNICATION SKILLS

(Common to all branches)

Teaching scheme **Credits:** 4 (3+1)

2hours lecture and 2 hours tutorial per week

Economics

Objectives

- *To impart a sound knowledge of the fundamentals of Economics*

MODULE 1 (7 hours)

Reserve Bank of India-functions-credit control-quantitative and qualitative techniques Commercial banks-functions- Role of Small Industries Development Bank of India and National Bank for Agriculture and Rural Development The stock market-functions-problems faced by the stock market in India-mutual funds

MODULE 2 (6 hours)

Multinational corporations in India-impact of MNC's in the Indian economy

Globalisation-necessity-consequences

Privatisation-reasons-disinvestment of public sector undertakings

The information technology industry in India-future prospects

MODULE 3 (6 hours)

Direct and indirect taxes- impact and incidence- merits of direct and indirect taxes progressive and regressive taxes-canons of taxation-functions of tax system tax evasion-reasons for tax evasion in India-consequences-steps to control tax evasion

Deficit financing-role-problems associated with deficit financing

MODULE 4 (5 hours)

National income-concepts-GNP, NNP, NI, PI and DPI-methods of estimating national income-difficulties in estimating national income

Inflation-demand pull and cost push-effects of inflation-government measures to control inflation

MODULE 5 (6 hours)

International trade-case for free trade-case for protectionism

Balance of payments-causes of disequilibrium in India's BOP-General Agreement on Tariffs and Trade-effect of TRIPS and TRIMS in the Indian economy-impact of WTO decisions on Indian industry

TEXT BOOKS

1. Ruddar Datt, Indian Economy, S.Chand and Company Ltd.
2. K.K.Dewett, Modern Economic Theory, S.Chand and Company Ltd.

REFERENCES

1. Paul Samuelson, Economics, Tata McGraw Hill
2. Terence Byres, The Indian Economy, Oxford University Press
3. S.K.Ray, The Indian economy, Prentice Hall of India
4. Campbell McConnel, Economics, Tata McGraw Hill

Communication Skills

Objectives

- *To improve Language Proficiency of the Engineering students*
- *To enable them to express themselves fluently and appropriately in social and professional contexts*
- *To equip them with the components of different forms of writing*

MODULE 1 (15 hours)

INTRODUCTION TO COMMUNICATION: Communication nature and process, Types of communication - Verbal and Non verbal, Communication Flow-Upward, Downward and Horizontal, Importance of communication skills in society, Listening skills, Reading comprehension, Presentation Techniques, Group Discussion, Interview skills, Soft skills

MODULE – II (15 hours)

TECHNICAL COMMUNICATION: Technical writing skills- Vocabulary enhancement-synonyms, Word Formation-suffix, affix, prefix, Business letters, Emails, Job Application, Curriculum Vitae, Report writing- Types of reports

Note: No university examination for communication skills. There will be internal evaluation for 1 credit.

REFERENCES

1. The functional aspects of communication skills, P.Prasad and Rajendra K. Sharma, S.K. Kataria and sons, 2007

2. Communication skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI learning private limited, 2010

3. Professional Communication, Kumkum Bhardwaj, I.K. International (P) House limited, 2008

4. English for technical Communication, Aysha Viswamohan, Tata Mc Graw Publishing Company limited, 2008

CS010 303: Problem Solving and Computer Programming

(Common with IT010 306)

Teaching scheme **Credits:** 4

2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart the basic concepts of problem solving using a computer.*
- *To learn about the structure of C programming language.*

Module I (10 hours)

Problem solving: Steps in Computer programming – Features of a good program – Problem solving using Algorithms and Flowcharts.

C fundamentals: Character set, Constants, Identifiers, keywords, basic data types, Variables, Operators, Expressions, Statements, Input and Output statements – Structure of a C program – simple programs.

Module II (13 hours)

Control statements: if, if-else, nested if – switch – while – do-while – for – break & continue – nested loops.

Single dimensional arrays – defining an array, array initialisation, accessing array elements – Programs for sequential search, bubble sort, binary search.

Multidimensional arrays – defining a two dimensional array, array initialisation, accessing elements – Programs for matrix processing.

Module III (12 hours)

Strings: declaring a string variable, reading and displaying strings, string related library functions – Programs for string matching and sorting.

Functions: Function definition, function call, function prototype, parameter passing, void function – Recursion – Passing array to function.

Macros: Defining and calling macros – Difference between macro & function.

Module IV (13 hours)

Structures: defining a structure variable, accessing members, array of structures, passing structure to function.

Unions: difference with structure, defining union variable, accessing members.

Pointers: declaration, operations on pointers, passing pointer to a function, accessing array elements using pointers, processing strings using pointers, pointer to pointer, array of pointers, pointer to array, pointer to function, pointer to structure, self referential structure.

Module V (12 hours)

Files: Different types of files in C – Opening & Closing a file – Writing to and Reading from a file – Processing files – Library functions related to file – fseek(), ftell(), ungetc(), fread(), fwrite() – Dynamic memory allocation.

Storage Class associated with variables: automatic, static, external and register.

Additional features: Enumerated data type, bitwise operators, typedef.

REFERENCES

1. Programming with C - Byron S. Gottfried, Tata McGraw Hill.
2. Computer Programming in C - Kerninghan & Ritchie, PHI .
3. Programming in C - Stephen C. Kochan, CBS publishers.
4. Programming in C (5e) – E. Balaguruswamy , Mc Graw Hill
5. Let us C – Yashwant Kanetkar, BPB.
6. A Book on C – Al Kelley and Ira Pohl, Addison-Wesley
7. Mastering Turbo C - Stan Kelly Bootle, BPB Publications.
8. Programming and Problem Solving with PASCAL - Micheal Schneider, Wiley Eastern Ltd. (Module 1)
9. Pointers in C - Yashwant Kanetkar, BPB
10. The Spirit of C- by Munish cooper, Jaico Books.

CS010 304: Computer Organization

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

• *To develop a good understanding of a complete computer system through an integrated approach to hardware, software and processor design.*
• *To emphasise on both background theory and actual design.*

Module I (10 hours)

CPU - Arithmetic: Signed addition and subtraction –BCD adder –Multiplication – Array multiplier – Booth's Algorithm, Division – Restoring and non-restoring division.

Module II (12 hours)

Floating-point arithmetic- addition, subtraction, multiplication, division. Decimal arithmetic- addition subtraction, multiplication, division. ALU - design of arithmetic, logical, arithmetic logical unit

Module III (14 hours)

Control Logic Design – Control Organization – Hardware control, Microprogram control (design for specific problems)– Microprogram sequencer, Horizontal and vertical micro instructions.

Module IV (12 hours)

Memory: - Memory hierarchy –Principle of inclusion-memory interleaving techniques. Disk memory - Data organisation on disk-Disk performance –Disk caching. Main memory-SRAM, DRAM, ROM –Associative memory, Scratchpad memory-Cache memory –Levels of Cache-Mapping techniques, Associative, Direct, and Set Associative-Main memory update policies.

Module V (12 hours)

Virtual Memory:-Overlay-Need for virtual memory-Address translation-Translation Look Aside Buffer-Relocation techniques-static, dynamic-Paged memory-Page table, Page frame data table-Segmented memory-Paged segments.

Reference Books

1. M.Morris Mano- *Computer System Architecture*- PHI- Third Edition-2006
2. M.Morris Mano – *Digital Logic and Computer Design* - PHI -2004
3. Carl Hamacher, Zvonko Vranesic, Safwat –*Computer Organization*-McGrawHill- Fifth Edition
4. David A.Patterson,John L.Hennessy-*Computer Organization and Design*-MKArm Edition
5. V.Carl Hamacher,Zvonko G. vranesic,Safwat G.Zaky-*Computer Organization*-McGrawHill-Fourth Edition
6. Behrooz parhami-*Computer Architecture*-Oxford University Press
7. Naresh Jotwani-*Computer System Organisation*- McGrawHill

CS010 305 SWITCHING THEORY AND LOGIC DESIGN

(Common with IT010 304)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives:-

To introduce the principles of Logic Systems and Circuits, thereby enabling the student to obtain the platform for studying Computer Architecture and Design.

Module 1: (14 Hrs)

Number Systems and Codes:- Decimal, Binary, Octal and Hexadecimal Number systems, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.

Switching Theory:- Boolean Algebra- Postulates and Theorems, De' Morgan's Theorem, Switching Functions- Canonical Forms- Simplification of Switching Functions- Karnaugh Map and Quine Mc-Clusky Methods.

Module 2: (12 Hrs)

Combinational Logic Circuits:- Review of Basic Gates- Universal Gates,Adders, Subtractors, Serial Adder, Parallel Adder- Carry Propagate Adder, Carry Lookahead Adder, Carry Save Adder, Comparators, Parity Generators, Decoder and Encoder, Multiplexer and Demultiplexer, PLA and PAL.

Module 3(12 Hrs)

Sequential Logic Circuits:- Latches and Flip Flops- SR, JK, D, T and MS Flip Flops, Asynchronous Inputs.

Clocked Sequential Circuits:- State Tables State Equations and State Diagrams, State Reduction and State Assignment, Design of Clocked Sequential Circuits using State Equations.

Module 4: (10 Hrs)

Counters and Shift Registers:- Design of Synchronous and Asynchronous Counters:- Binary, BCD, Decade and Up/Down Counters , Shift Registers, Types of Shift Registers, Counters using Shift Registers- Ring Counter and Johnson Counter.

Module 5(12 Hrs)

Fault Tolerance and Diagnosis : Concepts of Fault and Hazards- Fault Tolerance in Combinational Circuits- Fault Table, Fault Detection methods-Boolean Difference and Path Sensitizing Methods- Digital ICs- Digital Logic Families- Characteristics- Introduction to RTL, TTL,ECL, MOS and CMOS Logics.

REFERENCES

1. Zvi Kohavi *Switching and Finite Automat theory*, Tata McGrwHill
2. Morris Mano *Digital Logic and Computer Design*, Prentice Hall of India
3. Floyd T.L. *Digital Fundamentals*, Universal Bookstall
4. Biswas N.N. *Logic System Theory* Prentice Hall of India
5. Leach D. Malvino A.P. & Saha – *Digital Principles and Applications*- Tata McGraw Hill
6. Taub, Helbert abd Schilling, *Digital Integrated Electronics* TMH

CS010 306 ELECTRONIC DEVICES AND CIRCUITS

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives:-

- *To introduce the basic principles of various Electronic Circuits, their analysis and Design.*

Pre-requisites: EN010 109 Basic Electronics Engg. & Information Technology

Module 1 (12hrs):-
Transistor Biasing:- Operating Point- DC and AC Load Lines- Q Point selection- Bias Stability- Definition of Stability Factors - Fixed bias, Collector to Base bias , Self bias Circuits, Bias Compensation

Module 2: (12 Hrs)
Transistor as an Amplifier: Transistor at low Frequencies- h Parameter model analysis- Expression of Voltage and Current Gain-Input and Output Impedance.
Tuned Amplifiers:- Principle-Single Tuned and Doubled Tuned Amplifiers- Frequency Response

Module 3: (12 Hrs)
RC Coupled Amplifier:- Working, Analysis and Design- Phase and Frequency Response FET Amplifier- Biasing Analysis and Design- Large Signal amplifiers- Harmonic Distortion, Analysis of Class A, Class B, Class AB, Class C and Class D Amplifiers.

Module 4: (12 Hrs)
Feedback Amplifiers :-- Types of Feedback(Positive, Negative, Voltage, Current, Shunt and Series Feedback) - Feedback in Amplifiers Oscillators- Condition for Oscillation- Analysis and Design of RC Phase Shift Oscillators, Working of Hartley, Colpitt's and Wein Bridge Oscillators.

Module 5: (12 Hrs)
Wave Shaping Circuits:- Clipping, Clamping,RC Integrator, Differentiator, Transistor as a Switch- Astable, Monostable and Bistable Multivibrtaors, Sweep Generators.
Photo Devices:- LCD, Photodiode, Phototransistor, Optocoupler

REFERENCES

1. Electronic Devices and Circuits:- Boylsted- Pearson Education
2. Electronic Principles:- Malvino- Tata McGraw Hill
3. Integrated Electronics:- Jacob Millman & Halkias Tata McGrawHill
4. Electronic Devices and Circuits: -Bogart – Universal Book Stall -Delhi
5. Electronic Devices- Floyd- Pearson Education
6. Microelectronics Digital and Analog Botkar Khanna Publishers

CS010 307(P): Programming Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives
• *To acquaint the students with the fundamentals of programming.*
• *To provide the students with good knowledge in C programming and develop problem solving skills.*

1. Familiarisation with computer system compliers, editors and operating systems etc.
2. Familiarisation with office packages
3. Programming experiments in C to cover input output statements, control statements, functions, string, arrays, Structures, pointers and files.
4. Programes to find factorial, Fibonacci series, palindrome, matrix operations, sort a set of names, search etc.

Any experiment according to the syllabus of CS010 303 can be substituted.

CS010 308 LOGIC DESIGN LAB

Teaching scheme **Credits:** 2
3 hours Practical per week

Objectives:-

- *To provide an introduction to Logic Systems Design thereby giving a hands on experience on working with digital ICS ,which enable the study Computer System Architecture.*

1. Familiarization of Logic Gates and Realization of Logic Circuits using basic Gates.
2. Design and implementation of Arithmetic Circuits:- Half Adder, Full Adder, n bit Ripple Carry Adder, Carry Look ahead Adder, BCD Adder
3. Study of Flip Flops:- implementation of RS, JK, D, T and MS Flip Flops
4. Design and implementation of Synchronous and Asynchronous Counters, UP/DOWN Counters
5. Design and Implementation of Shift Registers, Counters using Shift Registers – Ring Counter and Johnson Counter
6. Study of Multiplexers , Demultiplexers, Encoder and Decoder
7. Design of Comparators and Parity Generators.

SEMESTER IV

EN010401 Engineering Mathematics III

(Common to all branches)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives:

- *Apply standard methods of mathematical &statistical analysis*

MODULE 1 Fourier series (12 hours)

Dirichlet conditions – Fourier series with period 2 π and 2l – Half range sine and cosine series – Harmonic Analysis – r.m.s Value

MODULE 2 Fourier Transform (12 hours)

Statement of Fourier integral theorem – Fourier transforms – derivative of transforms- convolution theorem (no proof) – Parsevals identity

MODULE 3 Partial differential equations (12 hours)

Formation by eliminating arbitrary constants and arbitrary functions – solution of Lagrange's equation - Charpits method –solution of Homogeneous partical differential equations with constant coefficients

MODULE 4 Probability distribution (12 hours)

Concept of random variable , probability distribution – Bernoulli's trial – Discrete distribution – Binomial distribution – its mean and variance- fitting of Binominal distribution – Poisson distribution as a limiting case of Binominal distribution – its mean and variance – fitting of Poisson distribution – continuous distribution- Uniform distribution – exponential distribution – its mean and variance – Normal distribution – Standard normal curve- its properties

MODULE 5 Testing of hypothesis (12 hours)

Populations and Samples – Hypothesis – level of significance – type I and type II error – Large samples tests – test of significance for single proportion, difference of proportion, single mean, difference of mean – chi –square test for variance- F test for equality of variances for small samples

REFERENCES

1. Bali& Iyengar – A text books of Engg. Mathematics – Laxmi Publications Ltd.
2. M.K. Venkataraman – Engg. Mathematics vol II 3rd year part A & B – National Publishing Co.
3. I.N. Sneddon – Elements of partial differential equations – Mc Graw Hill
4. B.V. Ramana – Higher Engg. Mathematics – Mc Graw Hill
5. Richard A Johnson – Miller Fread's probability & Statistics for Engineers- Pearson/ PHI
6. T. Veerarajan – Engg. Mathematics – Mc Graw Hill
7. G. Haribaskaran – Probability, Queueing theory and reliability Engg. – Laxmi Publications
8. V. Sundarapandian - probability ,Statistics and Queueing theory – PHI
9. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International
10. A.K.Mukhopadhyay-Mathematical Methods For Engineers and Physicists- I.K.International

CS010 402: Object Oriented Programming

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives
• *To impart the basic concepts of object oriented programming in C++.*
• *To provide sufficient knowledge about developing real world projects with object oriented concepts.*

Module I (8 hours)
Introduction to OOP - Evolution of object oriented languages - Need of Objects - Definition of Object-Oriented Language – Classes and Objects – Creating and Using Classes and objects – Member functions and variables – Constructors –multiple and parameterized constructorscopy constructors –constructors with default arguments- Destructors.

Module II (13 hours)
Inheritance and Access Control - Member access control in classes – Friend functions and classes – Extending classes - Public Private and Protected Inheritance – Classification of Inheritance – Single – Multiple – Multilevel – Hierarchical – Hybrid.

Module III (14 hours)
Polymorphism – Runtime and compile time polymorphism – overloading functions and operators – selecting friend member function for operator overloading - Virtual methods – pure virtual methods – Abstract classes - applications of abstract classes.

Module IV (13 hours)
Virtual Destructors – Virtual Base Classes - Template- class templates and function templates- Creating and using templates – Namespaces-Dynamic Objects - Dynamic object allocation - Inline functions. Exception Handling-basics of exception handling-exception handling mechanism- Throwing and Catching Mechanism-Rethrowing and Specifying exceptions.

Module V (12 hours)
Data file operations –opening and closing files-reading and writing from file-Classes and file operations-Other object oriented languages – Java – Object oriented features in Java – Comparison with C++-Object oriented system development-object oriented notations and graphs-object oriented analysis-object oriented design.

REFERENCES

1.. Robert Lafore: *Object Oriented Programming in C ++*, 3rd Edition, Galgotia Pub, New Delhi
2. E. Balaguruswamy: *Object oriented Programming with C++*,2nd Edition, Tata McGraw Hill, New Delhi, 2004
3. Dilkeshwar Pandey,Upendra K Tiwari, *Object Oriented Programming with Java*, Acme Learning (Module V), New Delhi ,2010
4. D Ravichandran: *Programming with C++* , 3rd Edition ,Tata McGraw Hill, New Delhi
5. Bjarne Stroustrup , *The C++ Programming Language*, 3rd Edition..,
6. Randal Albert, Todd Breedlove: *C++ ,An Active Learning Approach*, Jones And Bartlett Publishers, New Delhi ,2010
7. Deitel & Deitel, *C++ How To Program, Introducing Object-Oriented Design with the UML*, 3rd Edition Pearson
8. Matt Weisfeld: *The Object Oriented Thought Process* ,3rd Edition,Pearson Education, New Delhi ,2009
9. Jyoti Singh: *Object Oriented Systems & Concepts of C++;* Acme Learning, New Delhi, 2010
10. Poornachandra Sarang: *Object Oriented Programming with C++*, 2nd Edition, PHI, New Delhi, 2009
11. R. Rajaram, *Object Oriented Programming and C++*,2nd Edition,,New Age International Publishers, New Delhi,2007
12. E. Balaguruswamy, *Programming with Java*, 2nd Edition, Tata McGraw Hill, New Delhi
13.Bhushan Trivedi, *Programming with Ansi C++* ,Oxford Higher Education, New Delhi, 2007

CS010 403: Data Structures and Algorithms

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives
• *To impart the basic concepts of data structures and algorithms*
• *To develop understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.*

Module I (10 hours)
Principles of programming – System Life Cycle - Performance Analysis and Measurements-Time and Space complexity-Complexity calculation of simple algorithms. Hashing:- Static Hashing-Hash Tables-Different Hash Functions-Mid Square- Division-Folding-Digit Analysis, Collision-Collision Resolution Techniques.

Module II (12hours)
Study of basic data structures – Arrays- Structures-Sparse matrix – Stacks – Queues-Circular queues- Priority queues - Dqueues. Evaluation of expressions – Polynomial representation using arrays.

Module III (12hours)
Linked Lists - Linked stacks and queues - Doubly linked lists – Polynomial representation using linked lists, Garbage collection and Compaction.

Module IV (14 hours)
Trees - Binary Trees – Tree Traversal – Inorder - Preorder and Postorder, Search trees - AVL Trees, height balanced trees, Multiway search Trees- B Trees-B+ Trees.
Graphs – Depth first and breadth first search.

Module V (12 hours)
Sorting methods: Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, External sorting methods.

REFERENCES

1. Horowitz ,Sahni & Anderson Freed, Fundamentals of Data Structures in C, 2nd ed., Universities Press, Hyderabad, 2009
2. Rajesh K Shukla, *Data Structures Using C & C++* ,Wiley India, New Delhi, 2009
3. Yedidyah Langsam, Moshe J Augenstein, Aron M Tenenbaum, Data Stuctures using C and C++, 2nd ed., PHI Learning Private Limited, New Delhi, 1996
4. G. A. V Pai, *Data Structures and Algorithms Concepts, Techniques and Applications*, Tata McGraw Hill , New Delhi, 2008
5. G. S Baluja, *Data Structures Through C*, Dhanpat Rai & Co. , New Delhi, 2009
6. Sartaj Sahni , *Data Structures, Algorithms and Applications in C++ ,* 2nd ed., Universities Press, Hyderabad, 2009
7. Michael T Goodrich, Roberto Tamassia, David Mount, *Data Structures and Algorithms in C++*, Wiley India Edition, New Delhi, 2009
8. B.M. Harwani, *Data Structures and Algorithms in C++*, Dreamtech Press, New Delhi, 2010
9. Brijendra Kumar Joshi, *Data Structures and Algorithms in C*, McGraw Hill , New Delhi, 2010
10. K R Venugopal, K G Srinivasa, P M Krishnaraj, *File Structures using C++*, McGraw Hill, New Delhi, 2009
11. ISRD Group, *Data Structures using C*, McGraw Hill , New Delhi, 2010
12. Sudipta Mukherjee, , *Data Structures using C 1000 Problems and Solutions*, Tata McGraw Hill, New Delhi, 2010
13. Seymour Lipschutz, *Data Structures with C*, Schaum's Outlines, McGraw Hill , New Delhi, 2010
14. R Krishnamoorthy & G Indirani Kumaravel, *Data Structures using C*, McGraw Hill , New Delhi, 2008
15. John R Hubbard, *Data Structures with C++*, Schaum's Outlines, Tata McGraw Hill , New Delhi, 2010
16. Jean Paul Tremblay & Paul G Sorenson, *An Introduction to Data Structures with Applications*, 2nd ed., Tata McGraw Hill , New Delhi, 2010
17. Seymour Lipschutz, *Data Structures* , Schaum's Outlines, Tata McGraw Hill , New Delhi, 2006

CS010 404 SIGNALS AND COMMUNICATION SYSTEMS

Teaching scheme **Credits:** 4
3hours lecture and 1 hour tutorial per week

Objectives:-

- *To introduce the fundamentals of Analog and Digital Signals ,their properties and introduce the relevant transforms used in Communication.*
- *To familiarize the core ideas of Communication Engineering which in turn adds to the study of Computer Communication.*

Module 1 (15 hrs):-
Introduction to Signals:- Continuous Time Signals- Discrete Time Signals- Signal Operations- Properties of Signals(Periodicity and Symmetry), Frequency Domain Representation of Continuous Time Signals-Continuous Time Fourier Series(CTFS)- Definition- properties- Examples, Continuous Time Fourier Transform(CTFT)- Definition- Properties – Examples- Concept of Frequency Spectrum, Sampling- The Sampling Theorem(proof not required)- Quantisation

Module 2 (12 hrs):-
Communication Systems:- Architecture of a Typical Communication System – Basic problems in Signal Transmission - Noise – Types of Noise- Internal and External Noise, Cross Talk- Typical parameters of Communication Systems- Signal propagation Delay, Signal to Noise Ratio, Attenuation, Bandwidth Communication Channels:- Twisted Pairs- Coaxial Cables- Fiber Optic Cables- Capacity of a Noisy Channel- Shannon Hartley Theorem

Module 3: (15 Hrs)
Modulation- Need for Modulation Analog Modulation- Types of analog modulation- Amplitude Modulation, Frequency modulation, Phase modulation, Pulse Modulation Schemes- Pulse Amplitude modulation(PAM),
Pulse Width Modulation(PWM), Pulse Position Modulation(PPM), Pulse Code Modulation (PCM), Delta modulation, Sample problems based on different modulation methods.
Digital modulation;- Amplitude Shift Keying(ASK), Frequency Shift keying(FSK),Phase Shift Keying(PSK), Quadrature Amplitude modulation (QAM), Differential Phase Shift Keying(DPSK)

Module 4: (8 Hrs)
Multiplexing:-Time Division Multiplexing(TDM)- Frequency Division Multiplexing(FDM)- Wavelength Division multiplexing(WDM)
Switching:- Circuit, Packet and Message Switching Schemes, Case Study:- SONET (Basic ideas only)- Datagrams and virtual Circuits
Digital Transmission:- Analog to Digital Converter(ADC), Serial and parallel Transmission- Simplex, Half Duplex and Full Duplex Transmissions.

Module 5: (10 Hrs)
Error Correction and Detection;- Line Coding Schemes- Block Coding- Convolution Coding- Hamming Codes
Transmission Codes:- Different Character Codes- ASCII, EBCDIC, Baudot Code, Bar Coding, Parity Coding

REFERENCES

1. S.Haykin and B. V. Veen, *Signals and Systems*, John Wiley & Sons, N. Y., 2002
2. George Kennedy, Bernard Davis - *Electronic Communication Systems*-Tata McGraw Hill
3. Behrouz Forouzan- *Data Communication and Networking*- Tata McGraw Hill
4. Michael J Roberts, Govind Sharma- *Fundamentals of Signals and Systems*-Tata McGraw Hill
5. William Stallings- *Data and Computer Communications*- Prentice Hall of India
6. Fred Halsall- Digital Communication, *Computer Networks and Open Systems* Pearson Education
7. Taub and Schilling – *Principles of Communication Systems*- Tata McGraw Hill
8. Kolimbiris H.- *Digital Communication Systems*- Pearson Education

CS010405: Microprocessor Systems

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of microprocessors and interfacing concepts.*
- *To develop an understanding about the assembly level programming.*

Module I (10 hours)
Architecture of 8085 – Registers. Instruction set of 8085 - Instruction Types – Arithmetic – Logic data transfer, Branch, Stack, I/O and Machine Control instructions - Addressing Modes - Direct and Indirect Addressing - Immediate Addressing - Implicit Addressing.

Module II (12 hours)
Subroutines - Stack Operations - Call Return sequence- Programming Examples. Timing and control unit – The fetch operation – Machine cycle and T- State instruction and data flow. Address space partitioning - Memory mapped I/O - I/O mapped I/O.

Module III (14 hours)
Interrupts of 8085 - Hardware & Software Interrupts – Enabling, Disabling and masking of interrupts – Polling – HALT & HOLD states – Programmable interrupt controller – 8259.

Module IV (12 hours)
Data transfer schemes - Programmed data transfer - synchronous and asynchronous transfer - interrupt driven data transfer – DMA data transfer. Study of Interfacing ICs **– 8257,8255** programmable peripheral interface (compare it with 8155).

Module V (12 hours)
Programmable interval timer 8253, 8251 **-,**Interfacing Keyboard and display devices, Hardware and Software approach – USART 8251. (interfacing chips functions and internal block diagram only).

REFERENCES

1. Gaonkar -Microprocessor Architecture, *Programming and Applications with the 8085* - New Age International
2. Renu Singh, B. P. Singh -*Microprocessors, interfacing and Applications* New Age International-Third Edition
3. N K Srinath -*8085 Microprocessors programming and interfacing* - PHI
4. Adithya P. Mathur -*Introduction to Microprocessors Systems* - PHI
5. KK Tripathi, Rajesh K Gangwar -*Microprocessorand its Applications* -Acme learning
6. R.Theagarajan,S.Dhanasekaran,S.Dhanapal –*Microprocessor and ITS Applications* New Age International
7. N Senthil Kumar,M saravanan,s.jeevananthan-*Microprocessor and microcontrollers* - Oxford higher education

CS 010 406: Theory of Computation

(Common with IT010 404)

Teaching Scheme **Credits :** 4

3 hours lecture and 1 hour tutorial per week

Objectives

· *To impart the basic concepts of theory of automata ,languages and computation.*

· *To develop understanding about machines for sequential computation, formal languages and grammars , and classification of feasible and intractable problems.*

Module I (10 hours)

Proving techniques-Mathematical induction -Diagonalization principle –Pigeonhole principle-Functions – Primitive recursive and partial recursive functions – Computable and non computable functions—-Formal representation of languages – Chomsky Classification.

Module II (13 hours)

Introduction to Automata theory – Definition of Automation – Finite Automata –Language acceptability by Finite Automata –Deterministic and Nondeterministic finite automation- Regular Expressions – Finite Automation with ∈-Transitions –Conversion of NFA to DFA - Minimisation of DFA-DFA to Regular Expressions conversion-pumping lemma for regular languages – Applications of finite automata-NFA with o/p (moore /mealy)

Module III (12 hours)

Context Free Grammar –Simplification of CFG-Normal forms-Chomsky Normal form and Greibach Normal form- pumping lemma for Context free languages- Applications of PDA - Pushdown Automata – Formal definition – Language acceptability by PDA through empty stack and final state – Deterministic and nondeterministic PDA – designing of PDA

Module IV (13 hours)

Turing Machines – Formal definition – Language acceptability by TM –TM as acceptors, Transducers - designing of TM- Two way infinite TM- Multi tape TM - Universal Turing Machines- Church's Thesis-Godelization.- - Time complexity of TM - Halting Problem - Rice theorem - Post correspondence problem-Linear Bounded Automata.

Module V (12 hours)

Complexity classes- Tractable problems– Class P –P Complete-Reduction problem- Context grammar nonempty-Intractable problems- Class NP – NP Complete- Cooks theorem-Reduction problems-SAT-Clique-Hamiltonian-TSP-Vertex Cover-NP Hard problems.

REFERENCES

1. K.L.P. Mishra, N. Chandrashekharan , *Theory of Computer Science* , Prentice Hall of India
2. Michael Sipser, *Introduction to the Theory of Computation*, Cengage Learning,New Delhi, 2007
3. Harry R Lewis, Christos H Papadimitriou, *Elements of the theory of computation*, Pearson Education Asia
4. Rajendra Kumar,*Theory of Automata Language & Computation*,Tata McGraw Hill,New Delhi, 2010
5. Wayne Goddard, *Introducing Theory of Computation*, Jones & Bartlett India,New Delhi 2010
6. Bernard M Moret: *The Theory of Computation,* Pearson Education
7. John Hopcroft, Rajeev Motwani & Jeffry Ullman: *Introduction to Automata Theory Languages & Computation*, Pearson Edn
8. Raymond Greenlaw,H. James Hoover, *Fundamentals of Theory of Computation*,Elsevier,Gurgaon,Haryana, 2009
9. John C Martin, *Introducing to languages and The Theory of Computation*, 3rd Edition, Tata McGraw Hill,New Delhi, 2010
10. Kamala Krithivasan, Rama R, *Introduction to Formal Languages,Automata Theory and Computation*, Pearson Education Asia, 2009
11. Rajesh K. Shukla, *Theory of Computation*, Cengage Learning, New Delhi,2009
12. K V N Sunitha, N Kalyani: *Formal Languages and Automata Theory*, Tata McGraw Hill,New Delhi, 2010
13. S. P. Eugene Xavier, *Theory of Automata Formal Language & Computation*,New Age International, New Delhi, 2004

CS010 407: Data Structures Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To provide experience on design, testing, and analysis of Algorithms and Data Structures.*
- *To acquaint the students with the Data Structures used in the Computer Science field.*

1) Representation of Polynomials using Arrays and Linked List and the different operations that can be performed on Polynomials
2) Representation of Sparse Matrix using Arrays and Linked List and the different operations that can be performed on Sparse Matrices
3) Representation of Stacks using Arrays and Linked List and the different operations that can be performed on Stacks
4) Representation of Queues using Arrays and Linked List and the different operations that can be performed on Queues
5) Representation of Double Ended Queue using Arrays and Linked List and the different operations that can be performed on Double Ended Queue
6) Representation of Priority Queues using Arrays and Linked List and the different operations that can be performed on Priority Queues
7) Representation of Binary Trees using Arrays and Linked List and the different operations that can be performed on Binary Trees
8) Representation of Graphs using Arrays and Linked List and the different operations that can be performed on Graphs
9) Infix, Postfix and Prefix conversions.
10) Different Sorting and Searching methods.
11) String representation using Arrays and Linked List and different pattern matching algorithms
12) Implementation and operations on B-Tree and B+Tree

Any experiment according to the syllabus of CS010 403 can be substituted.

CS010 408(EC) ELECTRONIC CIRCUITS AND COMMUNICATION LAB

Teaching scheme **Credits:** 2
3 hours Practical per week

Objectives:-

- *To provide an introduction to Electronic Circuits Design thereby giving a hands on experience on working with various Electronic Components, and Devices*

PART 1 (Electronic Circuits):-
1. Design of Two Stage RC Coupled Amplifiers
2. Design of FET Amplifiers
3. Design of Bootstrap Sweep Generators
4. Design of Astable, Monostable, and Bistable Multivibrators (3 experiments)
5. Design of Oscillators(RC Phase Shift Oscillator, Hartley Oscillator, Colpitt's Oscillator – 3 experiments)

PART 2 (Communication Engineering):-
1. Amplitude Modulation
2. Frequency Modulation
3. Delta Modulation
4. Pulse Amplitude Modulation (PAM)
5. Pulse Width Modulation (PWM)
6. Amplitude Shift Keying (ASK)
7. Phase Shift Keying (PSK)

Note: - A minimum of 5 experiments from each part must be done.

REFERENCE BOOKS

1. Boylestead and Nashelky- Electronic Devices and Circuits- Prentice Hall of India
2. George Kennedy - Electronic Communication Systems - TMH

SEMESTER V

EN010501 B Engineering Mathematics IV
(CS, IT)

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives:

- *To use basic numerical techniques for solving problems and to know the importance of learning theories in mathmatics and in queueing system*.

MODULE 1 Finite differences (12 hours)
Finite difference operators - interpolation using Newtons forward and backward formula – Newton's divided difference formula - Numerical differentiation using Newtons forward and backward formula – Numerical integration – Trapezoidal rule – Simpsons 1/3rd and 3/8th rule

MODULE 2 Z transforms (12 hours)
Definition of Z transforms – transform of polynomial function and trignometric functions – shifting property , convolution property - inverse transformation – solution of 1st and 2nd order difference equations with constant coifficients using Z transforms.

MODULE 3 Discrete numeric functions (12 hours)
Discrete numeric functions – Manipulations of numeric functions- generating functions – Recurrence relations – Linear recurrence relations with constant coefficients – Homogeneous solutions – Particular solutions – Total solution – solution by the method of generating functions.

MODULE 4 Complex integration (12 hours)
Functions of complex variable – analytic function - Line integral – Cauchy's integral theorem – Cauchy's integral formula – Taylor's series- Laurent's series – Zeros and singularities – types of singularities – Residues – Residue theorem – evaluation of real integrals in unit circle – contour integral in semi circle when poles lie on imaginary axis.

MODULE 5 Queueing Theory (12 hours)
General concepts – Arrival pattern – service pattern – Queue disciplines – The Markovian model M/M/1/ , M/M/1/N – steady state solutions – Little's formula.

REFERENCES

1. C.L.Liu and D.P. Mohapatra – Elements of Discrete Mathematics - Mc Graw Hill
2. S.Lipschutz, M.L.Lipson – Discrete mathematics –Schaum's outlines – Mc Graw Hill
3. B.V. Ramana - Higher Engg. Mathematics – McGraw Hill
4. Babu Ram – Engg. Mathematics -Pearson.
5. K Venkataraman- Numerical methods in science and Engg -National publishing co
6. V. Sundarapandian - probability ,Statistics and Queueing theory - PHI
7. S.Bathul – text book of Engg.Mathematics – Special functions and complex variables –PHI
8. H. Weif HSU – probability, random variables & Random processes – Schaum's out lines - Mc Graw Hill
9. T.Veerarajan - probability ,Statistics & Random processes - Mc Graw Hill
10. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International

EN010 502(ME): Principles of Management

(Common with EN010 402(ME))

Teaching Scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week.

Objectives

- *To develop an understanding of different functional areas of management.*
- *To understand the functions and duties an individual should perform in an organisation.*

Module I (12 hours)

Management Concepts: Vision, Mission, Goals and Objectives of management- BOScientific management- Functions of management- Planning- Organizing- Staffing- Directing- Motivating- Communicating- Coordinating- Controlling- Authority and Responsibility- Delegation- Span of control- Organizational structure- Line, Line and staff and Functional relationship.

Module II (12 hours)

Personnel Management: Definition and concept- Objectives of personnel management- Manpower planning- Recruitment and Selection of manpower- Training and development of manpower- Labour welfare- Labour turnover- Quality circle- Industrial fatigue- Industrial disputes-Method of settling disputes- Trade unions.

Module III (12 hours)

Production management: Objectives and scope of production management- Functions of production department- production management frame work- product life cycle-Types of production- Production procedure- Project planning with CPM and PERT- Basic concepts in network.

Module IV (12 hours)

Financial Management: Objectives and Functions of Financial Management- Types of Capital- Factors affecting working capital- Methods of financing.
Cost Management: Elements of cost- Components of cost- Selling Price of a product.

Module V (12 hours)

Sales and Marketing Management: Sales management- Concept- Functions of sales department- Duties of sales engineer- Selling concept and Marketing concept- Marketing- Definition and principles of marketing- Marketing management and its functions- Sales forecasting- Pricing- Advertising- Sales promotion- Channels of distribution- Market research.

Text Books

1. Koontz and Weihrich, *Essentials of Management*, Tata McGraw Hill.
2. Mahajan M., *Industrial Engineering and Production Management*, Dhanpat Rai and Co.
3. Kemthose and Deepak, *Industrial Engineering an Management*, Prentice Hall of India.

Reference Books

1. Martand Telsang, *Industrial Engineering and Production Management.*
2. Khanna O.P., *Industrial Engineering and Management*, Dhanpat Rai and Co.
3. Philip Kotler, *Marketing Management*, Prentice Hall of India.
4. Sharma S. C. & Banga T. R., *Industrial Organisation and Engineering Economics*, Khanna Publishers.
5. Prasanna Chandra, *Financial Management*, Tata McGraw Hill.

CS010 503: Database Management Systems

(Common with IT010 506)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart an introduction to the theory and practice of database systems.*
- *To develop basic knowledge on data modelling and design of efficient relations.*
- *To provide exposure to oracle database programming.*

Module I (10 hours)

Basic Concepts - Purpose of Database Systems- 3 Schema Architecture and Data Independence- Components of DBMS –Data Models, Schemas and Instances-Data Modeling using the Entity Relationship Model-Entity types, Relationship Types, Weak Entity Types .

Module II (14 hours)

Relational Model Concepts –Constraints – Entity Integrity and Referential Integrity, Relational Algebra -Select, Project, Operations from Set Theory, Join, OuterJoin and Division - Tuple Relational Calculus.

SQL- Data Definition with SQL - Insert, Delete and Update Statements in SQL, Defining Domains, Schemas and Constraints, Constraint Violations - Basic Queries in SQL - Select Statement, Use of Aggregate functions and Group Retrieval, Nested Queries, Correlated Queries – Views.

Module III (12 hours)

Oracle Case Study : The Basic Structure of the Oracle System – Database Structure and its Manipulation in Oracle- Storage Organization in Oracle.- Programming in PL/SQL- Cursor in PL/SQL - Assertions – Triggers.

Indexing and Hashing Concepts -: Ordered Indices, Hash Indices, Dense and Sparse Indices, Multi Level Indices, Cluster Index, Dynamic Hashing.

Module IV (11 hours)

Database Design– Design Guidelines– Relational Database Design – Functional Dependency- Determination of Candidate Keys, Super Key, Foreign Key, Normalization using Functional Dependencies, Normal Forms based on Primary keys- General Definitions of First, Second and Third Normal Forms. Boyce Codd Normal Form– Multi-valued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form – Pitfalls in Relational Database Design.

Module V (13 hours)

Introduction to Transaction Processing- Transactions- ACID Properties of Transactions- Schedules- Serializability of Schedules- Precedence Graph- Concurrency Control – Locks and Timestamps-Database Recovery

Query processing and Optimization- Translating SQL Queries into a Relational Algebra Computing Select, Project and Join

Object Relational Databases-Distributed Databases-Different Types-Fragmentation and Replication Techniques-Functions of DDBMS.

REFERENCES

1. Elmsari and Navathe, *Fundamentals of Database System,* Pearson Education Asia, 5th Edition, New Delhi, 2008.
2. Henry F Korth, Abraham Silbershatz , *Database System Concepts*, Mc Graw Hill 6td Edition, Singapore, 2011.
3. Elmsari and Navathe, *Fundamentals of Database System,* Pearson Education Asia, 3rd Edition, New Delhi,2005, for oracle
4. Alexis Leon and Mathews Leon, *Database Management Systems,* Leon Vikas Publishers, New Delhi.
5. Narayanan S, Umanath and Richard W.Scamell, *Data Modelling and Database Design,Ce*ngage Learning, New Delhi, 2009.
6. S.K Singh,*Database Systems Concepts,Design and Applications,* Pearson Education Asia, New Delhi, 2006.
7. Pranab Kumar Das Gupta, *Datbase management System Oracle SQL And PL/SQL,* Easter Economy Edition, New Delhi, 2009
8. C.J.Date , *An Introduction to Database Systems,* Pearson Education Asia, 7th Edition, New Delhi.
9. Rajesh Narang, *Database Management Systems,* Asoke K ghosh , PHI Learning, New Delhi, 2009.
10. Ramakrishnan and Gehrke, *Database Management Systems,* Mc Graw Hill, 3rd Edition , 2003.
11. Peter Rob and Carlos Coronel, *Database Systems,* Thomson Course Technology, 7th Edition, 2007.
12. Satinder Bal Guptha and Adithya Mittal, *Introduction to Database Management System,* University Science Publishers, New Delhi, 2010.
13. Patrick O'Neil and Elizabeth O'Neil, *Database Principles, Programming and Performance,* Morgan Kaufmann, 2nd Edition, New Delhi,2010 .
14. Ramon A Mata-Toledo and Pauline K Cushman, Schaum's OUTlines *Database Management Systems,* Tata Mc Graw Hill , New Delhi, 2007.
15. Michel Kifer, Philip M. Lewis, Prabin K .Panigrahi and Arthur Bernstein, *Database Systems An Application Oriented Approach*, Pearson Education Asia, 2nd Edition, New Delhi, 2008.

CS010 504 DIGITAL SIGNAL PROCESSING

Teaching Schedule **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives:-

- *To introduce the principles and core areas of Signal Processing, in a programmatic approach and explore the basic ideas on the applications of DSP in various fields of Science and Technology.*

Pre-requisites:

CS 010 404 Signals and Communication Systems

Module 1: (15 Hrs)

Basic Concepts of DSP Systems:- Review of Continuous Time Signals and Discrete Time Signals, Elementary Discrete Signals, Operations on Discrete Signals- Operations on Independent and Dependent Variable(s)- Convolution Sum, Discrete Systems, Properties of Discrete Systems, Response of LTI Systems ,Z-Transforms- Definition, Properties and Illustrative Examples, System Function, Discrete Time Fourier Transform(DTFT)- Definition, Properties and Illustrative Examples, Frequency Response

Module 2: (15 Hrs)

Discrete Fourier Transform(DFT): -Definition, Properties and Illustrative Examples, Relation between DFT, DTFT and Z Transforms, Complexity of DFT calculation, Divide & Conquer – Fast Fourier Transform (FFT)- Radix 2 Decimation in Time (DIT) and Decimation in Frequency (DIF)Algorithms, Composite Point DFT Computation, Circular convolution- Computation of Circular Convolution using DFT, Discrete Cosine Transform, ,Finite Word Length effects in DFT Computation

Module 3(12Hrs)

Digital Filter Design:- Need of Digital Filters, Types of Digital Filters- Theoretical and Realizable Frequency responses of Low Pass, High Pass, Band Pass and Band Stop Filters. Filter Design Specifications

Finite Impulse Response Filter:- FIR Filters with Linear Phase, Need of Linear Phase, Frequency response of Linear Phase FIR Filters, FIR Filter Design Methods- Fourier Series Method – Gibb's Phenomenon, Window Method- Design of FIR Filters using Rectangular, Triangular,Hamming, Hanning, Blackmann and Kaiser Windows, Frequency Sampling Method. Realization of FIR Filter- Direct, Linear Phase and Cascade Realisations.Finite Word Length effects in FIR Filter Design

Module 4: (10 Hrs)

Infinite Impulse Response Filters:- Steps in IIR Filter Design, Conversion of Analog Filter to Digital Filter- Impulse Invariant and Bilinear Transformations, Analog Filter Design Approximations- Butterworth and Chebyshev Approximations., Realization of IIR Filter- Direct, Cascade and Parallel Realizations. Finite Word Length effects in IIR Filter Design.

Module 5(8 Hrs)

Introduction to DSP Chips: - Basic Architecture of a DSP chip, Case Study: TMS 320, TigerSHARC Processors (Overview of Architecture and Features)

Applications of DSP:- Audio Signal Processing and Compression, Image Processing- JPEG Compression,Video Compression, Speech Processing and Recognition, Weather Forecasting, RADAR, (Brief idea only)

*Note: While discussing the Topics on Frequency response, DFT, Design of FIR and IIR Filters, illustrative example programs **must** be developed in **MATLAB/SCILAB** .*

Reference Books

1. Digital Signal Processing Andreas Antoniou Tata McGrawHill
2. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall of India Pvt. Ltd., 1997
3. Digital Signal Processing , A Computer Based Approach- S.K. Mithra TataMcGraw Hill
4. Oppenheim A. V., Schafer R. W., Discrete-Time Signal Processing, PrenticeHall/Pearson.

CS010 505: Operating Systems
(Common with IT010 504)

Teaching Scheme **Credit:** 4
3 hours lecture and 1 hour tutorial per week.

Objectives
• *To understand the fundamental concepts and techniques of Operating Systems.*
• *To study the basic structure of Linux system*.

Module I (8 hours)
Introduction: Operating System – Batch, Multiprogrammed, Time-sharing and Real time systems – Operating system structure – Operating system operations
System Structures: Operating system service – System calls – System Programs – System structure – Simple structure, Layered approach – Kernel, Shell.

Module II (12 hours)
Process Management: Process concept – Process state, PCB – Process scheduling – Operations on processes – Interprocess communication – Multithreading –Benefits, Models
Process Scheduling: Basic concepts – Preemptive scheduling, Dispatcher – Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling.

Module III (16 hours)
Process Synchronization: The Critical-Section problem – Peterson's solution – Synchronization Hardware – Semaphores – Classic problems of synchronization – Monitors
Deadlocks: System model – Deadlock characterization – Methods for handling deadlocks – Prevention, Avoidance and Detection – Recovery from deadlock.

Module IV (14 hours)
Memory Management: Resident Monitor – Dynamic loading – Swapping – Contiguous memory allocation – Paging – Basic, Multi-level Paging – Segmentation
Virtual Memory – Demand Paging – Page Replacement algorithms – Allocation of Frames – Thrashing – Cause of thrashing.

Module V (10 hours)
File System: File concept – Access methods – Directory structure – Directory implementation – Linear list, Hash table – Disk scheduling
Case study: Linux system.

Reference Books

1. Abraham Silberschatz, Peter B.Galvin and Greg Gagne, "*Operating System Concepts*", John Wiley & Sons Inc, 8th Edition 2010.
2. D M Dhamdhere, "*Operating Systems A Concept-based Approach"*, Tata McGraw Hill, New Delhi, 2nd Edition, 2010.
3. Achyut S Godbole, *"Operating Systems",* Tata McGraw Hill , New Delhi, 2nd Edition, 2009.
4. Elmasri, Carrick, Levine, "*Operating Systems A Spiral Approach"*, Tata McGraw Hill, New Delhi, First Edition 2010.
5. Gary Nutt, "Operating Systems", Second Edition, Addison Wesley, 2003.
6. Andew S. Tanenbaum, "*Modern Operating*", Pearson Education, Second Edition, 2001.
7. Promod Chandra P.Bhatt, "*An introduction to Operating Systems Concepts and Practice",* PHI, New Delhi, Third Edition, 2010
8. B Prasanalakshmi, "*Computer Operating System*", CBS Publishers, New Delhi, First Edition, 2010
9. D P Sharma, "Foundation of *Operating Systems",* EXCEL BOOKS, New Delhi, First Edition 2008
10. Brian L Stuart, "*Operating Systems Principles, Design and Applications",* Cengage Learning, New Delhi, First Edition 2009.
11. Charles Crowley, "*Operating Systems A Design Oriented Approach",* Tata McGraw Hill, New Delhi, First Edition 2009.
12. Pabitra Pal Choudhaury, " *Operating Systems Principles and, Design",* PHI, New Delhi, First Edition, 2009

CS010 506: Advanced Microprocessors & Peripherals

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week.

Objectives

- *To understand the concepts related to advanced microprocessors.*
- *To study the basic technology of various peripherals.*
- *To have an overview of different types of communication buses and ports*.

Module I (15 hours)
8086 Architecture, Block diagram – Addressing modes – Instructions set of 8086 – data transfer – arithmetic – branch – loop – flag manipulation – shift & rotate – string instructions – writing simple program in 8086.

Module II (9 hours)
Additional features of 80286 – protected mode memory addressing – Additional features of 80386 – Paging mechanism (Flat memory model) – Additional features of Pentium Processors – Brief study of latest processors of Intel & AMD – Dual core processor(Brief idea only) .
Note: Architecture not required for the processors discussed in this module.

Module III: Peripherals (11 hours)
Study of motherboards – Different types of ports, slots and connectors – Processor Bus, AGP, PCI – Add-on cards – USB – Hard Disk Interfaces – IDE, ATA, Power supply – SMPS – function & operations.

Module IV: Storage Devices (15 hours)
Magnetic data storage: Principles – Hard disks – Cylinders – Clusters – Tracks and Sectors – Disk formatting – Partitioning – Hard disk drive operation – Data Transfer rates – Data addressing – CHS addressing – Logical Block Addressing.
Optical storage: CD Technology, CD ROM, CD-R, CD-RW, Interface – Magneto optical drives – DVD – RAID – Blu-ray disc.

Module V (10 hours)
Memory: Parity – ECC – Memory Addressing – 640 KB barrier – Extended and Expanded memory – HMA – Video memory – Flash Memory – Pen drive – Advanced memory technologies.

Reference Books

1. A K Ray, K M Bhurchandi, "*Advanced Microprocessors and Peripherals*", Tata McGraw Hill, New Delhi, 2nd Edition, 2010.
2. Craig Zacker & John Rourke, "*PC Hardware: The Complete Reference*", Tata McGraw Hill, New Delhi, First Edition, 2001.
3. Barry B.Brey, "*The Intel Microprocessors*", PHI, New Delhi, Sixth Edition, 2004.
4. Nilesh B. Bahadure, "Microprocessors", PHI, New Delhi, First Edition, 2010.
5. K.K Tripathi, Rajesh K Gangwar, "*Microprocessor and Its Application*", Acme Learning,2010
6. Douglas V Hall, "*Microprocessors and Interfacing*", Tata McGraw Hill, New Delhi, 2nd Edition, 2006
7. Scott Mueller, "*Upgrading and Repairing PC's*", Pearson Education, 17th Edition, 2006
8. Stephen J.Bigelow, "*Troubleshooting, Maintaining and Repairing PC's*", Tata McGraw Hill, New Delhi, 5th Edition, 2001

CS010 507 Database Lab

Teaching scheme **Credits:** 2
3 hours practical per week.

Objectives

- *To acquaint the students with the implementation and fundamental algorithms of database systems.*
- *To provide experience on design, querying, and processing of data in a relational database.*

I. Experiments to implement the following

1. Relational algebra operations select, project and join.
2. Determination of Attribute Closure, Candidate Key, Functional Dependency.
3. Checking Serializability of a Schedule.
4. Dynamic Hashing.

II. Experiments in any relational database for the following

1. Creation, Insertion, Updation, Deletion of Tables, Indexes, Views.
2. Simple Queries, Nested Queries, Use of Arithmetic and String Functions.
3. Simple PL/SQL Programs, Use of Exceptions, Cursor, Procedure, Function, Trigger, Sequence.
4. Report Generation
5. ODBC/JDBC Interface.

Any experiment according to the syllabus of CS010 503 can be substituted.

Resources:

1 SQL,PL/SQL"Ivan Bayross", BPB Publication 3rd Ed.

CS010 508: Hardware and Microprocessors Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To acquaint the students with the implementation and fundamental algorithms of database systems.*
- *To provide experience on design, querying, and processing of data in a relational database.*
- *To familiarise the students with 8085,8086,masm programming and various PC hardware components*
- *To provide experience on design, querying, and processing of data in a relational database.*

Phase I
1. Familiarization of 8085 training Kit.
2. Simple programs using 8085 Kit.

Phase II
3.Study of MASM Programming.
4.Simple programs in 8086 using MASM.

Phase III.
5.Familiarisation with PC Components.
6.Experiments based on various hardware components.
7.Experiments for communication with peripheral devices using C and MASM

NB: Students should do the experiments in all the phases. External examiner can conduct University Examinations on any of these phases.

SEMESTER VI

CS010 601: Design And Analysis Of Algorithms

(Common with IT010 605)

Teaching scheme **Credits:** 4

2 hours lecture and 2 hour tutorial per week

Objectives

- *To develop an understanding about basic algorithms and different problem solving strategies.*
- *To improve creativeness and the confidence to solve non-conventional problems and expertise for analysing existing solutions.*

Module I (13 hours)

Introduction and Complexity

What is an algorithm – Properties of an Algorithm, Development of an algorithm, Pseudocode Conventions, Recursive Algorithms – Performance Analysis - Space and Time Complexity –Asymptotic Notations – 'Oh', 'Omega', 'Theta', Worst, Best and Average Case Complexity, Running Time Comparison, Common Complexity Functions –Recurrence Relations – Solving Recurrences using Iteration and Recurrence Trees – Example Problems – Profiling - Amortized Complexity.

Module II (11 hours)

Divide and Conquer - Control Abstraction, Finding Maximum and Minimum, Costs associated element comparisons and index comparisons, Binary Search, Divide and Conquer Matrix Multiplication, Stressen's Matrix Multiplication, Quick Sort, Merge Sort. – Refinements.

Module III (14 hours)

Greedy Strategy - Control Abstraction, General Knapsack Problem, Minimum Cost Spanning Trees – PRIM's Algorithm, Kruskal's Algorithm, Job sequencing with deadlines.
Dynamic Programming - Principle of Optimality, Multistage Graph Problem, Forward Approach, Backward Approach, All-Pairs Shortest Paths, Traveling Salesman Problem.

Module IV (11 hours)

Backtracking – State Space Tree - Fixed Tuple and Variable Tuple Formulation - Control Abstraction – Generating Function and Bounding Function - Efficiency of the method - Monte Carlo Method – N-Queens Problem, Sum of Subsets.
Branch and Bound Techniques – FIFO, LIFO, and LC Control Abstractions, 15-puzzle.

Module V (11 hours)

Sophisticated Algorithms - Approximation Algorithms – Planar Graph Coloring, Vertex cover - String Matching Algorithms – Rabin Karp algorithm - Topological Sort - Deterministic and Non-Deterministic Algorithms.
Lower Bound Theory - Comparison Trees for Searching and Sorting, lower bound on comparison based algorithms, Sorting, Selection & Merging; Oracles and Adversary Arguments –Merging,Basic concepts of randomized algorithm-Las Vagas algorithm for search.

Reference Books

1. Ellis Horowitz and Sartaj Sahni, Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms,*Universities Press, 2nd Edition, Hyderabad.
2. Thomas Coremen, Charles, Ronald Rives, *Introduction to algorithm*, PHI Learning
3. Sara Baase & Allen Van Gelder , *Computer Algorithms – Introduction to Design and Analysis*, Pearson Education.
4. Anany Levitin, *Introduction to The Design & Analysis of Algorithms,* Pearson Education, 2nd Edition, New Delhi, 2008.
5. Berman and Paul, *Algorithms*, Cenage Learning India Edition, New Delhi, 2008.
6. S.K.Basu , *Design Methods And Analysis Of Algorithms* ,PHI Learning Private Limited, New Delhi,2008.
7. Jon Kleinberg and Eva Tardos, *Algorithm Design*, Pearson Education, New Delhi, 2006.
8. Hari Mohan Pandey, *Design Analysis And Algorithms,* University Science Press, 2008.
9. R. Panneerselvam, D*esign and Analysis of Algorithms,* PHI Learning Private Limited, New Delhi, 2009.
10. Udit Agarwal, *Algorithms Design And Analysis,* Dhanapat Rai & Co, New Delhi, 2009.
11. Aho, Hopcroft and ullman, *The Design And Analysis of Computer Algorithms,* Pearson Education, New Delhi, 2007.
12. S.E.Goodman and S. T. Hedetmiemi, *Introduction To The Design And Analysis Of Algorithms*, McGraw-Hill International Editions, Singapore 2000.
13. Richard Neapolitan, Kumarss N, *Foundations of Algorithms*, DC Hearth &company.
14. Sanjay Dasgupta, Christos Papadimitriou, Umesh Vazirani, Algorithms, Tata McGraw-Hill Edition.

CS010 602: Internet Computing

Teaching scheme **Credits**: 4

2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart the basic concepts of Internet Computing and Java Programming*
- *To develop understanding about Internet Computing with the help of Java Platform and establishing network connections using Socket Programming*

Module I (10hours)

Introduction to Java- Genesis of Java- Features of Java –Data Types-Variables and Arrays-Operators- Control Statements – Selection Statements – Iteration Statements- Jump Statements.

Module II (12 hours)

Creating & using classes in Java – Methods and Classes – Inheritance – Super Class – Method Overriding –Packages and Interfaces – Implementing Interfaces- Exception Handling – Exception Types, Threads-Multithreaded programs, Thread Priorities and Thread synchronization.

Module III (14hours)

I/O – I/O Basics – Byte Streams and Character Streams, Reading Console Input, Collections Framework, Applets & Applet Architecture-Applet Skelton- Passing Parameters to Applet, Event Handling-Event Model- Event Classes – Event Listener Interfaces, AWT – AWT Classes – AWT Controls – Layout Managers and Menus. Swing- JApplet – Jbuttons - JTables.

Module IV (13 hours)

Network Programming with Java – Socket Programming in Java-Client Sockets- Server Sockets- Secure Server Sockets- TCP/IP Programming with Java – Datagrams, IP multicasting, Remote Method Invocation.

Module V (11 hours)

Advanced Java Programming – Accessing Databases with JDBC, Servlets, Image processing using Java – Image Filter – Web Application development using Java Technolgies- Java Server Faces.

Reference Books

1) Herbert Schildt, *Java 2 Complete reference*, 5th ed., Tata McGraw Hill, New Delhi, 2010
2) Deitel & Deitel *Java How To Program* 7th ed., Pearson Education ,New Delhi, 2008
3) Cay Horstmann *Big Java* 3rd ed., Wiley India Edition, New Delhi, 2009
4) Y Daniel Liang *Introduction to Java Programming* 7th ed., Pearson Education ,New Delhi, 2010
5) R Krishnamoorthy, S Prabhu *Internet & Java Programming*, New Age International Publishers, New Delhi, 2008
6) Rajkumar Buyya, S Thamarai Selvi, Xingchen Chu, *Object Oriented Programming with Java*, McGraw Hill, New Delhi, 2009
7) P Radha Krishna, *Object Oriented Programming through Java* Universities Press, Hyderabad2008
8) Debasish Jana, *Java and Object Oriented Programming Paradigm*, Prentice Hall of India, New Delhi, 2005
9) G Thomas Wu, *An Introduction to Object Oriented Programming with Java*,4th ed., Tata McGraw Hill, New Delhi, 2010
10) E Balagurusamy, *Programming with Java A Primer*, 4th ed., McGraw Hill, New Delhi, 2010
11) John R Hubbard, *Programming with Java*, 2nd ed., Schaum's Outlines, Tata McGraw Hill, New Delhi, 2004

CS010 603 SYSTEM SOFTWARE

Teaching Scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives:-

- *To introduce the techniques adopted in the design and implementation of System Software.*

Module I (12 Hrs)
Introduction:-
System Software Vs. Application Software, Different System Software–, Macro Processor, Assembler, Linker, Loader, Text Editor, Debugger, Device Driver, Compiler, Interpreter[1] Database Management System, Operating System,[2]
Macro Preprocessor
Macro Instruction Definition and Invocation. Types of Macros – Parameterised macros, Nested macros, Recursive macros. Basic functions of Macro Preprocessor – Macro expansion, Generation of unique labels. Macro preprocessor design and Algorithm – Handling conditional Macro calls, Nested Macro calls and Recursive Macro calls.[Reference (1)] *Case Study* : *The C Preprocessor* [Web- Reference (1)]

Module - II (15 Hrs)
Assembler
Assembly Language Concepts – Mnemonic Instructions, Assembler Directives and Literals. Instruction formats and Addressing modes. Program Blocks and Control Sections. Basic Functions of Assembler. Assembler output format – Header, Text and End Records. Assembler Design – 2 Pass Assembler – Necessity of two passes and Forward reference. Algorithm for the two passes. Single Pass Assembler – Algorithm for Single Pass assembler. Handling External references – usage of Define and Refer records. Multi pass Assembler, Macro Assembler.[Reference (1)]
Case Study : *Microsoft Macro Assembler for MS-DOS* [Reference (1), (5)] - *Microsoft OBJ file format (Basic Structure and Important Records Only)* [Reference(2)].

Module - III (12 Hrs)
Linker and Loader
Need for Linking and Loading : The absolute loader, Program Relocation, Relocating Loader, Linking external symbols. Algorithms for the two passes of a Linking Loader. [References (2),(3)] Variants of the basic model – Automatic Library Search, Linkage Editor, Dynamic Linking. [Reference(1)]
Case study : *UNIX ELF and Microsoft DLL (basic structure only).*

Module - IV (11 Hrs)
Text Editors : Overview of Editing, User Interface, Editor Structure. [Reference (1)]
Case Study : VI Editor (Basic ideas only)[Reference (1)]
Debuggers : Debugging Functions and Capabilities, Relationship with other parts of the system, Debugging Methods- By Induction, Deduction and Backtracking, . [Reference (1) ,(8)] *Case Study : gdb* (Basic ideas only)

Module - V (10 Hrs)
Device Driver : Device Characteristics ,Design and anatomy, Types of device driver,

General Design – Character Devices and character device drivers, Block Devices and Block device drivers.
Case Study: Device Driver for the PC Speaker [References(4), (6),(7)]

REFERENCES

1. System Software: An Introduction to Systems Programming – Leland L. Beck, Pearson Education Asia 3rd Edition.
2. Systems Programming and Operating Systems – D.M. Dhamdhere, Tata McGraw Hill Second Revised Edition.
3. Systems Programming – John J. Donovan, Tata McGraw Hill Edition 1991.
4. Writing UNIX device drivers - George Pajari -Pearson Education Asia.
5. IBM PC Assembly Language and Programming - Peter Abel Third Edition – Prentice Hall of India
6. Linux Device Drivers - Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman – Third Edition - O.Reilly Books
7. Linux Kernel Internals- M. Beck, H. Bohme, M .Dziadzka, et al – Second Edition – Addison Wesley
8. System Software – J Nithyashri –Second Edition- Tata McGraw Hill

WEB REFERENCE:

1. http://gcc.gnu.org/onlinedocs/gcc-2.95.3/cpp_1.html The C Preprocessor

Note: separate subjects are provided in the syllabus in the Seventh and Fifth Semesters for the detailed discussion of the subjects marked [1] and [2] respectively.

CS010 604: Computer Networks

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To develop basic knowledge on the mode of operation of different types of computer networks that are used to interconnect a distributed community of computers and various interfacing standards and protocols.*

Module I (8 hours)
Network requirements, Network Architecture –layering and protocol, OSI Architecture, Internet Architecture, Performance-bandwidth and latency, Delay x bandwidth product, high speed networks.

Module II (10 hours)
Direct Link Network, Hardware Building Block, Framing-Byte Oriented Protocol, Bit Oriented Protocol , Clock Based Framing, Reliable Transmission-Stop and Wait, Sliding Window, Ethernet(802.3)-Physical properties, Access protocol, Wireless- Bluetooth, WiFi, Wimax

Module III (12 hours)
Packet Switching-Switching and Forwarding- Datagram, virtual circuit switching, Source routing Bridges and LAN Switches-Learning Bridges, Spanning tree Algorithms ,Broadcast and Multicast, Limitations of bridges, Simple Internetworking- Service Model, Global Address, Datagram Forwarding in IP, address translation, Routing-network as graph, distance vector, link state, matrix

Module IV (16 hours)
End to End Protocol, Simple de-multiplexer, Reliable Byte stream, TCP-Issues, segment format, connection establishment and termination sliding window revisited, triggering transmission, adaptive retransmission, RPC-fundamentals ,TCP Congestion control –additive increase, slow start, fast retransmit and fast recovery, congestion avoidance mechanism, DEC bit, Random Early Detection bit, Source Based Congestion avoidance

Module V (14 hours)
Applications -WWW, E-mail, Name Service, Network Management, Web Services Custom Application protocol, Generic Application Protocol ,Overlay Networks-Peer to Peer Networks.

Reference Books
1.Computer Networks A Systems Approach-Larry L.Peterson and Bruce S.Davie,4th Edition Morgan Kaufman
2. Introduction to data communication and networking Behrouz Forozan TMH.
3 .Computer networks, Andrew S Tanenbaum, PHI
4.Data communication, computer networks and open systems, Halsall F, Addison Wesley.

CS010 605 SOFTWARE ENGINEERING

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives:-

- *To familiarize the steps in designing a Computer Software System following the conventions in Engineering Design.*
- *To introduce the fundamentals of Structured and Object Oriented Designs and Design Tools.*

Module I (12 Hrs)
The Evolving role of Software – Software – The changing Nature of Software – Legacy software ,Introduction to CASE tools, A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) – Process Assessment – Personal and Team Process Models. Product and Process. Process Models – The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models – Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models – the Unified Process.

Module - II (12 Hrs)
Management: Functions - Project planning - Software productivity - Productivity metrics - Cost estimation - COCOMO & COCOMO II - Project control - Work breakdown structures, Gantt charts, PERT charts - Dealing with deviations - Team organization - centralized, de-centralized, mixed - An assessment of organizations - Risk management – Configuration Management. Introduction to project management and planning CASE tools.

Module - III (12 Hrs)
Requirements Engineering : Requirements Engineering tasks – Initiating the requirements Engineering Process-Eliciting Requirements – Developing Use cases – Building the Analysis Models – Elements of the Analysis Model – Analysis pattern – Negotiating Requirements – Validating Requirements. SRS Document.

Module - IV (12 Hrs)
Design activity & its objectives – Function Oriented and Object Oriented Design-Modularization techniques - module structure and its representation, interface and information hiding, categories, specific techniques to accommodate change, stepwise refinement, top-down and bottom-up design - Handling anomalies. Case Study with UML and CASE Tool support.

Module - V (12 Hrs)
Implementation Techniques - Programming principles and guidelines – Structured Programming. Software Testing Fundamentals-Test Case Design-White-Box Testing-Basis Path Testing-Control Structure Testing- Black-Box Testing- Various levels of Testing : Modules to System. Case study : Test case design and Testlog preparation

REFERENCES

1. Roger S.Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill International edition, Seventh edition.
2. Ian Sommerville, Software Engineering, 8th Edition, Pearson Education, 2008 (UNIT V)
3. Stephan Schach, Software Engineering, Tata McGraw Hill, 2007
4. Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson Education, second edition, 2001

CS010 606L01: DISTRIBUTED SYSTEMS

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart an introduction to distributed systems and distributed computing.*
- *To develop basic knowledge on distribution of data and file systems in distributed environment.*
- *To provide exposure to distributed database concepts.*

Module I (10 hours)
Introduction to Distributed Systems, evolution, characteristics, design issues, user requirements, Distributed computing models-workstation model, workstation-server model, processor–pool model. Protocols for distributed systems -VMTP and FLIP.

Module II (12 hours)
Client server communication, Group communication, IPC - Message passing – features. RPC – model, implementation, stub generation, RPC messages, communication protocols marshalling. Distributed shared memory – Architecture, design issues, thrashing, replacement strategy.
Synchronization – clock synchronization, event ordering, mutual exclusion.

Module III (14 hours)
Distributed file system**:** Components of DFS, design issues, interfaces, implementation, File Caching and Replication. Sun Network File System – architecture and implementation, Google File System. Naming- Namespace and contexts and name resolution.

Module IV (12 hours)
Distributed system management**:** Features of scheduling algorithms, Task assignment approach, load balancing, load sharing, Process migration mechanisms, Threads – design issues, Fault tolerance – failures, Byzantine failures.

Module V (12 hours)
Distributed Databases: Distributed DBMS architecture, distributed query processing, transactions, concurrency control, deadlock management and Distributed Database Recovery protocols-2PC, Network Partitioning.

Reference Books
1. Sunita Mahajan, Seema shah, *Distributed Computing* ,Oxford University Press, first edition, 2010
2. George Coulouris, Jean Dellimore and Tim Kindberg, *Distributed Systems – Concepts and designing*, Pearson Education Asia, fourth Edition 2006, New Delhi.
3. Pradeep. K, Sinha, Distributed Operating Systems ,PHI Edition, first Edition,1997.
4. Andrew S Tenenbaum, Distributed Operating Systems, Pearson Education Asia

CS010 606L02 Micro controller Based Systems

(Common with EE010 503 and EC010 502)

Teaching scheme **Credits:** 4

2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart the basic concepts of microcontrollers and their programming in assembly language and in C.*
- *It also focused on the 8051 microcontroller which is a widely used microcontroller.*

Pre-requisites: *Microprocessor systems, Advanced microprocessor and peripherals*

Module I (10 hours)

Microcontroller - Features of 8051-Arcchitecture of 8051-Pin diagram of 8051-memory organization-External memory interfacing-stacks- addressing modes-instruction set.

Module II (12 hours)

8051 programming in C-data types and time delay – I/O programming – logical operation – data conversation program –basics of serial communication connection to RS232- serial port programming in assembly and C.

Module III (14 hours)

Basics of interrupts,-interrupt sources- interrupt enable register-interrupt priority-interrupt control system-interrupt handling-single step operation- port bit latches and buffers-port structures and operation- accessing external memory.

Module IV (12 hours) Timer 0& -Timer1- T MOD SFR-mode0,mode 1,mode2,mode3-TCON SFR-serial interface-SCON SFR-mode0,mode 1,mode 2,mode3-block schematics baud rates-power on reset circuit-ONCE mode-on chip oscillator-external program & data memory timing diagrams.

Module V (12 hours)

PIC microcontrollers: Overview and features-PIC16C6X/7X FSR-Reset action-PIC memory organization-instructions-addressing modes.

Reference Books

1. Muhammad Ali mazidi, Janice Gillispie Mazidi, Rolin D Mc kinlay , *The 8051 microcontroller and embedded systems*,person, second edition., 2006
2. V Udayashankara,M S Mallikarjunaswamy ,8051 Microcontroller hardware &software application,TMH
3. Ajay V Deshmukh,Microcontrollers, theory and applications,TMH
4. Kennath J Ayala, *The 8051 microcontroller*., Penram International
5. 1 Satish Shah,*8051 microcontrollers MCS 51 family and its variants* ,Oxford higher education

CS010 606L03: User Interface Design

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart the basic concepts of User Interface Design.*
- *To develop understanding about human computer interaction methods that utilize more general, widespread and easier-to-learn capabilities.*

Module I (8 hours)
Introduction: Importance of user interface – definition, importance of good design, brief history – Graphical User Interface – Web User Interface – Theories, Principles and Guidelines of User interface design

Module II (10 hours)
Design Process: Obstacles in development path deigning for people-Understanding Human Interaction with computers, Importance of Human Characteristics, Human consideration, Human Interaction speeds – Understanding Business function

Module III (15 hours)
Screen Designing: Design goals - screen meaning and purpose, organizing screen elements ordering of screen data and content – screen navigation and flow – visually pleasing composition – amount of information – focus and emphasis – presenting information simply and meaningfully – information retrieval on web – Statistical graphics – Technological considerations in Interface Design.

Module IV (15 hours)
Menus and navigation schemes-structures of menus-functions of menus- contents of menus - formatting of menus – phrasing the menu- selecting menu choices-navigating menus-kinds of graphical menus- Selection of windows-Window characteristics-components of window, window presentation styles-types of windows-window management-organising window functions-window operations-Selection of device based and screen based controls - text and messages – icons and images – Multimedia – colours- uses, problems, choosing colours.

Module V (12 hours)
Distributed and Collaborative Interaction-Device consistency-distribution of the user interface-event distribution-graphical package layer-programmable API-Model semantics distribution-data layer distribution-asynchronous collaboration-Software tools-specification methods- interface building tools –evaluation and critiquing tools-Interaction devices keyboard and function keys - pointing devices- speech recognition, digitization and generation – image and video displays – printers.

Reference Books

1. Wilbert O. Galitz,*The Essential Guide to User Interface Design,* 2nd Edn., Wiley Dreamtech,Delhi,2002
2. Ben Shneiderman, *Designing the User Interface* ,3rd Edn., Pearson Education Asia,Delhi,2002
3. Dan R. Olsen, *Human Computer Interaction*,Cengage,New Delhi,2009
4. John M. Carroll,*Human Computer Interaction*, Pearson Education Asia, Delhi,2002
5. Alan Cooper, *The Essentials of User Interface Design* , Wiley Dreamtech, Delhi,2002.

CS010 606L04 : UNIX Shell Programming
(Common with IT010 606L03)

Teaching Scheme **Credits:** 4

2 hours lecture and 2 hour tutorial per week

Objectives

• *To provide a fair knowledge of Unix concepts and gain sharp skills in Unix Shell programming*

Module 1. (8 hours)

Introduction to Unix:- Architecture of Unix, Features of Unix , Basic Unix Commands - Unix Utilities:- Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands – Text processing utilities and backup

Module 2. (13 hours)

Introduction to Shells:-Unix Session, Standard Streams, Redirection, Pipes, tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization. Regular expressions, Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, words or lines, Comparing Files.

Module 3. (12 hours)

grep:-Operation, grep Family, Searching for File Content.
sed:-Scripts, Operation, Addresses, commands, Applications, grep and sed.
awk:-Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, Mathematical Functions, User Defined Functions, Using System commands in awk, Applications of awk, grep and sed

Module 4. (15 hours)

Interactive Shells - Korn Shell, C Shell and BASH - Shell Features, Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process. Shell Programming - Korn Shell, C Shell and BASH - Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

Module 5. (12 hours)

Process management:- Creation, Hierarchies, Sending signals to processes, exec, termination, Zombie, waitpid etc - Network management:- tools, Client server mechanism, address resolution, ping, telnet, ftp, dns and squid – X Window System:- Overview, Architecture, starting and stopping X, X clients and display

Reference Books

1. Behrouz A. Forouzan, Richard F. Gilberg," Unix and shell Programming.", Cengage Learning
2. Sumitabha Das , "Unix the ultimate guide", TMH. 2nd Edition.
3. Kernighan and Pike, "Unix programming environment", PHI. / Pearson Education
4. Graham Glass, King Ables," Unix for programmers and users", 3rd edition, Pearson Education
5. Maurice J. Bach, "The Design of the Unix Operating System", First Edition, Pearson Education, 1999

CS010 606L05: Embedded Systems

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart the basic concepts of Embedded System and its applications*
- *To develop understanding about micro controllers and programming the micro controller for the development of Embedded systems.*

Module I (-12 hours)
Introduction to Embedded Systems-Classification of Embedded Systems-Application areas of Embedded Systems, Typical Embedded System- Memory-Sensors and Actuators-Embedded Firmware - Characteristics and Quality Attributes of Embedded Systems

Module II (13 hours)
Application Specific Embedded System – Domain Specific Embedded System, Designing Embedded Systems with 8bit Microcontrollers- Factors to be considered in selecting a Controller- Designing with 8051 microcontroller- 8052 microcontroller, Programming the 8051 microcontroller – Addressing modes of 8051 – the 8051 Instruction set

Module III (13 hours)
Hardware Software Co-Design and Program Modeling – Computational models in Embedded Design, Embedded Hardware Design and development – Electronic Design Automation Tools, Embedded Firmware Design and Development - Embedded Firmware Design Approaches - Embedded Firmware Development Languages – Programming in Embedded C.

Module IV (12 hours)
Real Time Operating System based Embedded System Design – Operating System Basics – Types of Operating Systems – Tasks- Process- Threads – Multiprocessing and Multitasking – Task Scheduling – Task Communication – Task Synchronization – Introduction to Vx Works and Micro C/OS-II RTOS

Module V (10 hours)
The Embedded System Development Environment – Integrated Development Environment , The Embedded Product Development Life Cycle – EDLC- Objectives of EDLC – Different phases of EDLC – Modeling the EDLC

Reference Books
1. Shibu K V, *Introduction to Embedded Systems*, McGraw Hill, New Delhi, 2009
2. Raj Kamal, *Embedded Systems Architecture, Programming and Design,* 2nd ed., Tata McGraw Hill , New Delhi, 2008
3. Frank Vahid & Tony Givargis, *Embedded System Design A Unified Hardware/Software Introduction,* Wiley - India Edition, New Delhi, 2010
4. Wayne Wolf , *Computers as Components Principles of Embedded Computing System Design,* 2nd ed., Elsevier, Gurgaon, 2009
5. Steven F Barrett & Daniel J Pack , *Embedded Systems Design and Applications with the 68HC12 and HCS12,* Pearson Education, Delhi, 2008.

CS010 606L06: Advanced Software Environments

Teaching Scheme: **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart the basic concepts of Windows programming..*
- *To develop understanding about the new software environment and develop of software to meet the growing demand of the industry.*

Pre-requisites: *Knowledge required to study this subject (OOP concepts))*

Module I (10 hours)
Windows Programming – Components of Windows API- Distinction with ordinary programs – Event Driven Programming – WinMain Function – Creating Windows – Message loop – Window procedures - Menus & Buttons – Drawing on Windows, Advanced User Interface concepts, Developing application issues and solutions.

Module II (10 hours)
MFC Features & Advantages – MFC Classes – Life cycle of an MFC application – The CWinApp Classes – Creating windows – Message maps and event handling – Menus & Buttons - Drawing on MFC windows – Handling mouse & Keyboard events.

Module III (13 hours)
X-Windows – Clients & Servers - Basic Architecture of X-Windows systems – Layers in XWindows Architecture – XWindows Programming – Simple Hello World Application in X. Command line options and resources – connecting to X-Display – creating windows and graphics context – Handling events – creating child windows.

Module IV (13 hours)
CORBA – Introduction – Features – Fundamental concepts in Distributed objects – CORBA IDL – stub & Skeleton - implementing a simple CORBA server and CORBA client with C++.

Module V (14 hours)
CORBA object reference – Managing references at server – CORBA factories – CORBA object creation in C++ & JAVA – CORBA Exceptions – Destroying CORBA objects - comparison of CORBA & DCOM Architectures.

Reference Books
1. Yashwanth Kanetkar , Visual C++ Programming ,BPB Publications ,New Delhi, 2005.
2. Mike Blaszczals, Professional MFC with Visual C++ 6, 4th Edition, Shroff publishers & Distributors Private Limited, New Delhi, 2003.
3. Nabajyoti Bakakati, X Window System programming , 2nd Edition, Prentice-Hall of India Private Limited,New Delhi, 2001.
4. Jason Pritchard ,COM & CORBA side by side , Pearson Edition New Delhi, 2000.

CS010 607: Operating Systems Lab

Teaching scheme **Credits:** 2
3 hours practical per week.

Objectives

- *To provide a practical exposure of all algorithms and behaviour of processes in the system with respect to all its timings.*
- *This lab also explains the allocation of process in the memory with some memory management techniques.*

(Implement the following on LINUX platform. Use C for high level language implementation)
1. Basic UNIX commands
2. Shell programming
- Command syntax
- Write simple functions with basic tests, loops, patterns
3. Write programs using the following system calls of UNIX operating system:
fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
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 and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
7. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
8. Implement the Producer – Consumer problem using semaphores.
9. Implement inter-process communication using shared memory.
10. Implement some memory management schemes

Example for expt 10:
Free space is maintained as a linked list of nodes with each node having the starting byte address and the ending byte address of a free block. Each memory request consists of the process-id and the amount of storage space required in bytes. Allocated memory space is again maintained as a linked list of nodes with each node having the process-id, starting byte address and the ending byte address of the allocated space.
When a process finishes (taken as input) the appropriate node from the allocated list should be deleted and this free disk space should be added to the free space list. [Care should be taken to merge contiguous free blocks into one single block. This results in deleting more than one node from the free space list and changing the start and end address in the appropriate node].

For allocation use first fit, worst fit and best fit.

CS010 608 Mini Project

Teaching Scheme **Credits:** 2
3 hours practical per week

Objectives

- *To estimate the ability of the student in transforming the theoretical knowledge studied so far into application software.*
- *For enabling the students to gain experience in organisation and implementation of a small project and thus acquire the necessary confidence to carry out main project inthe final year.*
- *To understand and gain the knowledge of software engineering practices, so as to participate and manage large software engineering projects in future.*

In this practical course, each group consisting of two/three members (four in special cases) is expected to design and develop practical solutions to real life problems related to industry, institutions and computer science research. Software life cycle should be followed during the development. The theoretical knowledge, principles and practices gained from various subjects should be applied to develop effective solutions to various computing problems. The knowledge gained during various practical subjects to work with various software tools, Designing tools, programming languages, operating systems, etc. should be utilized in various stages of development. Structured/ Object Oriented design techniques may be used for the project. Software Requirements Specification (SRS), Modeling Techniques, Design and Testing strategies should be documented properly.
A committee consisting of minimum three faculty members will perform the internal assessment of the mini project. A report on mini project should be submitted for evaluation and project work should be presented and demonstrated before the panel of examiners.

Internal Continuous Assessment *(50 marks)*
40% - Design and development (30% by guide and 10% by committee)
30% - Final result and Demonstration (15% by guide and 15% by committee)
20% - Report (10% by guide and 10% by committee)
10% - Regularity in the class (by guide)

End Semester Examination *(Maximum Marks-100)*
20% - Demonstration of mini project
50% - Practical test connected with mini project
20% - Viva voce
10% - Project report

SEMESTER VII

CS010 701: Web Technologies

Teaching Scheme **Credits:** 4

2 hours lecture and 2 hours tutorial per week.

Objectives

- *To impart the new concepts in Web Technologies*
- *To develop understanding about the different technologies used in the World Wide Web including XML, Perl,*

Module I (15hours)

XHTML

Evolution of HTML and XHTML- Standard XHTML Document Structure- Basic Text Markup- Images-Hypertext Links-Lists- Tables- Forms- Frames.

Cascading Style Sheets

Introduction to CSS – Levels of Style Sheets- Style Specification Formats- Selector Forms- Property Value Forms – Font Properties- List Properties – Color- Alignment of Text – Background Images- Span and Div Tags.

Module II (12 hours)

XML

Introduction to SGML – features of XML - XML as a subset of SGML – XML Vs HTML – Views of an XML document - Syntax of XML- XML Document Structure – Namespaces- XML Schemas- simple XML documents – Different forms of markup that can occur in XML documents - Document Type declarations – Creating XML DTDs – Displaying XML Data in HTML browser – Converting XML to HTML with XSL minimalist XSL style sheets – XML applications

Module III (12hours)

Perl

Origin and Use of Perl- Scalars and their Operations – Assignment Statements and Simple Input and Output – Control Statements- Fundamentals of Arrays – Hashes- References- Functions- Pattern Matching – File Input and Output – Simple programs in Perl -Using Perl for CGI Programming.

Module IV (12 hours)

PHP

Origin and Use of PHP- Overview of PHP- General Syntactic Characteristics- Operations and Expressions- Control Statements- Arrays- Functions-Pattern Matching- Form Handling- Files-Cookies-Session Tracking - Simple programs in PHP.

Module V (9 hours)

Rails

Overview of Rails- Document Requests- Processing Forms- Rails Application with Databases – Layouts.

Ajax

Overview of Ajax – Basics of Ajax – Rails with Ajax.

Reference Books

1) Robert W Sebesta, Programming with World Wide Web , 4th ed., Pearson Education, New Delhi, 2009
2) Deitel & Deitel Internet & World Wide Web *How To Program* 4th ed., Pearson International Edition Education ,New Delhi, 2009
3) Deitel & Deitel, Nieto, Lin, Sadhu, XML How to Program, Pearson Education ,New Delhi, 2011
4) Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2009
5) Chris Bates, Web Programming Building Internet Applications 3rd ed., Wiley India Edition, New Delhi, 2009
6) Phil Ballard, Michael Moncur, Sams Teach Yourself Ajax, JavaScript and PHP, Pearson Education ,New Delhi, 2009.
7) Achyut S Godbole , Atul Kahate, Web Technologies TCP/IP Architecture and Java Programming, 2nd ed., Tata McGraw Hill Education Private Limited, New Delhi, 2010
8) Pankaj Sharma, Introduction to Web Technology, Katson Books, New Delhi, 2008
9) Bankim Patel, Lal Bihari Barik, Introduction to Web Technology & Internet, Acme Learning Private Limited, New Delhi, 2009

CS010 702: COMPILER CONSTRUCTION

Teaching Schemes **Credits:** 4
2 hours lecture and 2 hour tutorial per week.

Objectives

- *To introduce the various techniques involved in the translation of source programs into object programs by a compiler.*
- *To understand the inner working of a compiler using the various data structures used in the translation process.*

Module 1 (12Hrs)
Introduction to compilers:-Phases of a compiler-Analysis and synthesis phases-Lexical analysis and its role-Review of finite automation and Regular Expressions-Specification of tokens using regular expressions-Implementing lexical analyzer using finite automation-Design of lexical analyzer using LEX

Module 2 (12 Hrs)
Syntax analyzer-Role of syntax analyzer-Review of context free grammar-derivation and parse trees-Basic parsing approaches-Top down parsing-Recursive Descent parsing –LL(1) parsing-Bottom up parsing-Shift reduce parsing-Operator precedence parsing-LR parsing-Simple LR, Canonical LR and LALR parsers- Design of syntax analyzer using YACC

Module 3 (12 Hrs)
Semantic analysis-Need for semantic analysis-Syntax directed definitions-S attributed definitions- L- attributed definitions-Translation schemes-Type system and Type checking-Design of a simple type checker
Storage Management:-Memory allocation strategies (static, stack and heap allocations)-Memory allocation in block structured languages-Accessing local and non local data-Array allocation and access-Procedure calls-Parameter passing methods-Runtime stack and storage management

Module 4(12 Hrs)
Synthesis phase:-Intermediate Code Generation (ICG)-Need for ICG-IC Formats-3 Address code-Triples and quadruples
Code optimization:-Need for code optimizer-Basic blocks and program flow graph-Machne dependent and machine independent optimizations-Optimization transformations-Local and global optimizations

Module 5(12 Hrs)
Code Generation-Basic issues in code generation-Data descriptors-Expression trees-Generating target code from expression trees-Symbol table handling-Symbol table requirements and organization. Error handling-Types of errors-Compile time errors and recovery-Runtime errors-Runtime Error Handling ,Cross Compilers and Incremental Compilers(Brief idea only)

Reference Books

1.) Aho A Ravi Sethi and J D Ullman, Compilers Principles Techniques and Tools,Addison Wesley
2.) Kenneth C Louden, "Compiler Construction Principles and Practice", Cenage Learning Indian Edition
3.) D M Dhamdhare, System programming and operating system, Tata McGraw Hill & Company
4.) Tremblay and Sorenson, The Theory and Practice of Compiler Writing - Tata McGraw Hill & Company

CS010 703: COMPUTER GRAPHICS

Teaching Scheme **Credits:** 3
2 hours lecture and 1 hour tutorial per week.

Objectives:-

- *To understand the basic concepts of Computer Graphics & display techniques.*

Module I (3 Hrs)
Introduction: Applications of Computer Graphics, Raster scan and Random scan displays **[1]**– Video Display Devices, Display files – graphical input & output devices-Flat panel displays, Hardcopy Output Devices, Physical Interactive Devices , Data generation devices.**[2]**

Module II (10 Hrs)
2D Graphics: Output primitives-Line drawing algorithms – DDA, Bresenham's – Bresenham's Circle drawing algorithm – Other curves,polynomials and spline curves-2D viewing transformation-clipping-Cohen-Sutherland line clipping –polygon clipping-2D Transformations**[1]**

Module III (12 Hrs)
3D Graphics: 3D Transformations, 3D display methods, 3D Object Representation – Polygon Surfaces – Curved lines and surfaces-Quadric surfaces – Spline Representations – Cubic Spline Interpolation Methods-Bezier Curves and Surfaces – B-Spline Curves and Surfaces, Sweep representation,Octrees.**[1]**

Module IV (10 Hrs)
3D Rendering: Three-Dimensional Viewing – Projections **[3]**, Visible Surface Detection – Classification of Visible surface detection algorithms – Back-face Detection, Depth- Buffer Method, Scan-line Method. **[1,3]**

Module V (10 Hrs)
Rendering: Surface Rendering Methods- Basic illumination Models – Polygon–rendering Methods,Interpolative shading methods-Constant shading, Gouraud shading,Phong shading, Texture Mapping.**[3]**
Fractal Geometry Methods – Classification of Fractals – Self-Squaring Fractals, Ray Tracing and Ray Casting.**[1]**

REFERENCES:
1. Computer Graphics (C version) - Donald Hearn & Pauline Baker (Pearson Education Asia)
2. Procedural Elements for Computer Graphics –David F. Rogers, TATA McGraw Hill edition-second edition.
3. Computer Graphics - Zhigang Xiang & Roy A Plastack, Schaum's Series McGraw Hill edition.

CS010 704 : Object Oriented Modeling and Design

Teaching Scheme **Credits:** 3
2 hours lecture and 1 hour tutorial per week.

Objective

- *To impart ideas on building systems through the object oriented modelling approach using the Unified Modelling Language.*

Module 1 (10 hours)
Introduction: object oriented development-modeling concepts – object oriented methodology – models – object oriented themes-Object Modeling– links and associations – advanced links and association concepts – generalization and inheritance - grouping constructs – a sample object model
Advanced Object Modeling: aggregation – abstract classes – generalization as extension and restriction – multiple inheritance – metadata – candidate keys – constraints.

Module 2 (10 hours)
Dynamic modeling: Events and states – Operations – Nested state diagrams – Concurrency – Advanced dynamic modeling concepts – A sample dynamic model – Relationship of Object and Dynamic models.
Functional modeling: Functional models – Data Flow Diagrams - Specifying operations – Constraints – A sample functional model – Relation of functional to Object and Dynamic models.

Module 3 (10 hours)
Analysis: Analysis in object modeling, dynamic modeling and functional modeling, Adding operations- Iterating the analysis
System Design: Breaking system into subsystems - Identifying concurrency-allocating subsystems to processors and tasks, managing of data stores. Handling of global resources- handling boundary conditions-Common Architectural Frameworks

Module 4 (8 hours)
Object Design: Overview of Object design – Combining the three models – Designing algorithms – Design optimization – Implementation of control – Adjustment of inheritance - Design of association – Object representation – Physical packaging – Documenting design decisions-Comparison of methodologies

Module 5 (7 hours)
Unified Modeling language: Introduction, UML Diagrams – Class diagrams, Sequence diagrams, Object diagrams, Deployment diagrams, Use case diagrams, State diagrams, Activity diagram, Component diagrams – Case Study.

Reference Book
1.Object Oriented Modeling and Design -James Rumbaugh, Prentice Hall India
2.UML Distilled – Martin Fowler, Addison Wesley
3.Object- oriented Systems analysis and design using UML- 4th ed., Simon Bennet,Stephen McRobb, Ray Farmer. TMH.
4.Object Oriented Analysis and Design with Applications - Grady Booch, Pearson Education Asia

CS010 705: PRINCIPLES OF PROGRAMMING LANGUAGES

Teaching Scheme **Credits:** 3
2 hours lecture and 1 hour tutorial per week.

Objectives

- *To provide an overview of the key paradigms used in developing modern programming languages.*
- *To explore the implementation details of languages to provide an understanding of the source program and its execution behavior*.

Module I (9 Hours)
Introduction – Role of programming languages - Programming domains - Language evaluation criteria - Influence on language design - Implementation methods - Virtual computers - Bindings - Concept of binding.

Module II (9 Hours)
Data types - Implementation of data types - Primitive, User defined – Names –Variables – Type checking - Strong Typing - Type compatibility -Scope – Lifetime - Referencing environments - Named constants – Virtualization - Heap management.

Module III (8 Hours)
Expressions , Assignments and Control Structures – Arithmetic expressions – Assignment statements-Compound statements - Selection statements - Iterative statements – Unconditional branching – Guarded commands.

Module IV (10 Hours)
Subprograms-Fundamentals-Design issues-Local Referencing Environment-Parameter passing methods –Subprogram names as parameters – Overloaded Subprograms – Generic Subprograms – Separate & independent compilation – Design issues for functions – Accessing non-local environments – User defined overloaded operators – Co-routines.

Module V (9 Hours)
Implementation of Subprograms – General semantics of calls & returns- Activation Records – Blocks – Recursion
Exceptions and Programming Paradigms - Exception handling in C++, Java, PL/I, Ada , Fundamentals of Functional programming language – Examples – LISP Interpreter - Overview of Logic programming - Basic elements of Prolog.

REFERENCES

1. Robert W. Sebesta , "Concepts of Programming Languages" 4th Ed,2001.
2. Ravi Sethi "Programming Languages-concepts and constructs", Addison Wesley, 2nd Ed,1996.
3. Terrence W. Pratt , "Programming Languages" , Prentice Hall, 9th Ed,1996.
4. Michael L. Scott, "Programming Language Pragmatics" ,Elsevier, New Delhi,2009.
5. Thomson Learning, Kenneth .C. Louden, "Programming Languages: Principles And Practices", 2nd Ed,2011.
6. Bjarne StroutStrup ,"Design and Evolution of C++", Addison Wesley,1991.
7. James Gosling, "Java Programming Language ", Addison Wesley,2000.

CS010 706L01 : Real Time Systems
(Common to IT010 706L04 Real Time Systems)

Teaching Schemes **Credits:** 4

2 hours lecture and 2 hour tutorial per week.

Objectives

• *to learn , real-time operating systems, task scheduling, communication, fault tolerant techniques and , programming languages*

Module 1 (12 hours)

Introduction to Real Time Systems: Structure of real time systems, real time computer, task classes – Periodic, Aperiodic, critical, Non-critical, definition of real time systems – real time systems, embedded systems - Hard real time systems, soft real time systems, real time design issues.

Module 2 (12 hours)

Task Assignment and Scheduling: Uniprocessor scheduling algorithms –Rate monotonic Scheduling, Preemptive Earliest Deadline First (EDF), IRIS Tasks. Scheduling Aperiodic and Sporadic jobs in Priority Driven Sytems, Task Assignment- Utilization Balancing algorithm, Next Fit Algorithm for RM scheduling, Bin Packing for EDF, Myopic Offline Scheduling(MOS), Focused Addressing and Bidding, Buddy strategy. Fault Tolerant scheduling.

Module 3 (12 hours)

Communication – Communication Media and message sending topologies, network architecture issues, protocols – contention – based, token - based, stop and go multi loop, polled bus, hierarchal round robin, fault tolerant routing – clocks and synchronization– fault tolerant synchronization in hardware, synchronization in software.

Module 4 (12 hours)

Fault tolerance – definition, cause of failure, fault types, fault detection and containment, redundancy – hardware, software, time, information, integrated failure handling. Reliability Evaluation techniques- Obtaining parameter values, Reliability models for Hardware redundancy, software error models.

Module 5 (12 hours)

Programming Languages and Real Time databases – Desired language characteristics, Data Typing, Control Structures. Real time databases, characteristics, main memory databases, Transaction, Disk schedule algorithms, Databases for hard real time systems, maintaining serialization constituency.

References

1. Real Time Systems - C.M Krishna, Kang G. Shini (Tata McGraw Hill)
2. Real Time Systems- Jane W.S. Liu(Pearson)

CS010 706L02: DATA MINING AND DATA WAREHOUSING

Teaching Scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives
• *To impart an introduction to Data Mining.*
• *To develop basic knowledge of how data is transformed to Data Warehouses* .

Module I (12 hours)
Data Mining- Data Mining Funtionalities-Classification of Data Mining Systems-Data Mining Task Primitives- Major Issues in Data Mining
Data Preprocessing- Descriptive Data Summarization- Data Cleaning- Data Integration and Transformation- Data Reduction- Data Discretization and Concept Hierarchy Generation

Module II (14 hours)
Data Warehouse- A Multidimensional Data Model- Data Warehouse Architecture- Data Warehouse Implementation
Data Cube Computation and Data Generalization- Efficient methods for Data Cube Computation- Data Cube and OLAP Technology- Attribute Oriented Induction

Module III (10 hours)
Mining Frequent Patterns-Associations- Correlations-Basic Concepts-Efficient and Scalable Frequent Itemset Mining methods- Mining various kinds of Association Rules- From Association Mining to Correlation Analysis- Constraint Based Association Mining.

Module IV (12 hours)
Classification and Prediction- Issues regarding Classification and Prediction- Classification by Decision Tree Induction- Bayesian Classification – Rule Based Classification- Classification by Backpropagation- Support Vector Machines- Classification by Association Rule Analysis- Learning from Neighbors- Prediction- Accuracy and Error measures- Evaluating the accuracy of a Predictor- Ensemble methods- Model Selection.

Module V (12 hours)
Cluster Analysis- Types of Data in Cluster Analysis- Catagorization of Major Clustering methods- Partitioning methods- Hierarchical methods- Density based methods- Grid based methods- Model based Clustering methods- Clustering High Dimensional Data- Constraint based Cluster Analysis- Outlier analysis

Reference Books
1) Jiawei Han, Micheline Kamber, Data Mining Concepts and Techniques, 2nd edtn. , Elsevier New Delhi 2010
2) Alex Berson, Stephen J. Smith, Data Warehousing, Data Mining & OLAP Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008
3) Pieter Adriaans, Dolf Zantinge, Data Mining, Pearson Education Ltd., New Delhi, 2008
4) Thomas W Miller, Data and Text Mining, A Business Applications Approach, Pearson Education Ltd., New Delhi, 2008
5) Galit Shmueli, Nitin R. Patel, Peter C. Bruce, Data Mining for Business Intelligence, Wiley India Pvt. Ltd.,New Delhi 2009.

CS010 706L03: Operating System Kernel Design

(common to IT010 706L05 Operating System Kernel Design)

Teaching Scheme **Credits:** 4

2 hours lecture and 2 hour tutorial per week.

Objectives

- *To provide knowledge about the operating system working principles.*
- *To discuss most of the significant data structures and algorithms used in the kernel.*

Module I (13 hours)

Basic Operating System Concepts – Kernel – Types: monolithic, microkernel – An Overview of Unix Kernels-The Process/Kernel Model, Reentrant Kernels – Signals sending and receiving – System calls – System Call Handler and Service Routines - Interrupts and Exceptions - Interrupt Handling - The Timer Interrupt Handler.

Module II (13 hours)

Processes - Process Descriptor - Process State, Process relationship – Creating Processes - Process Termination - Process Scheduling – Scheduling algorithm – SMP Scheduler. Kernel Synchronization - Synchronization Techniques - Process Communication - System V IPC.

Module III (10 hours)

Paging in Linux - Memory Management - Page Frame Management - The Buddy System Algorithm - The Process's Address Space - The Memory Descriptor - Memory Regions – Page Fault Exception Handler.

Module IV (14 hours)

Overview of the Unix File System - The Virtual File System - role of the VFS - VFS Data Structures – File system Mounting. The Ext2 File system - Disk Data Structures - Creating the File system - Data Blocks Addressing - Allocating a Data Block.

Module V (10 hours)

Managing I/O Devices - Associating Files with I/O Devices - Device Drivers - Character Device - Block Device. Disk Caches - Buffer Cache - Writing Dirty Buffers to Disk - Page Cache.

Reference Books

1) Daniel P. Bovet, Marco Cesati, *Understanding the Linux Kernel*, First ed., O'Reilly, 2000
2) M Bech et al., *Linux Kernel Internals,* 2nd ed., Addison-Wesley, 1998
3) Maurice J. Bach, *The Design of the Unix Operating System,* First Edition, Pearson Education, 1999.
4) Abraham Silberschatz, Peter B.Galvin and Greg Gagne, "*Operating System Concepts*", John Wiley & Sons Inc, 8th Edition 2010.

CS010 706L04 : Digital image processing

Teaching Scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week.

Objectives

- *To learn the image fundamentals and mathematical transforms necessary for image processing.*
- *To learn the image enhancement techniques and image restoration procedures.*
- *To learn the image segmentation and representation techniques.*

Module I (14 hours)
Digital image representation : Elements of digital image processing systems - Image digitizers & scanners - Elements of visual perception - Brightness & contrast - colour perception & processing - pixel based transformation – geometric transformation – image file formats
Image sampling & Quantization - Two dimensional Sampling theorem - Reconstruction of image from its samples – Aliasing

Module II (14 hours)
Image Transforms : Two dimensional DFT & its properties - Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar, Slant, and Karhunen – Loeve transforms

Module III (10 hours)
Image Enhancement : Point processing - Histogram processing - Spatial Filtering – image subtraction - image averaging - Enhancement in the frequency domain – colour Image processing.

Module IV (12 hours)
Image Restoration : Degradation model – Diagonalization of circulant matrices - Inverse filtering - Wiener filter methods – Constrained least mean square filtering
Image Coding & Compression- basic principles Image compression: Run length coding , predictive coding ,Basics of Image compression standards

Module V (10 hours)
Image analysis : Segmentation – Thresholding – point, line and edge detection – Boundary detection - Region Based segmentation - image reconstruction – radon transform – projection theorem – convolution filter back projection - Fourier reconstruction method – applications of image processing.

References
1. Rafael C. Gonzalez - Richard E. Woods, *Digital Image Processing*, Pearson Education
2. Dutta Majumdar - *Digital Image Processing and Applications*, PHI
3. Madhuri A. Joshi – Digital Image Processing,PHI, New Delhi,2010
4. Anil K. Jain - Fundamentals of Digital Image processing," Prentice Hall India, 1989.
5. William K. Pratt - Digital Image Processing, John Wiley and sons, New delhi, 2010.
6. S.Jayaraman, S. Esakkiarajan. T. Veerakumar- Digital Image Processing,TMH,New Delhi, 2010.
7. Rosenfield and A. C. Kak - Digital Picture Processing, 2nd edition, Vols. 1 & 2, a. Academic Press, New York, 1982.

CS010 706L05: DATA PROCESSING AND FILE STRUCTURES

Teaching Scheme **Credits :** 4

2 hours lecture and 2 hour tutorial per week.

Objectives

- *To develop an understanding about basic concepts of data processing in mainframe system.*
- *To enable the students to learn the detailed features of COBOL, database concepts.*

Module I (10 hours)

Introduction to mainframe system

Introduction—Evolution of Mainframe Systems, Introduction to COBOL & JCL, COBOL/JCL Relation ,Compiling and Linking Programs in Mainframes, VSAM—VSAM Data Sets—Mainframes Operating Systems(over view), z/OS , OS/2 , MVS –Features

Module II (14 hours)

Programming Concept

Mainframe P**rogramming**—Introduction to COBOL, Structure of COBOL Programs, COBOL words, Identification and Environment Division, Configuration Section, Inputoutput Section, Data Division, Level Structure— File section, Assign to clause, Working Storage section-Editing, Special-names paragraph, Usage clause—Synchronized, Justified, Redefines, Renames clauses

Module III (11hours)

Data Processing Concept

Procedure division—Data movement, Arithmetic, Sequence control , Input/Output Conditional verbs, Group moves, Compute verb, Conditions, Table handling, Occur Clause - Perform verb, Set verb, Writing simple COBOL programs

Module IV (14 hours)

File Handling in Mainframes

File types — Sequential, Direct, Indexed files, Using Files in COBOL Programs, File Manipulation Verbs, **JCL Basics**—Writing to disk, DSN, DISP, Unit, Space, DCB Parameters, Job statement and Parameters –Positional and keyword Parameters, EXEC statement, EXEC Parameters, Concept of Compile and Run JCLs.

Module V (11 hours)

DataBase Concepts

Introduction to DB2—Relational DBMS Concept, Writing DB2/COBOL programs, Compilation and Binding of DB2 Programs , Concepts of DBRM, Bind JCL, Introduction to CICS – Case study (library information system in COBOL/JCL/DB2—to be taken along with all modules as example)

Reference Books

1. M K Roy, D Ghosh Dastidar ,*Cobol Programming* ,Tata McGraw Hill,New Delhi,1999,Second Edition
2. M K Roy, D Ghosh Dastidar ,*Cobol Programming : problems & Solutions*, Tata McGraw Hill, New Delhi
3. Saba Zamir**,** Chander Ranade ,*The MVS JCL Primer (J Ranade IBM Series)*, McGraw-Hill
4. C.J. date, Colin J White, *A Guide to DB2*, Pearson Education , New Delhi,4th Edition, 2006.
5. Craig S. Mullins, *DB2 Developers Guide*, Pearson education , New Delhi, 5th Edition,2008
6. Andreas S Philippakis, Leonard J Kazmier ,*Information System through COBOL*, McGraw-Hill

CS010 706L06 CLIENT SERVER ARCHITECTURE AND APPLICATIONS

Teaching Scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week.

Objectives

- *To impart an introduction Client-Server system.*
- *To develop basic knowledge on securing Client-Server system.*
- *To have exposure to applications of Client-Server system.*

Pre-requisites: *Computer Networks and Operating Systems*

Module I (10 hours)
Introduction: History-uses-Client Server Computing& Heterogeneous Computing Cross Platform Computing Distributed Computing - The costs of Client Server Computing - Advantages and Disadvantages - Client Server Databases.

Module II (12 hours)
Design: Fundamentals of client server design - Managing the interaction of client and server - Communications Techniques protocols & Client server interaction protocols - Preparing applications for client server - Optimizing applications for client server - Example client server implementations - Request acceptance dispatching - Execution of requests - Client server interaction using message.

Module III (14 hours)
Multitasking: Multi programming vs multitasking - Processor - Advantages and draw backs of multiple processor - Child and parent processor - Case study Novell Netware and Windows NT - Developing server applications - Threads - Server communication model.

Module IV (12 hours)
Synchronization: Scheduling implementations - processing queues - context switching pre-emptive systems - critical sections - mutual exclusion - semaphores – semaphore implementations in NT & Netware

Module V (12 hours)
Communications: Network communication - Inter process communication - Building portable client server applications - Introduction to Client/server security concepts- Secure client/server communications – password security at system level and application level

Reference Books

1. Jeffrey D.Schank, *" Novell's Guide to Client-Server Application & Architecture"* Novell Press.
2. Robert Orfali,Dan Harkey, Jeri Edwards,"Clien/Server Survival Guide",Wiley-India Edition,Third Edition,2007
3. Dawna Travis Dewire, "*Client Server Computing*", McGraw Hill
4. W.H.Inman,*"Developing Client Server Applications"* , BPB
5. Joe Salemi, "*Guide to Client Server Databases*", BPB.
6. David Vaskevitch, "*Client Server Strategies*",Galgotia.
7. Peter T.Davis, "Securing Client/Server Computer Networks", McGraw Hill
8. Subhash Chandra Yadav, Sanjay Kumar Singh,"An Introduction to Client/Server Computing", New Age International Publishers,2009

CS010 707: Systems Programming Lab

Teaching Scheme **Credits:** 2
3 hour practical per week

Objectives

- *To familiarize the design of all phases of compilers up to a stage of intermediate code generation.*
- *To enable the students to design and implement modern compilers for any environment.*

Section 1 (Compiler Design)

1. Design of a Lexical Analyzer using Finite Automation (including Symbol table)
(The program should be designed for a specific number of keywords, identifiers, numbers,
operators, punctuators etc. Finite automata should be designed for each type of token)
2. Design of lexical analyzer using LEX
3. Design of recursive descent and LL (1) parsers (including syntax tree)
(The programme should be designed for a subset of PL features (For example Arithmetic
expressions with operators +, -, *, /, ↑ etc)
4. Implementation of Operator precedence Parsing (including syntax tree)
5. Design of parser for arithmetic expressions using YACC
6. Design of a simple type checker (For eg for the primitive types of C)
7. Generation of IC for arithmetic expressions
8. Simple code optimization strategies (For example Constant folding, Loop invariant elimination, common sub expression elimination etc)
9. Design of a code generator for arithmetic expressions using Expression tree
(The program should take a set of IC as the input and produce the target code for some
machine such as Intel 8086 Microprocessor)
10. Writing a simple Compiler for a subset of Language features

Section 2:-

1.Design of 2-Pass Assembler(The Program should be designed for the generation for machine code of any simple processor such as Intel 8005)
2.Design of Absolute Loader
3.Design of Macro Pre-processor(The program should be designed for a simple preprocessor such as the # define in C)
4 Design of Device Drivers (Implementation of Simple Device Drivers such as one for the PC Speaker.)

Remark:

At Least 8 experiments from Section 1 and 2 experiments from section

CS010 708: Networking Lab

Teaching Scheme **Credits:** 2
3 hour practical per week

Objectives

- *To provide experience on design, testing, and analysis of Java Programs.*
- *To acquaint the students with the Networking Protocols and Communication using ports and sockets.*

1) Basic Java Programming
2) Programs to create Applets
3) Programs to create Graphic User Interfaces
4) Programs to implement Client and Server Sockets
5) Programs for Chatting using TCP and UDP
6) Programs for Remote Procedure Call
7) Programs for Remote Method Invocation
8) Programs to interface with XML
9) Programs to implement Sliding Window Protocols
10) Programs for Multicasting
11) Programs to interface with Databases
12) Programs for Image Processing
13) Programs in Perl and PHP
14) Programs to create Dynamic Web Pages

Any experiment according to the syllabus of CS010 602 Internet Computing, CS010604 Computer Networks, CS010701 Web Technologies may be substituted subjected to permission from competent authority.

CS 010 709 Seminar

Teaching scheme **Credits:** 2
2 hours practical per week

The seminar power point presentation shall be fundamentals oriented and advanced topics in the appropriate branch of engineering with references of minimum seven latest international journal papers having high impact factor.

Each presentation is to be planned for duration of 25 minutes including a question answer session of five to ten minutes.

The student's internal marks for seminar will be out of 50. The marks will be awarded based on the presentation of the seminar by the students before an evaluation committee consists of a minimum of 4 faculty members. Apportioning of the marks towards various aspects of seminar (extent of literature survey, presentation skill, communication skill, etc.) may be decided by the seminar evaluation committee.

A bona fide report on seminar shall be submitted at the end of the semester. This report shall include, in addition to the presentation materials, all relevant supplementary materials along with detailed answers to all the questions asked/clarifications sought during presentation. All references must be given toward the end of the report. The seminar report should also be submitted for the viva-voce examination at the end of eighth semester.

For Seminar, the minimum for a pass shall be 50% of the total marks assigned to the seminar.

CS 010 710 Project Work

Teaching scheme **Credits:** 1
1 hour practical per week

Project work, in general, means design and development of a system with clearly specified objectives.
The project is intended to be a challenge to intellectual and innovative abilities and to give students the opportunity to synthesize and apply the knowledge and analytical skills learned in the different disciplines.
The project shall be a prototype; backed by analysis and simulation etc. No project can be deemed to be complete without having an assessment of the extent to which the objectives are met. This is to be done through proper test and evaluation, in the case of developmental work, or through proper reviews in the case of experimental investigations.
• The project work has to be started in the seventh semester and to be continued on to eighth semester.
• Project work is to be done by student groups. Maximum of four students only are permitted in any one group.
• Projects are expected to be proposed by the students. They may also be proposed by faculty member (Guide) or jointly by student and faculty member.
• Students are expected to finalise project themes/titles with the assistance of an identified faculty member as project guide during the first week of the seventh semester.
The progress from concept to final implementation and testing, through problem definition and the selection of alternative solutions is monitored. Students build self confidence, demonstrate independence, and develop professionalism by successfully completing the project.
Each student shall maintain a project work book. At the beginning of the project, students are required to submit a project plan in the project book. The plan should not exceed 600 words but should cover the following matters.

- Relevance of the project proposed
- Literature survey
- Objectives
- Statement of how the objectives are to be tackled
- Time schedule
- Cost estimate

These proposals are to be screened by the evaluation committee (EC- minimum of 3 faculty members including the guide) constituted by the head of department, which will include a Chairman and the EC will evaluates the suitability and feasibility of the project proposal. The EC can accept, accept with modification, request a resubmission, or reject a project proposal.
Every activity done as part of project work is to be recorded in the project book, as and when it is done.
Project guide shall go through these records periodically, and give suggestions/comments in writing in the same book.
The students have to submit an interim report, along with project work book showing details of the work carried out by him/her and a power point presentation at the end of the 7th semester to EC. The EC can accept, accept with modification, request a resubmission, or extension of the project.
The student's internal marks for project will be out of 50, in which 30 marks will be based on

day to day performance assessed by the guide. Balance 20 marks will be awarded based on the presentation of the project by the students before an evaluation committee consists of a minimum of 3 faculty members including the guide.

For Project, the minimum for a pass shall be 50% of the total marks assigned to the Project work.

SEMESTER VIII

CS010 801 : HIGH PERFORMANCE COMPUTING

Teaching Scheme **Credits:** 4

3 hours lecture and 2 hour tutorial per week

Objectives

- *To design a powerful and cost-effective computer system.*
- *To provide the basic concepts of parallel processing on high performance computers.*

Module I (15 hours)

Introduction to parallel processing - Trends towards parallel processing - Parallelism in uniprocessor - Parallel computer structures-Architecture classification schemes, Amdahl's law,Indian contribution to parallel processing

Module II (15 hours)

Principles of pipelining and vector processing - Linear pipelining - Classification of pipeline processors - General pipelines - Instruction and Arithmetic pipelines –Design of Pipelined instruction unit-Principles of Designing Pipeline Processors- Instruction prefetch and branch handling- Data Buffering and Busing Structure-Internal forwarding and register tagging-Hazard detection and Resolution, Dynamic pipelines and Reconfigurability

Module III (15 hours)

Array processors - SIMD array processors - Interconnection networks - Static vs dynamic networks - mesh connected networks - Cube interconnection networks - Parallel algorithms for array processors - SIMD matrix multiplication-Parallel sorting on array processors - Associative array processing - Memory organization.

Module IV (15 hours)

Multiprocessor architectures and Programming - Loosely coupled and Tightly coupled multiprocessors - Interconnection networks - Language features to exploit parallelism -Inter process communication mechanism-Process synchronisation mechanisms, synchronization with semaphores.

Module V (15 hours)

Dataflow computers - Data driven computing and Languages, Data flow computers architectures - Static data flow computer , Dynamic data flow computer ,Data flow design alternatives.

References:

1.Computer Architecture & Parallel Processing - Kai Hwang & FayeA.Briggs,McGraw Hill
2. Computer architecture A quantitative approach - John L Hennessy and David A. Patterson-ELSEVIER,Fourth Edition
3. Elements of Parallel computing - V. Rajaraman - PHI
4. Super Computers - V. Rajaraman - Wiely arstern
5. Parellel Processing for Super Computers & AI Kai Hwange & Douglas Degneot Mc Graw Hill
6. Highly parallel computing - George S. Almasi,Allan Gottlieb. - Benjamin Cumings Publishers.
7. HIgh Performance Computer Architecture - Harold S. Stone, Addison Wesley.
8. Advanced Computing- Vijay P.Bhatkar, Asok V.Joshi, Arirban Basu, Asok K.Sharma.

CS010 802: ARTIFICIAL INTELLIGENCE

Teaching Scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To provide introduction to the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence.*
- *To familiarize with Fuzzy Logic and knowledge processing in expert systems*
- *To give exposure to problem solving in AI using Python*

Module 1 (14 hours)
Problems- problem spaces and search, production systems, Problem characteristics, Searching strategies – Generate and Test, Heuristic Search Techniques- Hill climbing– issues in hill climbing, General Example Problems.
Python-Introduction to Python- Lists Dictionaries & Tuples in Python- Python implementation of Hill Climbing

Module 2 (12 hours)
Search Methods- Best First Search- Implementation in Python- OR Graphs, The A * Algorithm, Problem Reduction- AND-OR Graphs, The AO* algorithm, Constraint Satisfaction. Games as search problem, MINIMAX search procedure, Alpha–Beta pruning.

Module3 (12 hours)
Knowledge representation -Using Predicate logic- representing facts in logic, functions and predicates, Conversion to clause form, Resolution in propositional logic, Resolution in predicate logic, Unification, Question Answering, forward and backward chaining.

Module 4 (12 hours)
Learning- Rote Learning – Learning by Advice- Learning in Problem Solving - By Parameter Adjustment with Macro Operators, Chunking, Learning from Examples- Winston's Learning Program, Version Spaces- Positive & Negative Examples – Candidate Elimination- Decision Trees- ID3 Decision Tree Induction Algorithm.

Module 5 (10 hours)
Fuzzy Sets – Concept of a Fuzzy number- Operations on Fuzzy Sets – Typical Membership Functions – Discrete Fuzzy Sets.
Expert System –Representing and using Domain Knowledge – Reasoning with knowledge– Expert System Shells –Support for explanation- examples –Knowledge acquisition-examples.

References

1. Elaine Rich, Kevin Knight, Shivashankar B Nair Tata McGraw Hill- Artificial Intelligence, 3rd Edn ,2004.
2. Stuart Russell – Peter Narang, Pearson Education Asia – Artificial Intelligence- A modern approach.
3. George F Luger - Artificial Intelligence, Pearson Education Asia
4. Allen B. Downey – (Think Python) Python for software design- How to think like a computer scientist, Cambridge University press, 2009 .

Web Reference

1. http://code.google.com/p/aima-python/ - Website for search strategy implementation in python

CS010 803: Security in Computing

Teaching Scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart an essential study of computer security issues*
- *To develop basic knowledge on cryptography*
- *To impart an essential study of various security mechanisms*

Module 1 (12 hours)
Introduction: Security basics – Aspects of network security – Attacks Different types – Security attacks -Security services and mechanisms.
Cryptography: Basic Encryption & Decryption – Classical encryption techniques – symmetric encryption, substitution ciphers – Caesar cipher – Monoalphabetic Cipher, Playfair Cipher, Polyalphabetic cipher - Vigenère – Cipher, Transposition ciphers - Rail Fence cipher, Row Transposition Ciphers.

Module 2 (12 hours)
Modern Block Ciphers - Fiestel Networks , DES Algorithm – Avalanche Effect.
Introduction to Number Theory - Prime Factorisation, Fermat's Theorem, Euler's Theorem, Primitive Roots, Discrete Logarithms.
Public key Cryptography:- Principles of Public key Cryptography Systems, RSA algorithms- Key Management – Diffie-Hellman Key Exchange, Elliptic curve cryptography.

Module 3 (12 hours)
Message Authentication-Requirements- Authentication functions- Message authentication codes-Hash functions- Secure Hash Algorithm, MD5, Digital signatures- protocols- Digital signature standards, Digital Certificates.
Application Level Authentications- Kerberos, X.509 Authentication Service, X.509 certificates.

Module 4 (12 hours)
Network Security: Electronic Mail Security, Pretty Good Privacy, S/MIME, IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload.
Web Security: Web Security considerations- Secure Socket Layer -Transport layer Security- Secure electronic transaction. Firewalls-Packet filters- Application Level Gateway- Circuit Level Gateway.

Module 5 (12 hours)
Operating System Security: Memory and Address Protection, Control of Access to General Objects, File Protection Mechanisms, Models of Security – Bell-La Padula Confidentiality Model and Biba Integrity Model.
System Security: Intruders, Intrusion Detection, Password Management, Viruses and Related Threats, Virus Countermeasure.

Reference Books

1. William Stallings, “Cryptography and Network Security – Principles and Practices”, Pearson
Education, Fourth Edition, 2006.
2. Charles P. Pfleeger, “Security in Computing”, Pearson Education, Third Edition, 2005.
3. Behrouz A. Forouzan, Dedeep Mukhopadhyay “Cryptography & Network Security”, Second
Edition,Tata McGraw Hill, New Delhi, 2010.
4. Andrew S. Tanenbaum, “Modern Operating Systems”, Pearson Education, Second Edition, 2002.
5. Atul Kahate, “Cryptography and Network Security”, Second Edition, Tata McGraw Hill
6. Wenbo Mao, “ Modern Cryptography- Theory & Practice”, Pearson Education, 2006.
7. Bruce Schneier, “Applied Cryptography”, John Wiley and Sons Inc, 2001.

CS010 804L01: E-COMMERCE

Teaching Scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week.

Objectives

- *To impart an introduction to Elecronic Commerce.*
- *To develop basic knowledge of Business in Internet and Electronic Payment*.

Module I (12 hours)
Introduction to Electronic Commerce:- E-Commerce Framework, Anatomy of Ecommerce Applications, E-Commerce Consumer & Organization Applications. **ECommerce and World Wide Web** – Internet Service Providers, Architectural Framework for Electronic Commerce, WWW as the Architecture, Hypertext publishing.

Module II (14 hours)
Network Security:- Client-Server Network Security, CS Security Threats, Firewalls, Data & Message Security, Encrypted Documents, Security on the Web.
Consumer Oriented Electronic Commerce:- Consumer Oriented Applications, Mercantile Process Models, Mercantile Models from the Consumer's Perspective, Mercantile Models from the Merchant's Perspective

Module III (10 hours)
Electronic Payment Systems :- Types of Electronic Payment Systems, Digital Token Based Electronic Payment System, Smart Cards, Credit Cards, Risk in Electronic Payment Systems, Designing Electronic Payment Systems.

Module IV (12 hours)
Electronic Data Interchange:- EDI Application in Business, EDI-Legal, Security and Privacy Issues, EDI standardization, EDI Envelope for Message Transport, Internet based EDI, Internal Information System, Work-flow Automation and Coordination, Supply Chain Management, Document Library, Types of Digital Documents, Corporate Data Warehouses.

Module V (12 hours)
Recent Trends in E-Commerce:- Multimedia in E-Commerce, Video Conferencing with Digital Videos, Broad Band Telecommunication, Frame & Cell Relays, Switched Multimegabit Data Service (SMDS), Asynchronous Transfer Mode, Mobile Computing and Wireless Computing.

Reference Books
1) Ravi Kalakota, Andrew B Whinston, Frontiers of Electronic Commerce, Pearson Education Inc., New Delhi, 2009
2) Ravi Kalakota, Andrew B. Whinston, Electronic Commerce A Manager's Guide, Pearson Education Inc., New Delhi, 2007
3) P. T. Joseph, E-Commerce An Indian Perspective, PHI Learning Private Limited, New Delhi, 2009

CS010 804L02: GRID COMPUTING

(Common to IT010 804L06:Grid Computing)

Teaching Scheme **Credits:** 4

2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart an introduction to Grid Computing.*
- *To develop basic knowledge about the Open Grid Service Architecture.*

Module I (12 hours)

Grid Computing – Introduction- Grid Activities- Overview of Grid Business Areas- Grid Applications- Grid Infrastructure.

Module II (12 hours)

Grid Computing Organizations and their roles- Grid Computing Anatomy- Grid Problem- Concept of Virtual Organizations- Grid Architecture- Autonomic Computing- Business on Demand and Infrastructure Virtualization- Semantic Grids.

Module III (12 hours)

Merging the Grid Services Architecture- Service Oriented Architecture- Web Service Architecture- XML relevance to Web Services- Service Message Description Mechanisms- Relationship between Web Service and Grid Service.

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Module IV (12 hours)

Open Grid Services Architecture- OGSA Platform Components- Open Grid Services Infrastructure- Introduction to Service Data Concepts- Grid Service- OGSA Basic Services- Common Management Model- Policy Architecture- Security Architecture.

Module V (12 hours)

Grid Computing Toolkits- GLOBAS GT3 Toolkit Architecture- GLOBAS GT3 Toolkit Programming Model- GLOBAS GT3 Toolkit High Level Services.

Reference Books

1) Joshy Joseph, Craig Fellenstein, Grid Computing, Pearson Education Inc, New Delhi 2004.

2) D Janakiram, Grid Computing A research Monograph, Tata McGraw-Hill Publishing Company Limited New Delhi, 2005.

CS010 804L03: Bioinformatics

Teaching Scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week.

Objectives

• *To understand the science of storing, extracting, organizing, analysing and interpreting biological data.*

Module 1 (12 hours)
Basic Concepts of Molecular Biology: Cells - Chromosomes, DNA, RNA, Proteins, Central dogma of molecular biology, RNA classification – coding and non coding RNAmRNA, tRNA, miRNAand sRNA , Genomes and Genes - Genetic code, ORFs, Slice varients, Transcription ,Translation and Protein synthesis.

Module 2 (12 hours)
Sequence alignments – - local/global, pairwise/multiple Sequence alignment- Smith-Waterman algorithm, NeedlemanWunch algorithm, Multiple sequence alignment –Sum-of-Pairs measure - Star and tree alignments ,Scoring matrices: basic concept of a scoring matrix, Matrices for nucleic acid and proteins sequences, PAM and BLOSUM ,Phylogenetic Trees

Module 3 (12 hours)
Informational view of Genomic data, Gene expression, Microarrays-cDNA arrays,Oligo Arrays, Data analysis methodologies-Normalization,Principal Componenet Analysis, Clustering- Hierarchical,K-meana,FCM,Application of Microarrays. Gene regulation, Gene Ontology, metabolic pathways, and gene set enrichment analysis.

Module 4 (12 hours)
Evolution of Protein Structures, Classification of Protein Structures- primary, secondary, ternary and quatenary, Protein Structure prediction and modeling, Assignment of protein structures to genomes, Prediction of protein function, Protein folding problem, Protein Threading, Drug discovery and development

Module 5 (12 hours)
Biological data bases: Pubmed, Swissport, EMBL, DDBJ, Genbank, Software Tools: Use of Tools for basic and specialized sequence processing such as: BLAST, FASTA, RasMol, Phylip, ClustalW

References
1. Setubal & Meidanis, "Introduction to Computational Molecular Biology", Brooks/Cole Cengage Learning 2009.
2. Arthur M Lesk, "Introduction to Bioinformatics", Oxford University Press, India, 2004
3.Vittal R. Srinivas "Bioinformatics a mordern Approach",PHI Learning 2009 .
4.Shuba Gopal,Rhys Price Jones,Paul Thymann,Anne Haake,"Bioinformatics with fundamentals of Genomics and proteomics, Tata McGraw Hill
3.Zoe Lacroix,Terence Critchlow "Bioinformtics managing scientific Data", Morgan Koufmann Publishers
4.B.G Curran,R J walker,SC Bhattia"Bioinformatics",CBS Publishers,2010
5.Harshawardhana P. Bal "Bioinformatics Principles and Applications",Tata MacGraw Hill

CS010 804L04: Optimization Techniques

Teaching Scheme **Credits :**4

2 hours lecture and 2 hours tutorial per week.

Objectives:

- *To understand the need and origin of the optimization methods.*
- *To get a broad picture of various applications of optimization methods used in engineering.*
- *To define an optimization problem and its various components.*

Module I (12 Hrs)

One Dimensional Unconstrained Minimization techniques, single variable minimization, unimodality, bracketing the minimum, necessary and sufficient conditions for optimality, convexity, steepest descent method.

Module II (12Hrs)

Linear programming, introduction, linear programming problem, linear programming problems involving LE (?) constraints, simplex method, optimality conditions, artificial starting solutions, the M method.

Module III (12hrs)

Transportation models, definition, non traditional models, transportation algorithm, East West corner method, Vogel approximation method. Assignment model, Introduction, Hungarian method.

Module IV (12Hrs)

Forecasting Models, moving average technique, regression method, exponential smoothing. Game Theory, two persons zero sum games, mixed strategy gamesgraphical method.

Module V (12Hrs)

Queuing models, elements of queuing model, pure birth and death model, specialized Poisson queues, single server models. Multiple server models, self service model.

References:

1. Ashok D Belegundu, Tirupathi R Chandrupatla, optimization concepts and Application in Engineering, pearson Education.
2 Kalynamoy Deb, “Optimization for Engineering Design, Alogorithms and Examples”, Prentice Hall
3. Hamdy A Taha, “Operations Research – An introduction”, Pearson Education,
4. Hillier / Lieberman, “Introduction to Operations Research”, Tata McGraw Hill Publishing company Ltd,
5. Singiresu S Rao, “Engineering optimization Theory and Practice”, New Age International,
6. Mik Misniewski, “Quantitative Methods for Decision makers”, MacMillian Press Ltd.

CS010 804L05: MOBILE COMPUTING

Teaching Scheme **Credits:** 4

2 hours lecture and 2 hours tutorial per week

Objectives

- *To study the relevance and underlining infrastructure of multimedia system.*
- *To enable the students to apply contemporary theories of multimedia learning to the development of multimedia products.*

Module I (10 hours)

Introduction to wireless communication system:- 2G cellular network,2G TDMA Standards, 3G wireless networks, wireless local loop and LMDS, Broadcast Systems-Broadcast transmission, Digital Audio Broadcasting-Multimedia Object Transfer Protocol. Digital Video Broadcasting. Cellular concepts-channel assignment strategy-hand off strategy-interface and system capacity-trunking –improving coverage and capacity in cellular system.

Module II (12 hours)

Wireless Communication Systems:-Telecommunication Systems-GSM-GSM services & features, architecture, channel type, frame structure, signal processing in GSM & DECT features & characteristics, architecture, functional concepts & radio link, personal access communication system(PACS)-system architecture-radio interface, Protocols. Satellite Systems-GEO, LEO, MEO.

Module III (11 hours)

Wireless LAN and ATM:- Infra red and Radio Transmission, Infrastructure and ad hoc networks ,802.11- Bluetooth- Architecture, Applications and Protocol, Layers, Frame structure. comparison between 802.11 and 802.16. Wireless ATM- Services, Reference Model, Functions, Radio Access Layer. Handover- Reference Model, Requirements, Types, handover scenarios. Location Management, Addressing, Access Point Control Protocol (APCP).

Module IV (14 hours)

Mobile Network and Transport Layers:- Mobile IP- Goals, Requirements, IP packet delivery, Advertisement and discovery. Registration, Tunneling and Encapsulation, Optimization, Reverse Tunneling, IPv6, Dynamic Host configuring protocol, Ad hoc networks – Routing, DSDV, Dynamic source routing. Hierarchical Algorithms. Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Transmission.

Module V (13 hours)

Wireless Application Protocol & World Wide Web WAP- Architecture, Protocols-Datagram, Transaction, Session.-Wireless Application Environment-WML- Features, Script- Wireless Telephony Application. WWW- HTTP, Usage of HTML, WWW system architecture.

References

1. Jochen Schiller “Mobile Communications “ , Preason Education Asia
2.Wireless communications Principles and practice-second edition-Theodore S.Rappaport, PHI, Second Edition ,New Delhi, 2004
3. Computer Networks – Andrew S. Tanenbaum , PHI
4.. Communication Networks -Fundamental Concepts and Key Architectures
Leon-Garcia & Indra Widjaja, Tata McGraw Hill

CS010 804L06 : Advanced Networking Trends

Teaching Scheme **Credits:** 3
2 hours theory and 1 hour tutorial per week.

Objectives

- *To acquaint the students with the application of networking.*
- *To understand the variousTCP/IP protocols and the working of ATM and its performance, Network security and authentication, and variousalgorithms related to it has been dealt, to get a practical approach ,advanced topics in the design of computer networks and network protocols*

Module 1 (12 hours)
Ethernet Technology – Frame format – Interface Gap – CSMA/CD – 10 mbps Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless Ethernet.
ISDN - Definition - Protocol architecture - System architecture - Transmission channels - ISDN interface, B-ISDN.

Module 2 (12 hours)
ATM – ATM Principles – BISDN reference model – ATM layers – ATM adaption Layer – AAL1, AAL2, AAL3/4, AAL5 – ATM addressing – UNI Signaling – PNNI Signalling

Module 3 (12 hours)
Wireless LAN – Infrared Vs Radio transmission – Infrastructure & ad hoc n/w – IEEE 802.11 – Physical Layer – MAC layer. Bluetooth – Physical Layer – MAC layer – Networking – Security

Module 4 (12 hours)
Mesh Networks- Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture –Opportunistic Routing – Self Configuration and Auto Configuration - Capacity Models –Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks

Module 5 (12 hours)
Sensor Networks- Introduction – Sensor Network architecture – Data Dissemination – Data Gathering –MAC Protocols for sensor Networks – Location discovery – Quality of Sensor Networks– Evolving Standards – Other Issues – Recent trends in Infrastructure less Networks

References
1. An introduction to Computer Networking - Kenneth C Mansfield, Jr., James L. Antonakos, PHI
2. Communication Networks Fundamental Concepts & Key Architecture - Leon-Garcia – Widjaja, Tata McGraw Hill
3. Mobile Communication - Jochen Schiller, Pearson Education Asia
4. C. Siva Ram Murthy and B.S.Manoj, “Ad hoc Wireless Networks – Architectures and Protocols’, Pearson Education, 2004
5. C.K.Toh, “Adhoc Mobile Wireless Networks”, Pearson Education, 2002.

CS010 805G01: MULTIMEDIA TECHNIQUES

Teaching Scheme **Credits :** 4
2 hrs lecture and 2 hrs tutorial per week

Objectives

- *To study the relevance and underlining infrastructure of multimedia system.*
- *To enable the students to apply contemporary theories of multimedia learning to the development of multimedia products.*

Module I (10 hours)
Multimedia Basics: Multimedia and Hypermedia, Multimedia Software, Editing and Authoring Tools, VRML.
Graphics and Image Data Representation— Graphics/Image Data Types, Popular File Formats.
Concepts in Video and Digital Audio— Color Science, Color Models in Images, Color Models in Video. Types of Video Signals, Digitization of Sound, MIDI - Musical Instrument Digital Interface, Quantization and Transmission of Audio.

Module II (12 hours)
Lossless & Lossy Compression Algorithms— Introduction, Basics of Information Theory, Run-Length Coding, Variable-Length Coding, Dictionary-Based Coding, Arithmetic Coding, Lossless Image Compression. Distortion Measures, The Rate- Distortion Theory, Quantization, Transform Coding, Wavelet-Based Coding, Wavelet Packets, Embedded Zerotree of Wavelet Coefficients, Set Partitioning in Hierarchical Trees (SPIHT).

Module III (11 hours)
Image, Video and Audio Compression — Image Compression -JPEG , JPEG-LS.
Basic Video Compression Techniques - Introduction to Video Compression, Video Compression Based on Motion Compensation, MPEG
Video Coding— **Audio Compression Techniques-**—MPEG, ADPCM in Speech Coding, Vocoders, Psychoacoustics, Audio Codecs.

Module IV (14 hours)
Storage and Retrieval of Images — Content-Based Retrieval in Digital Libraries: Image retrieval, CBIRD. A Case Study, Image Search Systems, Quantifying Results, Querying on Videos, Querying on Other Formats, Outlook for Content-Based Retrieval.
Image Databases—Raw Images, Compress Image Presentations, Image Processing Segmentation, Similarity- Based Retrieval, Alternating Image DB Paradigms, Representing Image DBs with Relations and R Trees, Retrieving Images by Special Layout, Implementations, Selected Commercial Systems.

Module V (13 hours)
Multimedia Databases
Text/Document Databases—Precision and Recall, Stop Lists, Word Stems and Frequency tables, Latent Semantic Indexing, TV-Trees, Other Retrieval Techniques.
Multimedia Databases—Design and Architecture of a Multimedia Database, Organizing Multimedia Data based on the Principle of Uniformity, Media Abstractions, Query Languages for Retrieving Multimedia Data , Indexing SMDSs with Enhanced Inverted Indices, Query Relaxation/ Expansion.

References

1. .Ze-Nian Li and M. S. Drew, *.Fundamental of Multimedia*., Pearson Education,2004
2. V. S. Subrahmanian, *.Principles of Multimedia Database Systems*., Morgan Kaufmann Publication.
3. K. R. Rao, Zoran S. Bojkovic, D. A. Milovanovic, *.Introduction to Multimedia Communications.*, Wiley.
4. R. Steinmetz and K. Nahrstedt *.Multimedia: Computing, Communication & Applications*, Pearson Education.
5. Buford, *Multimedia Systems*., Pearson Education.
6. C. T. Bhunia, *.Multimedia and multimedia Communications*., New Age International Publishers.
7. Prabhat K. Andheigh, Kiran Thakrar, *Multimedia Systems design*., PHI.
8. Koegel Buford, *Multimedia Systems*., Pearson Eduaction.
9. J. D. Gibson, *.Multimedia Communications: Directions and Innovations.*, Academic Press, Hard-court India.

CS010 805G02 :Neural networks

(Common to IT010 805G05 Neural Networks)

Teaching scheme **Credits:** 4

2 hrs lecture and 2 hrs tutorial per week

Objectives

- *To understand the fundamental building blocks of Neural networks*

Module 1 (14 hours)

Biological Neurons and Neural Networks, Basic Structures and Properties of Artificial Neural Networks, Basic Neuron Models-McCulloch-Pitts -Nearest Neighbour- Radial Basis Function, Activation Functions ,Singe Layer Perceptrons-Linear Seperability, Learning and Generalization in Single Layer Perceptron-Hebbian Learning-Gradient Descent Learning-Widrow-Hoff Learning-The Generalized Delta rule, Practical Considerations

Module 2 (12 hours)

Multi Layer Perceptron Learning,Back Propogation Algorithim -Applications – Limitations– Network Paralysis – Local Minima – Temporal Instability, Pattern Analysis Tasks-Classification- Regression- Clustering, Pattern Classification and Regression using ultilayer Perceptron.

Module 3 (10 hours)

Radial Basis Function Networks: Fundamentals, Algorithms and Applications, Learning with Momentum, Conjugate Gradient Learning, Bias and Variance. Under-Fitting and Over-Fitting, Stochastic neural networks, Boltzmann machine.

Module 4 (12 hours)

Network based on competition:- Fixed weight competitive Network-Maxnet, Mexican Hat and Hamming Net, Counter Propagation Networks- Kohonen's self-organizing map – Training the Kohonen layer – Training the Grossberg layer – Full counter propagation network – Application, Adaptive resonance theory – classification- Architecture – Learning and generalization.

Module 5 (12 hours)

Pattern Association: - training algorithm for pattern association - Hetro Associative Network, Auto Associative Network, Architecture of Hopfield nets – stability analysis ,General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM training algorithms.

References

1. B. Yegnanarayana, "Artificial Neural Networks", PHI.
2. Simon Haykin, Neural Networks, 2/e, Prentice Hall
3. Neural Computing & Practice – Philip D. Wasserman
4. Neural Networks in Computer Intelligence-Limin Fu,Tata Mc.Hill Edition

CS010 805G03 : Advanced Mathematics

(common to IT010 805G02 Advanced Mathematics)

Teaching Scheme **Credits:** 4

2 hours lecture and 2 hours tutorial per week

Objectives

- *To provide an understanding of Green's Function, Integral Equations, Gamma, Beta functions, Power Series solution of differential equation, Numerical solution of partial differential equations*

Module 1 (12 Hours)

Green's Function

Heavisides, unit step function – Derivative of unit step function – Dirac delta function – properties of delta function – Derivatives of delta function – testing functions – symbolic function – symbolic derivatives – inverse of differential operator – Green's function – initial value problems – boundary value problems – simple cases only

Module 2 (12 Hours)

Integral Equations

Definition of Volterra and Fredholm Integral equations – conversion of a linear differential equation into an integral equation – conversion of boundary value problem into an integral equation using Green's function – solution of Fredhlom integral equation with separable Kernels – Integral equations of convolution type – Neumann series solution.

Module 3 (12 Hours)

Gamma, Beta functions

Gamma function, Beta function – Relation between them – their transformations – use of them in the evaluation certain integrals – Dirichlet's integral – Liouville's extension of Dirichlet's theorem – Elliptic integral – Error function.

Module 4 (12 Hours)

Power Series solution of differential equation

The power series method – Legendre's Equation – Legendre's polynomial – Rodrigues formula – generating function – Bessel's equation – Bessel's function of the first kind – Orthogonality of Legendre's Polynomials and Bessel's functions.

Module 5 (12 Hours)

Numerical solution of partial differential equations

Classification of second order equations- Finite difference approximations to partial derivatives – solution of Laplace and Poisson's equations by finite difference method – solution of one dimensional heat equation by Crank – Nicolson method – solution one dimensional wave equation.

References

1. S.S Sasthri, "Introductory methods of Numerical Analysis",Prentice Hall of India.
2. Ram P.Kanwal, Linear Integral Equation, Academic Press, New York.
3. Allen C.Pipkin, Springer, A Course on Integral Equations, Verlag.
4. H.K.Dass, Advanced Engg. Mathematics, S.Chand.
5. Michael D.Greenberge, Advanced Engg. Mathematics, Pearson Edn. Asia.
6. B.S.Grewal, Numrical methods in Engg.&science, Khanna Publishers.
7. R.F. Hoskins, Generalized functions, John Wiley and Sons.
8. Bernard Friedman, Principles and Techniques of Applied Mathematics, John Wiley and sons
9. James P.Keener, Principles of Applied Mathematics, Addison Wesley.
10. P.Kandasamy, K.Thilagavathy, K.Gunavathy Numerical methods, S.Chand & co

CS010 805G04: Software Architecture

(Common to IT010 805G01 Software Architecture)

Teaching Scheme **Credits:** 4

2 hours lecture and 2 hours tutorial per week.

Objectives

- *To understand the role of a software architecture in the development of an enterprise application system.*
- *To develop the ability to understand the models that are used to document a software architecture.*

Module I (13 hours)

Software Architecture—Software Architecture, Software Design Levels, The status of Software Engineering and Architecture.

Architecture Styles—Use of Patterns and Styles in Software Design, Common Architectural Styles -Pipes and Filters, Data Abstraction and Object Orientation, Event Based Implicit Invocation, Layered Systems, Repositories, Interpreters, **Process Control Paradigms**—Case Studies to Illustrate the use of Architectural Principles.

Module II (11 hours)

Architectural Design—Guidelines for User Interface Architectures, Design Space and Rules, Applying Design Space with an Example, A Validation Experiment.

The Quantified Design Space—Background, Quantified Design Space.

Module III (11 hours)

Formal models and Specifications— Formalizing the Architecture of a Specific System-Architectural Formalism and its Applications, Formalizing Various Architectural Styles, Filters, Pipes, Pipe-and-Filter System, Formalizing Architectural Design Space.

Module IV (14 hours)

Architectural Description Languages—Requirements for Architectural Description Languages, The Linguistic Character of Architectural Description, Desiderata for Architecture Description Languages, Problems.

First-Class Connectors—Current practice, Software System Composition. Adding Implicit Invocation to Traditional Programming Languages

Module V (11 hours)

Architectural Design Tools— UniCon A Universal Connecting Language, Components, Abstraction and Encapsulation, Types and Type checking.

Architectural Design - Exploiting Styles , Architectural Interconnection

References

1. Mary Shaw & David Garlan," *Software Architecture"*, Prentice Hall India Private Limited, Third Edition, New Delhi, 2000.

2. Len Bass, Paul Clements, & Rick Kazman, "*Software Architecture in Practice"*, Pearson Education.

CS010 805G05: Natural Language Processing

Teaching scheme **Credits:** 4
2 hour lecture and 2 hour tutorial

Objectives

- *To acquire a general introduction including the use of state automata for language processing*
- *To understand the fundamentals of syntax including a basic parse*
- *To explain advanced feature like feature structures and realistic parsing methodologies*
- *To explain basic concepts of remotes processing*
- *To give details about a typical natural language processing applications*

Module I (12 hours)
INTRODUCTION: Introduction: Knowledge in speech and language processing – Ambiguity – Models and Algorithms – Language, Thought and Understanding. Regular Expressions and automata: Regular expressions – Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology – Finite-State Morphological parsing – Combining FST lexicon and rules – Lexicon-Free FSTs: The porter stammer – Human morphological processing

Module II (12 hours)
SYNTAX: Word classes and part-of-speech tagging: English word classes – Tagsets for English – Part-of-speech tagging – Rule-based part-of-speech tagging – Stochastic part-of speech tagging – Transformation-based tagging – Other issues. Context-Free Grammars for English: Constituency – Context-Free rules and trees – Sentence-level constructions – The noun phrase – Coordination – Agreement – The verb phase and sub categorization – Auxiliaries – Spoken language syntax – Grammars equivalence and normal form – Finite-State and Context-Free grammars – Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search – A Basic Top-Down parser – Problems with the basic Top- Down parser – The early algorithm – Finite-State parsing methods.

Module III (12 hours)
ADVANCED FEATURES AND SYNTAX : Features and Unification: Feature structures – Unification of feature structures – Features structures in the grammar – Implementing unification – Parsing with unification constraints – Types and Inheritance. Lexicalized and Probabilistic Parsing: Probabilistic context-free grammar – problems with PCFGs – Probabilistic lexicalized CFGs – Dependency Grammars – Human parsing.

Module IV (12 hours)
SEMANTIC: Representing Meaning: Computational desiderata for representations – Meaning structure of language – First order predicate calculus – Some linguistically relevant concepts – Related representational approaches – Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis – Attachments for a fragment of English – Integrating semantic analysis into the early parser – Idioms and compositionality – Robust semantic analysis. Lexical semantics: relational among lexemes and their senses – WordNet: A database of lexical relations – The Internal structure of words – Creativity and the lexicon.

Module V (12 hours)

APPLICATIONS: Word Sense Disambiguation and Information Retrieval: Selectional restriction-based disambiguation – Robust word sense disambiguation – Information retrieval – other information retrieval tasks. Natural Language Generation: Introduction to language generation – Architecture for generation – Surface realization – Discourse planning – Other issues. Machine Translation: Language similarities and differences – The transfer metaphor – The interlingua idea: Using meaning – Direct translation – Using statistical techniques – Usability and system development.

References:

1. Daniel Jurafsky & James H.Martin, " Speech and Language Processing", Pearson Education(Singapore)Pte.Ltd.,2002.
2. James Allen, "Natural Language Understanding", Pearson Education, 2003

CS010 805G06: Pattern Recognition

Teaching Scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week.

Objectives:

- *To impart a basic knowledge on pattern recognition and to give a sound idea on the topics of parameter estimation and supervised learning, linear discriminant functions and syntactic approach to PR.*
- *To provide a strong foundation to students to understand and design pattern recognition systems.*

Module I (12 hours)
Introduction: introduction to statistical, syntactic and descriptive approaches, features and feature extraction, learning and adaptation. Bayes Decision theory, introduction, continuous case, 2-categoryclassification, minimum error rate classification, classifiers. Discriminant functions and decision surfaces.

Module 2(12 hours)
Introuction- Maximum likelihood estimation - General principle,Gaussian case ; bias. Bayesian estimation – class conditioned density, parameterdistribution, Bayesian Parameter estimation – General Theory,Gibb's Algorithm – Comparison of Bayes Method with Maximum likelihood.

Module 3(12 hours)
Introduction,Density Estimation. Parzen Windows – Convergence of mean, variance, Kn – Nearest Neighbourestimation,Nearest neighbor rule,Converge error rate, error bound , partial distance.

Module 4(12 hours)
Linear discriminate functions and decision surfaces:-Introduction, training error, Threshold weight, discriminate function – two category case, multicategory case. Generalized discriminant function, Quadratic discriminant functions, Polynomial discriminant, PHI functions. Augmented vector.Two category linearly separable case: weight space, solution region, margin, learning rate ,algorithm(Gradient descent – newton)Relaxation procedures.

Module 5(12 hours)
Syntactic approach to PR : Introduction to pattern grammars and languages, higher dimensional grammars, tree, graph, web, plex, and shape grammars, stochastic grammars, attribute grammars, Parsing techniques, grammatical inference.

References
1. R.O Duda, Hart P.E, "Pattern Classification And Scene Analysis", John Wiley
2. Gonzalez R.C. & Thomson M.G., "Syntactic Pattern Recognition - An Introduction", Addison Wesley.
3. J. T. Tou and R. C. Gonzalez, "Pattern Recognition Principles", Wiley, 1974
4. Fu K.S., "Syntactic Pattern Recognition And Applications", Prentice Hall,
5. Rajjan Shinghal, "Pattern Recognition: Techniques and Applications", Oxford University Press, 2008.

CS010 806: Computer Graphics Lab

Teaching Scheme **Credits:** 2
3 hour practical per week

Objectives

• *To acquaint the students with the implementation of fundamental algorithms in Computer Graphics.*

I. Experiments to implement the following: (**first 3 weeks**)
1. DDA Algorithm
2. Bresenham's Line drawing Algorithm for any slope.
3. Mid-point Circle Algorithm.
4. 2D Transformations

II. Experiments to implement the following:
1. 3D Rotations on a cube (about any axis, any general line) controlled by keyboard navigation keys.
2. 3D Rotations on a cube with hidden surface elimination.(keyboard controlled)
3. Composite transformations
4. Bezier cubic splines like screen saver
5. Any Fractal Construction (Koch curve)
6. Animations using the above experiments.(eg.moving along curved path)

Any experiment according to the syllabus of CS010 702 Computer Graphics can be substituted subjected to permission from competent authority.

CS010 807 Project Work

Teaching scheme **Credits:** 4
6 hours practical per week

The progress in the project work is to be presented by the middle of eighth semester before the evaluation committee. By this time, the students will be in a position to publish a paper in international/ national journals/conferences. The EC can accept, accept with modification, and request a resubmission.

The progress of project work is found unsatisfactory by the EC during the middle of the eighth semester presentation, such students has to present again to the EC at the end of the semester and if it is also found unsatisfactory an extension of the project work can be given to the students.

Project report: To be prepared in proper format decided by the concerned department. The report shall record all aspects of the work, highlighting all the problems faced and the approach/method employed to solve such problems. Members of a project group shall prepare and submit **separate** reports. Report of each member shall give details of the work carried out by him/her, and only summarise other members' work.

The student's sessional marks for project will be out of 100, in which 60 marks will be based on day to day performance assessed by the guide. Balance 40 marks will be awarded based on the presentation of the project by the students before an evaluation committee.

For Project, the minimum for a pass shall be 50% of the total marks assigned to the Project work.

CS010 808 Viva -Voce

Teaching scheme **credits: 2**

A comprehensive oral Viva-voce examination will be conducted to assess the student's intellectual achievement, depth of understanding in the specified field of engineering and papers published / accepted for publication etc. At the time of viva-voce, certified bound reports of seminar and project work are to be presented for evaluation. The certified bound report(s) of educational tour/industrial training/ industrial visit shall also be brought during the final Viva-Voce.

An internal and external examiner is appointed by the University for the Conduct of viva voce University examination.

For Viva-voce, the minimum for a pass shall be 50% of the total marks assigned to the Viva-voce.

Note: If a candidate has passed all examinations of B.Tech. course (at the time of publication of results of eighth semester) except Viva-Voce in the eighth semester, a re-examination for the Viva-Voce should be conducted within one month after the publication of results. Each candidate should apply for this 'Save a Semester examination' within one week after the publication of eighth semester results.