MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
Sponsored by CMR Educational Society
(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2008 Certified)
Maisammaguda, Dhulapally (Post Via Hakimpet), Secunderabad – 500100, Telangana State, India.
Contact Number: 040-23792146/64634237, E-Mail ID: mrcet2004@gmail.com, website: www.mrcet.ac.in

BACHELOR OF TECHNOLOGY
ELECTRONICS AND COMMUNICATION ENGINEERING

ACADEMIC REGULATIONS
COURSE STRUCTURE AND SYLLABUS
(Batches admitted from the academic year 2015 - 2016)

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

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- ”Autonomous Institution /College” means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.
- “Academic Autonomy” means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- “Commission” means University Grants Commission.
- “AICTE” means All India Council for Technical Education.
- “University” the Jawaharlal Nehru Technological University, Hyderabad.
- “College” means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.
- “Program” means:
  - Bachelor of Technology (B.Tech) degree program
  - UG Degree Program: B.Tech
- “Branch” means specialization in a program like B.Tech degree program in Electronics & Communication Engineering, B.Tech degree program in Computer Science and Engineering etc.
- “Course” or “Subject” means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester.
- T–Tutorial, P–Practical, D–Drawing, L-Theory, C-Credits

FOREWORD

The autonomy is conferred on Malla Reddy College of Engineering & Technology (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Malla Reddy College of Engineering & Technology (MRCET)is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institution in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

"A thought beyond the horizons of success committed for educational excellence"

PRINCIPAL

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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VISION

- To establish a pedestal for the integral innovation, team spirit, originality and competence in the students, expose them to face the global challenges and become technology leaders of Indian vision of modern society.

MISSION

- To become a model institution in the fields of Engineering, Technology and Management.
- To impart holistic education to the students to render them as industry ready engineers.
- To ensure synchronization of MRCET ideologies with challenging demands of International Pioneering Organizations.

QUALITY POLICY

- To implement best practices in Teaching and Learning process for both UG and PG courses meticulously.
- To provide state of art infrastructure and expertise to impart the quality education.
- To groom the students to become intellectually creative and professionally competitive.
- To channelize the activities and tune them in heights of commitment and sincerity, the requisites to claim the never ending ladder of SUCCESS year after year.

For more information: www.mrcet.ac.in

ACADEMIC REGULATIONS FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2015-16 and onwards

1. Award of B. Tech. Degree

A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

1.1 The candidate shall pursue a course of study for not less than four academic years and not more than eight academic years.

1.2 After eight academic years of course of study, the candidate is permitted to write the examinations for two more years.

1.3 The candidate shall register for **192 credits** and secure **192 credits** with compulsory subjects as listed in Table-1

Table 1: Compulsory Subjects

S.No	Subject Particulars
1	All practical Subjects
2	Mini Project
3	Technical Seminar
4	Project Work

1.4 In addition to 1.3, the candidate has to register for Mandatory courses (Non-credit course), 50% of scoring is required for the award of the degree.

2. The students, who fail to fulfill all the academic requirements for the award of the degree within ten academic years from the year of their admission, shall forfeit their seats in B. Tech. course.

3. Courses of study

The following courses of study are offered at present as specializations for the B. Tech. Course:

S.No	Department
01	Aeronautical Engineering
02	Computer Science Engineering
03	Electronics & Communication Engineering
04	Information Technology
05	Mechanical Engineering
06	Mining Engineering

4. Credits

Particulars	Semester	
	Periods per week	Credits
Theory	05	04
	04	03
Practical	03	02
Drawing	03	02
	06	04
Mini Project	--	04
Technical Seminar	06	02
Major Project	15	10

***Duration of each period is 50 minutes.**

5. Distribution and Weightage of Marks

5.1 The performance of a student in each semester shall be evaluated subject-wise for a maximum of 100 marks for a theory and 75 marks for a practical subject. In addition, Mini Project, Technical seminar and Major Project work shall be evaluated for 100, 50 and 300 marks, respectively.

5.2 For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End-Examination.

5.3 For theory subjects, during a semester there shall be 2 mid-term examinations. Each mid- term examination consists of a descriptive paper and assignment. The descriptive paper shall be for 20 marks with a total duration of 2 hours. The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. While the first mid-term examination shall be conducted from 1 to 2 units of the syllabus, the second mid-term examination shall be conducted from 3 to 5 units**.** Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned). The first Assignment should be submitted before the conduct of the first mid-examination, and the second Assignment should be submitted before the conduct of the second mid-examination. The total marks secured by the student in each mid-term examination are evaluated for 25 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each candidate.
However, if any student is absent/scoring internal marks less than 40% in any subject of a mid-term examination he/she will be given a chance to write the internal exam once again after he/she re-registering for the internal exam in the concerned subject and paying stipulated fees as per the norms.

The end examination will be conducted for 75 marks with Part A as a compulsory question for 25 marks. Part B is for maximum of 50 marks with 5 questions consisting of two parts each (a) and (b), out of which the student has to answer either (a) or (b), not both. Each question in Part B carries 10 marks.

5.4 For practical subjects there shall be a continuous evaluation during a semester for 25 sessional marks and 50 end semester examination marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the examination branch of the College.

5.5 For the subject having design and/or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and Estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end semester examination. There shall be two internal tests in a Semester and the average of the two shall be considered for the award of marks for internal tests.

5.6 There shall be a Mini Project to be taken up during the vacation after III year II Semester examination. However, the Mini-Project and its report shall be evaluated along with the Major Project work in IV year II Semester. The Mini Project shall be submitted in a report form and presented before the committee. It shall be evaluated for 100 marks. The committee consists of an External Examiner, Head of the Department, and the Supervisor of the Mini Project and a Senior Faculty member of the department. There shall be no internal marks for Mini Project.

5.7 There shall be a Technical Seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for the seminar.

5.8 Out of a total of 300 marks for the Major Project work, 100 marks shall be allotted for Internal Evaluation and 200 marks for the End Semester Examination (Viva Voce). The End Semester Examination of the Major Project work shall be conducted by the same committee as appointed for the mini-project. In addition, the project supervisor shall also be included in the committee. The topics for mini project, seminar and project work shall be different from one another. The evaluation of project work shall be made at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project.

5.9 The Laboratory marks and the sessional marks awarded by the College are subject to scrutiny and scaling by the college wherever necessary. In such cases, the sessional and laboratory marks awarded by the College will be referred to Academic Council. The Academic Council will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Academic Council are final and binding. The laboratory records and internal test papers shall be preserved in the College as per the Affiliation University rules and produced before the Committees/Academic Council as and when asked for.

6. Attendance Requirements

6.1 A student is eligible to write the University examinations only if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

6.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee

6.3 Shortage of Attendance below 65% in aggregate shall not be condoned.

6.4 A student who is short of attendance in semester may seek re-admission into that semester when offered within 4 weeks from the date of the commencement of class work.

6.5 Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class and their registration stands cancelled.

6.6 A stipulated fee as determined by the examination branch shall be payable towards condonation of shortage of attendance.

6.7 **A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester, as applicable, including the days of attendance in sports, games, NCC and NSS activities.**

6.8 **If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.**

7. Course Registration:

7.1 Every student has to register for a set of Courses in each Semester, with the total number of their Credits being limited by considering the permissible weekly Contact Hours (typically: 30/Week); For this, an average Course Registration of minimum 20 Credits/Semester (e.g., 6-7 Courses) and a maximum of 28 credits are generally acceptable on recommendation of concerned academic advisor by satisfying the pre-requisite conditions.

7.2 Approval of the Course Registration will be informed by the concerned Head of the Department on the beginning of the semester by taking the number of students registered (minimum **one-third** students per class) and availability of the faculty into consideration.

7.3 Dropping of the Course Registration can be permitted up to two weeks from the commencement of the semester. Thereafter no droppings are permitted.

7.4 Interchanging of Course Registrations are not permitted.

7.5 The Pre-requisite conditions for the additional course(s) registration by the students are based on the slots available in the Time Table, Class rooms and Faculty availability.

8. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6.

8.1 A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/project and secures not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the mid-term and end semester exams.
8.2 A student shall be promoted from I year to II year upon fulfilling the minimum required attendance.
8.3 A student will be eligible to be promoted from II year to III year, upon fulfilling the academic requirements of 50 % credits up to II year I semester examinations and secures prescribed minimum attendance in II year.
8.4 A student will be eligible to be promoted from III year to IV year, upon fulfilling the academic requirements of 50 % credits up to III year I semester examinations and secures prescribed minimum attendance in III year.
8.5 A student shall register and put up minimum attendance in all 192 credits and shall earn a minimum of 184 credits for the award of B.Tech degree. Further, marks obtained in the 184 credits shall be considered for the calculation of percentage of marks as well as overall CGPA.
8.6 Students who fail to earn 184 credits as indicated in the course structure within ten academic years (8 years of study + 2 years additionally for appearing for exams only) from the year of their admission, shall forfeit their seat in B.Tech course and their admission stands cancelled.

9. Course pattern

9.1 The entire course of study is for four academic years. I,II, III and IV years shall be on semester pattern.

9.2 A student, eligible to appear for the end examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject during the period of supplementary exams.

9.3 When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the next semester. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

10. Award of Class

In assessing the performance of the students in examinations, the usual approach is to award marks based on the examinations conducted at various stages (sessional, mid-term, end-semester etc.,) in a semester. As per UGC Autonomous guidelines, the following system is implemented in awarding the grades and CGPA under the **Choice Based Credit System (CBCS).**

Letter Grades and Grade Points:

The UGC recommends a 10-point grading system with the following letter grades as given below:

Grades	Points	Marks secured (%)
O (Outstanding)	10	≥ 90
A+(Excellent)	9	85 – 89
A(Very Good)	8	75 – 84
B+(Good)	7	70 – 74
B(Above Average)	6	60 – 69
C(Average)	5	50 – 59
P(Pass)	4	40 – 49
F(Fail)	0	<40
Ab(Absent)	0	-

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

13.1 A student shall register and put up minimum attendance in all 192 credits and shall earn a minimum of 184 credits for the award of B.Tech degree. Further, marks obtained in the 184 credits shall be considered for the calculation of percentage of marks as well as overall CGPA ≥ 5.0, within 8 academic years from the date of commencement of the first academic year, shall be declared to have **'qualified'** for the award of the B.Tech. Degree in the chosen branch of Engineering as selected at the time of admission.

13.2 A student who qualifies for the award of the degree as listed in 13.1 shall be placed in the following classes.

13.3 Students with final CGPA (at the end of the under graduate programme) ≥ 7.50, and shall be placed in **'first class with distinction'**.

13.4 Students with final CGPA (at the end of the under graduate programme) ≥ 6.50 but < 7.50, shall be placed in **'first class'**.

13.5 Students with final CGPA (at the end of the under graduate programme) ≥ 5.50 but < 6.50, shall be placed in **'Second class'.**

13.6 All other students who qualify for the award of the degree (as per item 13.1), with final CGPA (at the end of the under graduate programme) ≥ 5.00 but < 5.50, shall be placed in **'pass class'.**

13.7 A student with final CGPA (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

13.8 Students fulfilling the conditions listed under item 13.3 alone will be eligible for award of **'university rank'** and **'gold medal'.**

Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

SGPA (Si) = Σ(Ci x Gi) / ΣCi

where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

CGPA = Σ(Ci x Si) / Σ Ci

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

11 Minimum Instruction Days

The minimum instruction days for each semester shall be 90days.

12 There shall be no branch transfers after the completion of the admission process.

13 WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases.

14. TRANSITORY REGULATIONS

14.1 Discontinued, detained, or failed candidates are eligible for readmission as and when next offered.

14.2 After the revision of the regulations, the students of the previous batches will be given two chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

14.3 In case of transferred students from other Universities, the credits shall be transferred to JNTUH as per the academic regulations and course structure of the MRCET.

15. General

15.1 Wherever the words he , him , his , occur in the regulations, they include she , her , hers .

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

15.3 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

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

15.5 The students seeking transfer to colleges affiliated to JNTUH from various other Universities/Institutions, have to pass the failed subjects which are equivalent to the subjects of prescribed curriculum of the institute, and also pass the subjects of prescribed curriculum of the institute which the candidates have not studied at the earlier Institution on their own without the right to sessional marks. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of prescribed curriculum of the institute, the candidates have to study those subjects in prescribed curriculum of the institute in spite of the fact that those subjects are repeated.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

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

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

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

		examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including

		practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)

(i) A show cause notice shall be issued to the college.

(ii) Impose a suitable fine on the college.

(iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

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ELECTRONICS & COMMUNICATION ENGINEERING

VISION

To evolve into a center of excellence in Engineering Technology through creative and innovative practices in teaching-learning, promoting academic achievement & research excellence to produce internationally accepted competitive and world class professionals.

MISSION

To provide high quality academic programmes, training activities, research facilities and opportunities supported by continuous industry institute interaction aimed at employability, entrepreneurship, leadership and research aptitude among students.

QUALITY POLICY

- **Impart up-to-date knowledge to the students in Electronics & Communication area to make them quality engineers.**
- **Make the students experience the applications on quality equipment and tools.**
- **Provide systems, resources and training opportunities to achieve continuous improvement.**
- **Maintain global standards in education, training and services.**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: PROFESSIONALISM & CITIZENSHIP

To create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.

PEO2: TECHNICAL ACCOMPLISHMENTS

To provide knowledge based services to satisfy the needs of society and the industry by providing hands on experience in various technologies in core field.

PEO3: INVENTION, INNOVATION AND CREATIVITY

To make the students to design, experiment, analyze, interpret in the core field with the help of other multi disciplinary concepts wherever applicable.

PEO4: PROFESSIONAL DEVELOPMENT

To educate the students to disseminate research findings with good soft skills and become a successful entrepreneur.

PEO5: HUMAN RESOURCE DEVELOPMENT

To graduate the students in building national capabilities in technology, education and research.

PROGRAMME SPECIFIC OBJECTIVES (PSOs)

PSO1

To develop a student community who acquire knowledge by ethical learning and fulfill the societal and industry needs in various technologies of core field.

PSO2

To nurture the students in designing, analyzing and interpreting required in research and development with exposure in multi disciplinary technologies in order to mould them as successful industry ready engineers/entrepreneurs

PSO3

To empower students with all round capabilities who will be useful in making nation strong in technology, education and research domains.

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.
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.
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.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
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.
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.
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.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.
12. **Life- long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

COURSE STRUCTURE

I Year B. Tech (ECE) – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX.MARKS	
						Int	Ext
1	R15A0001	ENGLISH	3		2	25	75
2	R15A0021	MATHEMATICS-1	5		4	25	75
3	R15A0011	ENGINEERING PHYSICS-1	3	1	2	25	75
4	R15A0013	ENGINEERING CHEMISTRY	4		3	25	75
5	R15A0501	COMPUTER PROGRAMMING WITH C	4	1	3	25	75
6	R15A0302	ENGINEERING DRAWING	2	3	4	25	75
7	R15A0581	COMPUTER PROGRAMMING LAB	-	3	2	25	50
8	R15A0083	ENGINEERING PHYSICS & CHEMISTRY LAB	-	3	2	25	50
9	R15A0081	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I	-	3	2	25	50
		TOTAL	21	14	24	225	600

I Year B. Tech (ECE) – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX.MARKS	
						Int	Ext
1	R15A0002	PROFESSIONAL ENGLISH	3		2	25	75
2	R15A0022	MATHEMATICS-II	5	-	4	25	75
3	R15A0012	ENGINEERING PHYSICS-II	3	1	2	25	75
4	R15A0502	OBJECT ORIENTED PROGRAMMING	4	1	3	25	75
5	R15A0201	ELECTRICAL CIRCUITS	5	-	4	25	75
6	R15A0014	ENVIRONMENTAL STUDIES	4	-	3	25	75
7	R15A0582	OBJECT ORIENTED PROGRAMMING LAB	-	3	2	25	50
8	R15A0084	IT WORKSHOP/ENGINEERING WORKSHOP	-	3	2	25	50
9	R15A0082	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-2	-	3	2	25	50
*10	R15A0003	HUMAN VALUES AND SOCIETAL PERSPECTIVES	2	-	-	50	-
		TOTAL	26	11	24	275	600

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

II Year B. Tech (ECE) – I Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R15A0023	Mathematics-III	4	1	3	25	75
2	R15A0401	Electronic Devices and Circuits	5	-	4	25	75
3	R15A0402	Signals and Systems	4	1	3	25	75
4	R15A0403	Probability Theory and stochastic Process	4	1	3	25	75
5	R15A0202	Electrical Technology	5	-	4	25	75
6	R15A0061 R15A0066 R15A0067	Open Elective 1 1. Managerial Economics and Financial Analysis 2. Disaster Management 3. Technology Management	4	-	3	25	75
7	R15A0481	Electronic Devices & Circuits Lab	-	3	2	25	50
8	R15A0482	Basic Simulation Lab	-	3	2	25	50
*9	R15A0004 R15A0005	Foreign Language: French Foreign Language: German	2	-	-	50	-
Total			28	09	24	250	550

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

II Year B. Tech (ECE) – II Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R15A0203	Control Systems	4	1	3	25	75
2	R15A0404	Pulse and Digital Circuits	4	1	3	25	75
3	R15A0405	Electronic Circuit Analysis	4	1	3	25	75
4	R15A0406	Electromagnetic Theory and Transmission Lines	4	1	3	25	75
5	R15A0407	Switching Theory and Logic Design	4	1	3	25	75
6	R15A0064 R15A0069 R15A0065	Open Elective 2: 1. Enterprise Resource Planning 2. Intellectual Property Rights 3. Management Science	4	-	3	25	75
7	R15A0483	EC& PC Lab	-	3	2	25	50
8	R15A0281	Electrical Technology Lab	-	3	2	25	50
9	R15A0006	Gender Sensitization	-	3	2		
Total			24	14	24	250	550

III Year B. Tech (ECE) – I Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R15A0408	IC Applications	5	-	4	25	75
2	R15A0409	Analog Communications	5	-	4	25	75
3	R15A0569	Computer Organization & Operating Systems	4	1	3	25	75
4	R15A0410	Digital Design Through Verilog	4	1	3	25	75
5	R15A0411 R15A0412 R15A0204	Core Elective 1 1. Digital System Design 2. Design of Fault Tolerance Systems 3. Digital Control Systems	4	1	3	25	75
6	R15A0507 R15A0520 R15A0570	Open Elective 3 1. Java Programming 2. Web Technologies 3. Artificial Intelligence	4	1	3	25	75
7	R15A0484	IC Applications & HDL Simulation Lab	-	3	2	25	50
8	R15A0485	Analog Communications Lab	-	3	2	25	50
*9	R15A0007	Technical Communications and Soft Skills	2	-	-	50	-
Total			24	09	24	250	550

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

III Year B. Tech (ECE) – II Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R15A0413	Digital Communications	4	1	3	25	75
2	R15A0414	Microprocessors and Microcontrollers	5	-	4	25	75
3	R15A0415	Digital Signal Processing	5	-	4	25	75
4	R15A0416	Antennas and Wave Propagation	4	1	3	25	75
4	R15A0417 R15A0418 R15A0419	Core Elective 2 1. Electronic Measurements & Instruments 2. Optical Communications 3. Data Communications	4	1	3	25	75
6	R15A0509 R15A0543 R15A0568	Open Elective 4 1. Data Base Management System 2. Software Project Management 3.APPS Design and Development	4	1	3	25	75
7	R15A0486	Microprocessors and Microcontrollers Lab	-	3	2	25	50
8	R15A0487	Digital Signal Processing Lab	-	3	2	25	50
Total			20	12	24	200	550

IV Year B. Tech (ECE) – I Semester

S.No.	Subject Code	SUBJECT	L	T/P/D	C	Max. Marks	
						Int	Ext
1	R15A0420	VLSI Design	5	-	4	25	75
2	R15A0421	Microwave Engineering	5	-	4	25	75
3	R15A0422	Cellular & Mobile Communications	4	1	3	25	75
4	R15A0514	Computer Networks	4	1	3	25	75
4	R15A0423 R15A0424 R15A0434	Core Elective 3 1. Satellite Communications 2. Embedded Systems Design 3. Bio-Medical Instrumentation	4	1	3	25	75
5	R15A0426 R15A0427 R15A0428	Core Elective 4 1. Digital Image Processing 2. Speech Processing 3. Multimedia & Signal Coding	4	1	3	25	75
7	R15A0488	eCAD & VLSI Lab	-	3	2	25	50
8	R15A0489	Microwave Engineering & Digital Communications Lab	-	3	2	25	50
Total			26	10	24	200	550

IV Year B. Tech (ECE) – II Semester

S.No.	Subject Code	SUBJECT	L	T/P/D	C	Max. Marks	
						Int	Ext
1	R15A0429 R15A0430 R15A0431	Core Elective 5 1. Radar Systems 2. Digital Signal Processors & Architectures 3. RF Circuit Design	5	-	4	25	75
2	R15A0432 R15A0573 R15A0433	Core Elective 6 1. Wireless Communications & Networks 2. Network Security & Cryptography 3. Telecommunication Switching Systems & Networks	5	-	4	25	75
3	R15A0490	Mini Project	-	-	4	-	100
4	R15A0491	Technical Seminar	-	6	2	50	-
5	R15A0492	Major Project	15	-	10	100	200
Total			25	6	24	200	450

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	4	**1/ - /-**	**4**

(R15A0408) IC APPLICATIONS

OBJECTIVES

The main objectives of the course are:

1. To introduce the basic building blocks of linear integrated circuits.
2. To teach the linear and non-linear applications of operational amplifiers.
3. To teach the theory of ADC and DAC.
4. To introduce the concepts of waveform generation and introduce some special function ICs.
5. To understand and implement the working of basic digital circuits.

UNIT - I:

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT - II:

Op-Amp, IC-555 & IC 565 Applications: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, waveform Generators - Triangular, Saw-tooth, Square wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, Description of Individual Blocks, Applications.

UNIT - III:

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV:

Digital Integrated Circuits: Classification of Integrated Circuits, Combinational Logic ICs - Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, De-multiplexers, Encoders, Priority Encoders, Multiplexers, De-multiplexers, Parity Generators/Checkers, Parallel Binary Adder/ Subtractor, Magnitude Comparators.

UNIT - V:

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS 40XX Series ICs - All Types of Flip-flops, conversion of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS :

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 2003.
3. Digital fundamentals – Floyd and Jain, Pearson Education,8th Edition ,2005.

REFERENCE BOOKS:

1. Op Amps & Linear Integrated circuits-Concepts and Applications James M.Fiore,Cengage Learning/Jaico,2009.
2. Operational Amplifiers with linear integrated circuits by K.Lal kishore-Pearson,2009.
3. Linear integrated circuits and applications-Salivahana,TMH.
4. Modern digital electronics-RP Jain-4/e-TMH,2010.
5. Digital design principles and practices-John.F.Wakerly 3/e,2005.
6. Operational amplifiers with linear integrated cuircuits,4/e William D.Stanley,Pearson education India,2009.

OUTCOMES:

On completion of this course, the students will have:

1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. Understanding of the different families of digital integrated circuits and their characteristics.
3. Also students will be able to design circuits using operational amplifiers for various applications.

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	4	**1/ - /-**	**4**

(R15A0409) ANALOG COMMUNICATIONS

OBJECTIVES

1. Emphasize on the study of principles of communication theory.
2. Focus on the fundamentals of communication system.
3. Introduce the techniques of transmitting and receiving information signals using analog carrier modulation techniques (AM, FM, PM) and evaluate their performance levels (SNR) in the presence of channel noise.
4. Establish foundation for understanding the relationship among various technical factors useful in the design & operation of a communication system.

UNIT I

AMPLITUDE MODULATION: Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation: Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves: square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector.

DSB-SC modulation: Double side band suppressed carrier modulation, time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulators, Ring Modulator, Detection of DSBSC waves: Coherent detection, COSTAS Loop.

Radio Transmitters- Classification of Transmitters, AM Transmitter Block diagram and explanation of each block.

UNIT II

SSB MODULATION: Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Hilbert Transform & its Properties, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves.

Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave plus Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT III

ANGLE MODULATION: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave. Generation of FM Waves: Indirect FM, Direct FM: Varactor Diode and Reactance Modulator. Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM. , Pre-emphasis & de-emphasis, FM Transmitter block diagram and explanation of each block.

UNIT IV

NOISE: Noise in communication System, White Noise, Narrowband Noise –In phase and Quadrature phase components. Noise Bandwidth, Noise Figure, Noise Temperature, Noise in DSB& SSB System Noise in AM System, Noise in Angle Modulation System, and Threshold effect in Angle Modulation System.

UNIT V

RECEIVERS: Radio Receiver, Receiver Types: Tuned radio frequency receiver, Superhetrodyne receiver- RF section, Frequency mixers, tracking, Intermediate frequency, AGC. Receiver Parameters & Characteristics, FM Receiver and its comparison with AM Receiver.

PULSE MODULATION: Types of Pulse modulation, PAM: Generation (Single polarity, double polarity) and Demodulation. PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM.

TEXTBOOKS:

1. Communication Systems- Simon Haykin, 2nd Edition, Wiley Publications.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.
3. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.

REFERENCES:

1. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
2. Communication Systems Second Edition – R.P. Singh, SP Sapre, TMH, 2007.
3. Analog & Digital Communication – K.Sam Shanmugam, Wiley 2005
4. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.
5. Electronic Communication Systems- Modulation & Transmission- Robert J.Schoenbeck, 2nd Edition, PHI

OUTCOMES

1. Upon completion of the subject, students will be able:
2. Conceptually understand the baseband signal and system
3. Identify various elements, processes and parameters in telecommunication systems and describe their functions, effects and inter relationship
4. Design procedure of AM transmission and reception, analyze, measure and evaluate the performance of the telecommunication system against given criteria
5. Understand basic knowledge of FM transmission and reception Design typical telecommunication systems that consists of basic and essential building blocks

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(R15A0569) COMPUTER ORGANIZATION AND OPERATING SYSTEMS

Course Objectives:

The course objectives are:

1. To have a thorough understanding of the basic structure and operation of a digital computer.
2. To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
3. To study the different ways of communicating with I/O devices and standard I/O interfaces.
4. To study the hierarchial memory system including cache memories and virtual memory.
5. To demonstrate the knowledge of functions of operating system memory management scheduling, file system and interface, distributed systems, security and dead locks.
6. To implement a significant portion of an Operating System.

UNIT - I:

Basic Structure of Computers: Computer Types, Functional UNIT, Basic Operational Concepts, Bus, Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, Fixed Point Representation, Floating - Point Representation.

Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit, Instruction Codes, Computer Registers Computer Instructions - Instruction Cycle.

Memory - Reference Instructions, Input - Output and Interrupt, STACK Organization, Instruction Formats, Addressing Modes, DATA Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT - II:

Micro Programmed Control: Control Memory, Address Sequencing, Microprogram Examples, Design of Control Unit, Hard Wired Control, Microprogrammed Control.

The Memory System: Basic Concepts of Semiconductor RAM Memories, Read-Only Memories, Cache Memories Performance Considerations, Virtual Memories secondary Storage, Introduction to RAID.

UNIT - III:

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input-Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE1394.

UNIT - IV:

Operating Systems Overview: Overview of Computer Operating Systems Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures-Operating System Services and Systems Calls, System Programs, Operating System Generation.

Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Allocation of Frames, Thrashing Case Studies - UNIX, Linux, Windows

Principles of Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

UNIT - V:

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection.

File System Implementation: File System Structure, File system Implementation, Directory Implementation, Allocation Methods, and Free-Space Management.

TEXT BOOKS:

1. Computer Organization - Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer System Architecture - M. moris mano, 3rd edition, Pearson
3. Operating System Concepts - Abreham Silberchatz, Peter B. Galvin, Greg Gagne, 8th Edition, John Wiley.

REFERENCE BOOKS:

1. Computer Organization and Architecture - William Stallings 6th Edition, Pearson
2. Structured Computer Organization - Andrew S. Tanenbaum, 4th Edition, PHI
3. Fundamentals of Computer Organization and Design - Sivaraama Dandamudi, Springer Int. Edition
4. Operating Systems - Internals and Design Principles, Stallings, 6th Edition - 2009, Pearson Education.
5. Modern Operating Systems, Andrew S Tanenbaum 2nd Edition, PHI
6. Principles of Operating System, B. L. Stuart, Cengage Learning, India Edition.

Course Outcomes:

Upon completion of the course, students will have through knowledge about:

1. Basic structure of a digital computer
2. Arithmetic operations of binary number system
3. The organization of the Control Unit, Arithmetic and Logical Unit, Memory Unit and the I/O unit.
4. Operating system functions, types, system calls.
5. Memory management techniques and dead lock avoidance
6. Operating systems file system and implementation and its interface.

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	4	**1/ - /-**	**3**

(R15A0410) DIGITAL DESIGN THROUGH VERILOG

OBJECTIVE:

This course teaches:

1. Designing digital circuits, behavior and RTL modeling of digital circuits using verilog HDL, verifying these Models and synthesizing RTL models to standard cell libraries and FPGAs.
2. Students aim practical experience by designing, modeling, implementing and verifying several digital circuits.

This course aims to provide students with the understanding of the different technologies related to HDLs, construct, compile and execute Verilog HDL programs using provided software tools. Design digital components and circuits that are testable, reusable, and synthesizable.

UNIT - I:

Introduction to VerilLog HDL: Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Function Verification, System Tasks, Programming Language Interface, Module, Simulation and Synthesis Tools

Language Constructs and Conventions: Introduction, Keywords, Identifiers, White Space, Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators.

UNIT - II:

Gate Level Modeling: Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tristate Gates, Array of Instances of Primitives, Design of Flip-Flops with Gate Primitives, Delay, Strengths and Construction Resolution, Net Types, Design of Basic Circuit.

Modeling at Dataflow Level: Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vector, Operators.

UNIT - III:

Behavioral Modeling: Introduction, Operations and Assignments, 'Initial' Construct, Assignments with Delays, 'Wait ‘Construct, Multiple Always Block, Design at Behavioral Level, Blocking and Non-Blocking Assignments, The 'Case' Statement, 'If' an 'if-Else' Constructs, 'Assign- De-Assign' Constructs, 'Repeat' Construct, for loop, 'The Disable' Construct, 'While Loop', Forever Loop, Parallel Blocks, Force-Release, Construct, Event.

UNIT - IV:

Switch Level Modeling: Basic Transistor Switches, CMOS Switches, Bidirectional Gates, Time Delays with Switch Primitives, Instantiation with 'Strengths' and 'Delays' Strength Contention with Tri reg Nets.

System Tasks, Functions and Compiler Directives: Parameters, Path Delays, Module Parameters. System Tasks and Functions, File Based Tasks and Functions, Computer Directives, Hierarchical Access, User Defined Primitives.

UNIT - V:

Sequential Circuit Description: Sequential Models - Feedback Model, Capacitive Model, Implicit Model, Basic Memory Components, Functional Register.

Components Test and Verification: Test Bench - Combinational Circuits Testing, Sequential Circuit Testing, Test Bench Techiniques, Desin Verification, Assetion Verification.

TEXT BOOKS:

1. T.R. Padmanabhan, B Bala Tripura Sundari, Design Through Verilog HDL, Wiley 2009.
2. Zainalabdien Navabi, Verliog Digital System Design,TMH, 2nd Edition.

REFERENCE BOOKS:

1. Fundamentals of Digital Logic with Verilog Design - Stephen Brown,Zvonkoc Vranesic, TMH, 2nd Edition.
2. Advanced Digital Logic Design using Verilog, State Machines & Synthesis for FPGA - Sunggu Lee, Cengage Learning, 2012.
3. Verilog HDL - Samir Palnitkar, 2nd Edition, Pearson Education, 2009.
4. Advanced Digital Design with Verilog HDL - Michel D. Ciletti, PHI,2009.

OUTCOMES

1. By the end of the course student should be able to:
2. Describe Verilog HDL
3. Design Digital circuits
4. Write behavior model of digital circuits
5. Write RTL models of digital circuits
6. Verify behavior and RTL models
7. Describe standard Cell Librarioes and FPGAs
8. Synthesize RTL models to standard cell libraries and FPGAs
9. Implement RTL models on FPGAs and testing and verification

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	3	**1/ - /-**	**3**

CORE ELECTIVE – I

(R15A0411) DIGITAL SYSTEM DESIGN

OBJECTIVES:

This course provides in depth knowledge digital system design of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

1. To design and analysis of sequential circuits.
2. To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
3. To understand about the SM charts and their realization
4. To implement synchronous state machines using flip-flops.
5. To detect the fault models in sequential circuits.

UNIT -I:

Minimization and Transformation of Sequential Machines: The Finite State Model – Capabilities and limitations of FSM –State equivalence and machine minimization – Simplification of incompletely specified machines.

Fundamental mode model –Flow table –State reduction – Minimal closed covers –Races, Cycles and Hazards.

UNIT -II:

Digital Design: Digital Design Using ROMs, PALs and PLAs, BCD Adder, 32 –bit adder, State graphs for control circuits, A shift and add multiplier, Array multiplier.

UNIT -III:

SM Charts: State machine charts, Derivation of SM Charts, Realization of SM Chart, Implementation of Binary Multiplier.

UNIT -IV:

Fault Modeling & Test Pattern Generation: Logic Fault model –Fault detection & Redundancy-Fault equivalence and fault location –Fault dominance –Single stuck at fault model –Multiple stuck at fault models –Bridging fault model. Fault diagnosis of combinational circuits by conventional methods –Path sensitization techniques, Boolean Difference method –Kohavi algorithm.

UNIT -V:

Fault Diagnosis in Sequential Circuits: Circuit Test Approach, Transition Check Approach – State identification and fault detection experiment, Machine identification.

TEXT BOOKS:

1. Fundamentals of Logic Design –Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design –Miron Abramovici, Melvin A. Breuer and Arthur D.Friedman-John Wiley & Sons Inc.
3. Switching Theory and Logic Design –A. Anand Kumar, PHI

REFERENCE BOOKS:

1. Switching and Finite Automata Theory –Z. Kohavi , 2 nd Ed., 2001, TMH
2. Digital Design –Morris Mano, M.D.Ciletti, 4 th Edition, PHI.
3. Digital Circuits and Logic Design –Samuel C. Lee , PHI
4. Logic Design Theory –N. N. Biswas, PHI

OUTCOMES

Upon completion of the course, the student will be able to:

1. Design and analysis of sequential circuits.
2. Understand the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
3. Understand about the SM charts and their realization
4. Implement synchronous state machines using flip-flops.
5. Detect the fault models in sequential circuits.

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	3	**1/ - /-**	**3**

CORE ELECTIVE – I

(R15A0412) DESIGN OF FAULT TOLERANCE SYSTEMS

OBJECTIVES:

1. To create understanding of the fundamental concepts of fault-tolerance
2. To learn basic techniques for achieving fault-tolerance in electronics, communication and software systems
3. To develop skills in modeling and evaluating fault-tolerant architectures in terms of reliability, availability and safety
4. To gain knowledge in sources of faults and means for their prevention and forecasting
5. To understand merits and limitations of fault-tolerant design

UNIT – I: Fault Tolerant Design

Basic Concepts: Reliability Concepts, Failure & Faults, Reliability and Failure rate, Relation between Reliability and Meantime between failure, Maintainability and Availability, Reliability of series, Parallel and Parallel-Series combinational circuits

Fault Tolerant Design : Basic Concepts – Static, dynamic, Hybrid Triple Modular Redundant System, Self purging redundancy, SIFT out redundancy (SMR), 5 MR Re-Configuration techniques, Use of Error Correcting codes, Time redundancy and software redundancy

UNIT – II: Self Checking Circuits & Fail Safe Design

Self Checking circuits: Basic concepts of self checking circuits, Design of Totally self checking checker, checkers using m out of n codes, Berger code, Low cost residue code

Fail Safe Design: Strongly fault secure circuits, fail safe design of sequential circuits using partition theory and Berger code

UNIT – III ATPG Fundamentals & Design for Testability for Combinational Circuits

Introduction to ATPG, ATPG Process – Testability and Fault analysis methods – Fault masking, Transition delay fault, Path delay

Design for Testability for Combinational Circuits: Basic concepts of Testability, Controllability and Observability, The Reed Muller's expansion technique, OR-AND-OR Design, Use of control and Syndrome Testable Designs

UNIT – IV Scan Architectures & Techniques

Introduction to Scan Based testing, Functional testing, The Scan effective Circuit, The MUX-D Style Scan flip-flops, The Scan shift register, Scan cell operation

Scan Test Sequencing, Scan test timing, Partial Scan, Multiple Scan Chains, Scan based Design rules (LSSD), At-speed scan testing and Architecture, multiple clock and scan domain operation, critical paths for at speed scan test

UNIT – V Built in Self Test (BIST)

BIST concepts, Test Pattern generation for BIST exhaustive testing, Pseudorandom testing, pseudo exhaustive testing, constant weight patterns, Generic offline BIST architectures, Memory Test architecture, BILBO

TEXT BOOKS:

1. Fault Tolerant & Fault Testable Hardware Design – Parag K. Lala, 1984, PHI.
2. Design for Test for Digital IC's and Embedded Core Systems – Alfred L. Crouch, 2008, Pearson Education.

REFERENCES:

1. Digital Systems Testing and testable Design – Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman, Jaico Books
2. Essentials of Electronic Testing - Bushnell & Vishwani D.Agarwal, Springers.

OUTCOMES

On completion of this course, it is expected that the student will be able to:

1. Understand the fundamental concepts of fault-tolerance
2. Learn basic techniques for achieving fault-tolerance in electronics, communication and software systems
3. Develop skills in modeling and evaluating fault-tolerant architectures in terms of reliability, availability and safety
4. Gain knowledge in sources of faults and means for their prevention and forecasting
5. Understand merits and limitations of fault-tolerant design

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CORE ELECTIVE – I

(R15A0204) DIGITAL CONTROL SYSTEMS

OBJECTIVE:

To cater the knowledge of

1. Basic and digital control system for the real time analysis
2. Design of control systems.
3. To provide comprehensive knowledge of concepts of stability analysis
4. Design of discrete time systems.
5. To expose the students to the concepts of optimal control for discrete domain.

UNIT – I

SAMPLING AND RECONSTRUCTION:

Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

THE Z – TRANSFORMS:

Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms-Plane analysis of discrete-time control system, Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between S-plane and Z-plane.

UNIT – II

STATE SPACE ANALYSIS:

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it‘s Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations.

CONTROLLABILITY AND OBSERVABILITY:

Concepts of Controllability and Observability, Tests for controllability and observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT – III

STABILITY ANALYSIS:

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT – IV

DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS:

Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag, Lead-Lag and Lag- Lead compensators and digital PID controllers.

UNIT – V

STATE FEEDBACK CONTROLLERS AND OBSERVERS:

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

TEXT BOOKS:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition.
2. Digital Control and State Variable Methods by M.Gopal, TMH.
3. Digital Control System Analysis and Design, 3rd Edition by Charles L. Phillips, H. Troy Nagle.

REFERENCE BOOKS:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control Engineering, M.Gopal New age international publishers.
3. Advanced Control Theory by NAGOOR KANI, 2nd Edition, RBA Publications.
4. Digital Control Systems, Design, Identification and Implementation by Landau**,** Iona Dore, ZitoGianluca,Springer1st edition.
5.Digital control systems by R.Isermann, Springer; 1st edition.

OUTCOMES

Upon completion of the course, the student will be able to:

1. Learn the basics and digital control system for the real time analysis
2. Design of control systems.
3. Learn comprehensive knowledge of concepts of stability analysis
4. Understand the design of discrete time systems
5. Understand the concepts of optimal control for discrete domain.

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OPEN ELECTIVE – III

(R15A0507) JAVA PROGRAMMING

OBJECTIVES:

1. The objective of this course is to provide object oriented concepts through which robust, secured and reusable software can be developed.
2. To understand object oriented principles like abstraction, encapsulation, inheritance, polymorphism and also fundamentals of object-oriented programming in Java, including objects, classes, and interfaces.
3. To provide the Knowledge in Packages, Exception handling, Multithreading.
4. To Explore AWT and Applets to create GUI applications.
5. To give the students the ability to use the potential benefits of object-oriented programming for solving complex problems efficiently.

UNIT I :

Object oriented thinking :- Need for oop paradigm, A way of viewing world – Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of oop concepts

Java Basics History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, String handling

UNIT II:

Inheritance – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, Object class

Packages and Interfaces : Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces, package java.io – File, Byte Streams, Character Streams, Stream I/O.

UNIT III:

Exception handling - Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Package java.util-Collections Framework: Collection Interface: Queue, Collection class:LinkedList,Stack class, StringTokenizer, Date, Random, Scanner.

Multi threading: Differences between multi threading and multitasking, tread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads.

UNIT IV:

Enumerations, auto boxing Generics –A simple generics example.

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

AWT: class hierarchy, component, container, panel, window, frame, canvas, graphics. Layout Manager – layout manager types – boarder, grid, flow, card and grib bag.

UNIT V:

AWT controls: Labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar.

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Swing – Introduction, limitations of AWT, MVC architecture, components, containers.

TEXT BOOKS:

1. Java- the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, pearson eduction.

REFERENCES:

1. Thinking in Java 4th Edition, Bruce Eckel
2. Introduction to Java programming, Y. Daniel Liang, pearson education.
3. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education.

OUTCOMES

Upon completion of the course, the student will be able to:

1. Understand object oriented concepts through which robust, secured and reusable software can be developed.
2. Understand object oriented principles like abstraction, encapsulation, inheritance, polymorphism and also fundamentals of object-oriented programming in Java, including objects, classes, and interfaces.
3. Learn the Knowledge in Packages, Exception handling, Multithreading.
4. Explore AWT and Applets to create GUI applications.
5. Learn the potential benefits of object-oriented programming for solving complex problems efficiently.

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OPEN ELECTIVE – III

(R15A0520) WEB TECHNOLOGIES

OBJECTIVES:

1. Giving the students the insights of the Internet programming and how to design and implement complete applications over the web.
2. It covers the notions of Web servers and Web Application Servers, Design Methodologies with concentration on Object-Oriented concepts, Client-Side
3. Programming, Server-Side Programming, Active Server Pages, Database Connectivity to web applications, Adding Dynamic content to web applications,
4. Programming Common Gateway Interfaces, Programming the User Interface for the web applications.

UNIT I:

HTML Common tags: List, Tables, images, forms, Frames; Cascading Style sheets. Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

UNIT II:

Introduction to XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX. Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's.

UNIT III:

Web Servers and Servlets: Tomcat web server, Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax. Servlet Package, Reading Servlet 150 parameters, Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

UNIT IV:

Database Access: Database Programming using JDBC, JDBC drivers, Studying Javax.sql.* package, Accessing a Database from a Servlet. Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment.

UNIT V:

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing : Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing

Session and Application Data – Memory Usage Considerations, Accessing a Database from a JSP page, Deploying JAVA Beans in a JSP Page, Introduction to struts framework.

TEXT BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNIT s 1, 2)
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson (UNITs 3,4,5)

REFERENCE BOOKS:

1. Programming world wide web-Sebesta,Pearson
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson
3. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
4. Jakarta Struts Cookbook, Bill Siggelkow, S P D O'Reilly for chap 8.
5. March's beginning JAVA JDK 5, Murach, SPD
6. An Introduction to Web Design and Programming –Wang-Thomson

OUTCOMES:

1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Styles sheets.
3. Installation and usage of Server software's.
4. Database Connectivity to web applications
5. Build web applications using Servlet and JSP

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OPEN ELECTIVE – III

(R15A0570) ARTIFICIAL INTELLIGENCE

OBJECTIVES:

To illustrate

1. The most important as well as lasting ideas in artificial intelligence, Neural networks, genetic programming, computer vision, heuristic search, knowledge representation and reasoning,
2. Bayes networks, planning, and language understanding are each revealed through the growing field.
3. The subject provides a refreshing and motivating new synthesis of the field by one of AI's master expositors and leading researchers. "Artificial Intelligence: A New Synthesis" takes the reader on a complete tour of this intriguing New World of AI.

UNIT I

Introduction

Definition of Artificial Intelligence, subfields of AI, Intelligent Action, Search, Knowledge Representation.

UNIT II

The Search

Search, Blind search, Breadth First, Depth First, Heuristic Search, Search as function maximization, Adversary Search.

UNIT III

Logistics

Knowledge Representation, Predicate logic, First Order Logic, Databases with quantifiers

UNIT IV

Learning Methods

Learning Methods, Learning by building identification trees, Learning by training neural networks.

UNIT V

Processing

Natural Language Processing, Signal Processing, syntax and Parsing, semantics and meaning.

TEXT BOOKS/ REFERENCE BOOKS

1. Essentials of Artificial Intelligence - Matt Ginsberg, Matthew L. Ginsberg –Morgan Kaufmann, 1993.
2. Stuart Russel, Peter Norvig "Artificial Intelligence - A Modern Approach", 3e, PHI, 2009
3. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill, 1993
4. Artificial Intelligence, Patrick Henry Winston, Addison-Wesley Pub Co, 3rd edition, 1992.

OUTCOMES

At the end of the course the student should be able to understand artificial intelligence, Neural networks, genetic programming, computer vision, heuristic search, knowledge representation and reasoning.

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(R15A0484) IC APPLICATIONS AND HDL SIMULATION LAB

Note: To perform any twelve experiments (choosing at least five from each part).

Part - I: Linear IC Experiments

1. OP AMP Applications – Adder, Subtractor, Comparators.
2. Integrator and Differentiator Circuits using IC 741.
3. Active Filter Applications – LPF, HPF (first order)
4. IC 741 Waveform Generators - Sine, Squarewave and Triangular waves.
5. IC 555 Timer - Monostable and Astable Multivibrator Circuits.
6. Schmitt Trigger Circuits - Using IC 741
7. IC 565 - PLL Applications.
8. Voltage Regulator using IC 723, Three Terminal Voltage Regulators - 7805, 7809, 7912.

EQUIPMENT REQUIRED:

1. 20 MHz / 40 MHz / 60 MHz Oscilloscope.
2. 1 MHz Function Generator (Sine, Square, Traingular and TTL).
3. Regulated Power Supply.
4. Multimeter / Volt Meter.

Part - II: HDL Simulation programs:

Programming can be done using any compiler. Download the programs on FPGA / CPLD boards and performance testing may be done using pattern generator / logic analyzer apart from verification by simulation using Cadence / Mentor Graphics / Synopsys / Equivalentfront end CAD tools.

1. HDL code to realize all the logic gates
2. Design of 2-to-4 decoder
3. Design of 8-to-3 encoder (without and with Priority)
4. Design of 8-to-1 multiplexer and 1 x 8 demuliplexer.
5. Design of 4 bit binary to gray code converter
6. Design of 4 bit comparator
7. Design of Full adder using 3 modeling styles
8. Design of flip flops: SR, JK, T
9. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset)

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(R15A0485) ANALOG COMMUNICATIONS LAB

Note: Minimum 12 Experiments should be conducted:
All these experiments are to be simulated first using MATLAB, Comsim or any other simulation package and then to be realized in hardware.

LIST OF EXPERIMENTS:

1. Amplitude modulation and demodulation.
2. DSB-SC Modulator & Detector.
3. SSB-Sc Modulator & Detector (Phase Shift Method).
4. Frequency modulation and demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals.
6. Pre-emphasis & de-emphasis.
7. Frequency Division Multiplexing & De multiplexing.
8. Verification of Sampling Theorem.
9. Pulse Amplitude Modulation & Demodulation.
10. Pulse Width Modulation & Demodulation.
11. Pulse Position Modulation & Demodulation.
12. Frequency Synthesizer.
13. AGC Characteristics.
14. PLL as FM Demodulator.

Equipment required for the Laboratory:

1. RPS - 0-30 V.
2. CRO - 0-20 M Hz.
3. Function Generators - 0-1 M Hz.
4. RF Generators - 0-1000 M Hz./0-100 MHz.
5. Multimeters.
6. Lab Experimental kits for Analog Communication.
7. Radio Receiver/TV Receiver Demo kits or Trainees.
8. Spectrum Analyzer – 60 M Hz.
9. Any one Simulation Package.

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MANDATORY COURSE – III

(R15A0007) TECHNICAL COMMUNICATION AND SOFT SKILLS

INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

OBJECTIVES:

a. To improve the language proficiency of the students in English with emphasis on LSRW skills.
b. To equip the students to approach academic subjects more professionally using the theoretical and practical components of the English syllabus.
c. To develop the professional skills and communication skills in formal and informal situations and hone the required professional ethics.

SYLLABUS

Unit- 1: Factors affecting information and document design, Principles of effective writing , Technical Writing, Grammar and Editing- Technical writing process, Writing drafts and revising, Collaborative writing, technical writing style and language.

Unit- 2: Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication.

Unit-3: Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids. Writing reports, Email writing, official notes, business letters, memos, progress reports, minutes of meetings, event report.

Unit- 4: Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, self esteem.

Unit- 5: Ethics- Business ethics, , Personality Development in social and office settings, netiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Rapid reading, Complex problem solving, Creativity, leadership skills ,cubicle Etiquettes, team building.

Text Books:

1. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)

Reference Books:

1. Dale Jung k, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
2. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
3. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

OUTCOMES:

1. The student will become proficient in LSRW skills.
2. They develop formal LSRW skills approach to different situations.
3. They hone professional ethics and learn to be proficient formally.

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(R15A0413) DIGITAL COMMUNICATIONS

OBJECTIVES:

1. To understand the building blocks of digital communication system.
2. To prepare mathematical background for communication signal analysis.
3. To understand and analyze the signal flow in a digital communication system.
4. To analyze error performance of a digital communication system in presence of noise and other interferences.

UNIT I

Pulse Digital Modulation: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Time Division Multiplexing & Demultiplexing.

Delta Modulation: Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, Noise in PCM and DM systems. Illustrative Problems.

UNIT II

Digital Modulation Techniques: Introduction, ASK modulator, Coherent and Non-Coherent ASK detector, FSK modulator, Spectrum of FSK, coherent reception, non-coherent detection of FSK.

BPSK transmitter, Coherent reception of BPSK, DPSK, QPSK.

Data Transmission: Base band signal receiver, probability of error, The optimum filter, Matched filter, probability of error using matched filter.Optimum filter using correlator.Probability of error of ASK,FSK,BPSK and QPSK. Illustrative Problems.

UNIT III

Information Theory: Discrete messages, Concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties, Illustrative Problems.

Source Coding: Introduction, Advantages, Hartley Shannon's theorem, bandwidth –S/N trade off, Shanon- Fano coding, Huffman coding, Illustrative Problems.

UNIT IV

Linear Block Codes: Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of linear block codes, Hamming codes.

Cyclic Codes: Encoding, Syndrome Calculation, Decoding,

UNIT V

Convolution Codes: Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: State, Tree and Trellis diagram. Decoding using Viterbi algorithm Illustrative Problems.

TEXT BOOKS:

1. Digital communications - Simon Haykin, John Wiley, 2005
2. Principles of Communication Systems – H. Taub and D. Schilling, TMH, 2003

REFERENCES:

1. Digital and Analog Communication Systems – K.Sam Shanmugam, John Wiley, 2005.
2. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog & Digital – Singh & Sapre, TMH, 2004.
3. Modern Analog and Digital Communication – B.P.Lathi, Oxford reprint, 3rd edition, 2004.

OUTCOMES:

At the end of the course, the student will be able to:

1. Understand basic components of digital communication systems
2. Design Optimum receivers for digital modulation techniques
3. Analyze the error performance of digital modulation techniques
4. Know about different error detecting and error correcting codes.

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(R15A0414) MICROPROCESSORS AND MICROCONTROLLERS

OBJECTIVES:

1. To understand the basics of microprocessors and microcontrollers architectures and its functionalities
2. To develop an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques.
3. To design and develop Microprocessor/ microcontroller based systems for real time applications using low level language like ALP.

UNIT -I:

8086 Architecture: Architecture of 8086, Register Organization, Programming Model, Memory addresses, Memory Segmentation, Physical Memory Organization, Signal descriptions of 8086- Common Function Signals, Minimum and Maximum mode signals, Timing diagrams.

UNIT -II:

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Procedures, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String Manipulations.

UNIT -III:

I/O Interface: 8255 PPI, Various Modes of Operation and Interfacing to 8086, D/A and A/D Converter, Stepper motor, Interfacing of DMA controller 8257

Interfacing with advanced devices : Memory Interfacing to 8086, Interrupt Structure of 8086, Interrupt Vector Table, Interrupt Service Routine, architecture of 8259.

Communication Interface: Serial Communication Standards, Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.

UNIT -IV:

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs, memory interfacing to 8051

UNIT -V:

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

ARM Processor : Fundamentals, Registers, current program status register, pipeline concept.

TEXT BOOKS:

1. D. V. Hall, Microprocessors and Interfacing, TMGH, 2nd Edition 2006.
2. Kenneth. J. Ayala, The 8051 Microcontroller, 3rd Ed., Cengage Learning.
3. ARM System Developer's Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCE BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH, 2nd Edition 2006.
2. The 8051Microcontrollers, Architecture and Programming and Applications -K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - Liu and GA Gibson, PHI, 2nd Ed.
4. Microcontrollers and Application - Ajay. V. Deshmukh, TMGH, 2005.

OUTCOMES:

After going through this course the student will be able to

1. The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers.
2. The student will learn how to interface peripherals to microprocessors/microcontrollers.

The students will learn the design of microprocessors/microcontrollers-based systems.

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(R15A0415) DIGITAL SIGNAL PROCESSING

OBJECTIVES:

1. To understand the basic concepts and techniques for processing signals and digital signal processing fundamentals.
2. To Understand the processes of analog-to-digital and digital-to-analog conversion and relation between continuous-time and discrete time signals and systems.
3. To Master the representation of discrete-time signals in the frequency domain, using z-transform, discrete Fourier transforms (DFT).
4. To Understand the implementation of the DFT in terms of the FFT, as well as some of its applications (computation of convolution sums, spectral analysis).
5. To learn the basic design and structure of FIR and IIR filters with desired frequency responses and design digital filters.
6. The impetus is to introduce a few real-world signal processing applications.
7. To acquaint in FFT algorithms, Multi-rate signal processing techniques and finite word length effects.

UNIT I:

Introduction to Digital Signal Processing: Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, Linear Shift Invariant Systems, Stability, and Causality, Frequency Domain Representation of Discrete Time Signals and systems.

Realization of Digital Filters: Solution of Difference Equations Using Z-Transform, Realization of Digital Filters - Direct, Canonic, Cascade and Parallel forms.

UNIT II:

Discrete Fourier Transforms: Properties of DFT. Linear Convolution of Sequences using DFT. Computation of DFT: Over-lap Add Method, Over-lap Save Method.

Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

UNIT III:

IIR Digital Filters: Analog Filter Approximations - Butterworth and Chebyshev, Design of IIR Digital filters from Analog Filters, Impulse Invariant Techniques and Bilinear Transformation Method.

UNIT IV:

FIR Digital Filters: Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Filters: Fourier Method. Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

UNIT V:

Multirate Digital Signal Processing: Introduction, Down sampling, Decimation, Upsampling, Interpolation, Sampling Rate Conversion, Applications of Multi Rate Signal Processing.

Finite Word Length Effects: Limit cycles, Overflow Oscillations, Methods to prevent Overflow, Dead band effects.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009.
3. Fundamentals of Digital Signal Processing – Loney Ludeman, John Wiley, 2009

REFERENCE BOOKS:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008.
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, b Thomson, 2007.
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj and C.Gnanapriya, TMH, 2009.
4. Discrete Systems and Digital Signal Processing with MATLAB – Taan S. EIAli, CRC press, 2009.
5. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2nd Edition, Pearson Education, 2009.
6. Digital Signal Processing - Nagoor Khani, TMG, 2012.

OUTCOMES

On completion of the subject the student must be able to:

1. Perform time, frequency and z-transform analysis on signals and systems
2. Understand the inter relationship between DFT and various transforms
3. Understand the significance of various filter structures and effects of rounding errors
4. Design a digital filter for a given specification
5. Understand the fast computation of DFT and Appreciate the FFT processing
6. Understand the trade-off between normal and multi rate DSP techniques and finite length word effects.

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(R15A0416) ANTENNAS AND WAVE PROPAGATION

OBJECTIVES

1. Understand basic terminology and concepts of Antennas.
2. To attain knowledge on the basic parameters those are considered in the antenna design process and the analysis while designing that.
3. Analyze the electric and magnetic field emission from various basic antennas and mathematical
4. Formulation of the analysis.
5. To have knowledge on antenna operation and types as well as their usage in real time filed.
6. Aware of the wave spectrum and respective band based antenna usage and also to know the propagation of the waves at different frequencies through different layers in the existing layered free space environment structure.

UNIT -I:

Antenna Basics:

Introduction, Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Illustrative Problems.

Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Antenna Theorems, Radiation, Retarded Potentials – Helmholtz Theorem.

Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area, Effective Height, Natural Current Distributions, Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths, Illustrative Problems.

UNIT –II:

VHF, UHF and Microwave Antennas - I :

Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types, Optimum Horns, Design Considerations of Pyramidal Horns, Illustrative Problems.

VHF, UHF and Microwave Antennas - II:

Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Impact of Different Parameters on Characteristics, 103 Reflector Antennas – Introduction, Flar

Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features, Illustrative Problems. Lens Antennas – Introduction, Geometry of Non-metallic Dielectric Lenses, Zoning, Applications.

UNIT -III:

Antenna Arrays:

Point Sources – Definition, Patterns, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays, Illustrative Problems.

Antenna Measurements:

Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3- Antenna Methods)

UNIT -IV:

Wave Propagation – I:

Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts, Ground Wave Propagation (Qualitative Treatment) – Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections. Space Wave Propagation – Introduction, Field Strength Variation with Distance and Height, Effect of Earth‘s Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering Phenomena, Tropospheric Propagation.

UNIT -V:

Wave Propagation – II:

Sky Wave Propagation – Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance, Multihop Propagation.

TEXT BOOKS:

1. Antennas and Wave Propagation – J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, TMH, New Delhi, 4th ed., (Special Indian Edition), 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000. 3.A.Harish, M.Sachidanada," Antennas and Wave Propagation", Oxford University Press,2007

REFERENCE BOOKS:

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd Ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. Antennas – John D. Kraus, McGraw-Hill (International Edition), 2nd Ed. 1988.
5. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th edition, 1955.

OUTCOMES

Student will be able to

1. Aware of antenna parameter considerations
2. Capable to analyze the designed antenna and field evaluation under various conditions and formulate the electric as well as magnetic fields equation set for far field and near field conditions
3. Understand the array system of different antennas and field analysis under application of different currents to the individual antenna elements
4. Understand the design issues, operation of fundamental antennas and their operation methodology in practice.
5. Design a lens structure and also the bench set up for antenna parameter measurement of testing for their effectiveness

Knowledge about the means of propagation of electromagnetic waves

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CORE ELECTIVE – II

(R15A0417) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

OBJECTIVES:

1. An introduction to measurement techniques and instrumentation design and operation
2. The basic concept of units, measurement error and accuracy, the construction and design of measuring devices and circuits, measuring instruments and their proper applications
3. To use different measuring techniques and the measurement of different physical parameters using different transducers.

UNIT - I:

Block Schematics of Measuring Systems: Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT - II:

Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Capacitance-Voltage Meters, Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator.

UNIT - III:

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT - IV:

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Piezoelectric Transducers, MagnetoStrictive Transducers.

UNIT - V:

Bridges: Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Pressure - High Pressure, Vacuum level, Temperature - Measurements, Data Acquisition Systems.

TEXTBOOKS:

1. Electronic instrumentation: H.S.Kalsi - TMH, 2nd Edition 2004.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI, 5th Edition, 2003.

REFERENCES:

1. Electronic Instrumentation and Measurements - David A. Bell, Oxford Uiv. Press, 1997.
2. Electronic Measurements and Instrumentation: B. M. Oliver, J. M. Cage TMH Reprint.
3. Measurement Systems - Emest O. Doebelin and Dhanesh N Manik, 6th Ed., TMH.
4. Electronic Measurements and Instrumentations by K. Lal Kishore, Pearson Education - 2010.
5. Industrial Instrumentation: T. R. Padmanabham Spiriger 2009.

OUTCOMES

Upon a successful completion of this course, the student will be able to:

1. Describe the fundamental concepts and principles of instrumentation
2. Explain the operation of various instruments required in measurements
3. Apply the measurement techniques for different types of tests
4. To select specific instruments for specific measurement function.
5. Understand principle of operation and working of different electronic instruments.
6. Students will understand functioning, specification and application of signal analyzing instruments

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CORE ELECTIVE – II

(R15A0418) OPTICAL COMMUNICATIONS

OBJECTIVES:

1. To realize the significance of optical fiber communications.
2. To understand the construction and characteristics of optical fiber cable.
3. To develop the knowledge of optical signal sources and power launching.
4. To identify and understand the operation of various optical detectors.
5. To under the design of optical systems and WDM.

UNIT I

Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, V number, Mode coupling, Step Index fibers, Graded Index fibers.

Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. [2]. Fiber materials — Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers.

UNIT II

Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses. Information capacity determination, Group delay, Types of Dispersion - Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening. Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss.

UNIT III

Fiber Splicing- Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints,. Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations,Resonant frequencies. Reliability of LED&ILD.

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling.

UNIT IV

Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photodetectors. Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT V

Optical System Design — Considerations, Component choice, Multiplexing. Point-to- point links, System considerations, Link power budget with examples. Overall fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples.

Transmission distance, Line coding in Optical links, WDM, Necessity , Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS :

1. Optical Fiber Communications – Gerd Keiser, Tata Mc Graw-Hill International edition, 4th Edition, 2008.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

RERFERENCES :

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

OUTCOMES:

1. At the end of the course the student will be able to:
2. Understand and analyze the constructional parameters of optical fibers.
3. Be able to design the optical system.
4. Estimate the losses due to attenuation, absorption, scattering and bending.
5. Compare various optical detectors and choose suitable one for different applications.

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CORE ELECTIVE – II

(R15A0419) DATA COMMUNICATIONS

COURSE OBJECTIVE:

Data communications and networking is the fastest growing technologies in our culture today. The course attempts

1. To provide a unified overview of the broad field of data and computer communications.
2. Emphasizes basic principles and topics of fundamental importance concerning the technology and architecture of this field
3. Provides a detailed discussion of leading edge topics.

UNIT I:

INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING: Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Circuit Arrangements, Data communications Networks, Alternate Protocol Suites.

SIGNALS, NOISE, MODULATION, AND DEMODULATION: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and M-ary Encoding, Digital Modulation.

UNIT II:

METALLIC CABLE TRANSMISSION MEDIA : Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves, Transmission Line Classifications, Metallic Transmission Line Types, Metallic Transmission Line Losses.

DIGITAL TRANSMISSION : Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage –to-Quantization Noise Voltage Ration, Companding, PCM Line Speed, Time-Division Multiplexing, Frequency- Division Multiplexing, Wavelength- Division Multiplexing

Unit III:

WIRELESS COMMUNICATIONS SYSTEMS: Electromagnetic Polarization, Rays and Wavefronts, Electromagnetic Radiation, wave Attenuation and Absorption, Microwave Communications Systems, Satellite Communications Systems.

CELLULAR TELEPHONE SYSTEMS:

First- Generation Analog Cellular Telephone, Personal communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, North American Cellular and PCS Summary, Global system for Mobile Communications, Personal Communications Satellite System.

Unit IV:

DATA COMMUNICATIONS CODES, ERROR CONTROL, AND DATA FORMATS: Data Communications Character Codes, Bar Codes, Error Control, Error Detection, Error Correction, Character Synchronization.

Unit V:

DATA COMMUNICATIONS EQUIPMENT: Digital Service Unit and Channel Service Unit, Voice- Band Data Communication Modems, Bell Systems- Compatible Voice- Band Modems, Voice- Band Modern Block Diagram, Voice- Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, Cable Modems, Probability of Error and Bit Error Rate.

DATA–LINK PROTOCOLS: Data –Link Protocol Functions, Character –and Bit- Oriented Protocols, Data Transmission Modes, Asynchronous Data – Link Protocols, Synchronous Data – Link Protocols, Synchronous Data – Link Control, High – Level Data – Link Control.

TEXT BOOKS:

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

REFERENCE BOOKS:

1.Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.TMH.
2.Computer Communications and Networking Technologies, Gallow, Second Edition Thomson
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education

OUTCOMES:

Upon completion of the subject, the student will be able to:

1. Understand unified overview of the broad field of data and computer communications.
2. Emphasizes basic principles and topics of fundamental importance concerning the technology Understand the architecture of this field
3. Learn detailed discussion of leading edge topics.

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(R15A0509) DATABASE MANAGEMENT SYSTEMS

Objectives:

- To Understand the basic concepts and the applications of database systems
- To Master the basics of SQL and construct queries using SQL
- To understand the relational database design principles
- To become familiar with the basic issues of transaction processing and concurrency control
- To become familiar with database storage structures and access techniques

UNIT I:

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction –Instances and Schemas – Data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – Database Users and Administrator – Transaction Management – Database Architecture – Storage Manager – the Query Processor.

Introduction to the Relational Model – Structure – Database Schema, Keys – Schema Diagrams.

Database design and ER diagrams – ER Model - Entities, Attributes and Entity sets – Relationships and Relationship sets – ER Design Issues – Concept Design – Conceptual Design with relevant Examples. Relational Query Languages, Relational Operations.

UNIT II:

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple Relational Calculus (TRC) – Domain relational calculus (DRC).

Overview of the SQL Query Language – Basic Structure of SQL Queries, Set Operations, Aggregate Functions – GROUPBY – HAVING, Nested Sub queries, Views, Triggers, Procedures.

UNIT III:

Normalization – Introduction, Non loss decomposition and functional dependencies, First, Second, and third normal forms – dependency preservation, Boyce/Codd normal form.

Higher Normal Forms - Introduction, Multi-valued dependencies and Fourth normal form, Join dependencies and Fifth normal form

UNIT IV:

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation-Based Protocols – Multiple Granularity.

UNIT V:

Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Check Points - Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- ARIES Algorithm, Remote Backup systems.
File organization – various kinds of indexes - B+ Trees- Query Processing – Relational Query Optimization.

TEXT BOOKS:

1. Database System Concepts, Silberschatz, Korth, McGraw hill, Sixth Edition.(All UNITS except III th)
2. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition.

REFERENCE BOOKS:

1. Fundamentals of Database Systems, Elmasri Navathe Pearson Education.
2. An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III.

Outcomes:

- Demonstrate the basic elements of a relational database management system
- Ability to identify the data models for relevant problems
- Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data
- Apply normalization for the development of application software’s

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OPEN ELECTIVE –IV

(R15A0568) APPS DESIGN AND DEVELOPMENT

Objectives:

1. To have an awareness of software engineering fundamentals and practices.
2. To learn the concepts of scripting languages and multimedia used for application design.
3. To understand the methods of java programming under client/server side and data base connection.

UNIT – I: Fundamental concepts

Software Process models**:** The waterfall model, Incremental process models, Evolutionary process models. The Unified process. Multimedia and hypermedia, World Wide Web, overview of multimedia software tools, Graphics data types, file formats, color in image and video: color models in images, color in video.

UNIT – II: HTML Common tags

Lists, Tables, Images, Forms, Frames; XML.

UNIT - III : Introduction to Java Scripts

Objects in Java Script, Dynamic HTML with Java Script. Design of GUI.

UNIT - IV : Web Servers

Introduction to Servlets: Lifecycle of a Servlet, The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing, Environment: Installing the Java: Software Development Kit, Tomcat Server. Using Cookies-Session Tracking, Security Issues.

UNIT - V : Database Access

Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, TESTING: Types of software testing ,test cases.

TEXT BOOKS:

1. Web Programming ,Building Internet Applications, CHRIS BATES II Edition, Wiley Dreamtech.
2. Programming world wide web ,SEBESTA,PEARSON.

REFERENCES:

1. Core Servlets And Java Servlets Pages Vol-1:Core Technologies BY MARTY HALL,LARRY BROWN PEARSON.
2. Software Engineering ,ROGER S PRESSMAN,TATA McGraw-HILL.
3. Software Testing Techniques, BORIS BEIZER,DREAMTECH,II EDITION.
4. Java Complete Reference ,7^{TH} EDITION ,HERBERTSCHILDT,TMH.

Outcomes

1. Ability to identify the minimum requirements for the development of application.
2. Ability to apply different multimedia development tools to produce web based and stand-alone user interfaces.
3. Analysis of client side scripting and server side scripting with java.

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OPEN ELECTIVE – IV

(R15A0543) SOFTWARE PROJECT MANAGEMENT

OBJECTIVES:

1. Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Compare and differentiate organization structures and project structures.
3. Implement a project to manage project schedule, expenses and resources with the Application of suitable project management tools.

UNIT I

Software Process Maturity

Software maturity Framework**,** Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

Process Reference Models Capability Maturity Model (CMM)**,** CMMI, PCMM, PSP, TSP.

UNIT II

Software Project Management Renaissance

Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

Life-Cycle Phases and Process artifacts

Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.

UNIT III

Workflows and Checkpoints of process

Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments.

Process Planning

Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT IV

Project Organizations

Line-of- business organizations, project organizations, evolution of organizations, process automation.

Project Control and Process Instrumentation

The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, and metrics automation.

UNIT V

CCPDS-R Case Study and Future Software Project Management Practices

Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOKS:

1. Software Project Management, *Walker Royce,* Pearson Education.
2. Managing the Software Process, *Watts S. Humphrey*, Pearson Education.

REFERENCE BOOKS:

1. Effective Project Management: Traditional, Agile, Extreme, Robert Wysocki, Sixth edition, Wiley India, rp2011.
2. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
3. Process Improvement essentials, James R. Persse, O'Reilly, 2006
4. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
5. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
6. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
7. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
8. The Art of Project Management, Scott Berkun, SPD, O'Reilly, 2011.
9. Applied Software Project Management, Andrew Stellman & Jennifer Greene, SPD, O'Reilly, rp2011.
10. Agile Project Management, Jim Highsmith, Pearson education, 2004.

OUTCOMES

Upon completion of the subject, the student be able to:

1. Understand the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Compare and differentiate organization structures and project structures.
3. Implement a project to manage project schedule, expenses and resources with the Application of suitable project management tools.

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(R15A0486) MICROPROCESSORS AND MICROCONTROLLERS LAB

OBJECTIVES:

1. To develop and execute variety of assembly language programs of Intel 8086 including arithmetic and logical, sorting, searching, and string manipulation operations.
2. To develop and execute the assembly language programs for interfacing Intel 8086 with peripheral devices.
3. To develop and execute simple programs on 8051 micro controller.

The Following programs/experiments are to be written for assembler and execute the same with 8086 and 8051 kits.

1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in a string for 8086.
4. Program for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Parallel communication between two microprocessors using 8255.
8. Serial communication between two microprocessor kits using 8251.
9. Interfacing to 8086 and programming to control stepper motor.
10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/ Counter in 8051.
12. Program and verify Interrupt handling in 8051
13. UART Operation in 8051.
14. Communication between 8051 kit and PC.
15. Interfacing LCD to 8051.
16. Interfacing Matrix/ Keyboard to 8051.
17. Data Transfer from Peripheral to Memory through DMA controller 8237/8257.

Note:- Minimum of 12 experiments to be conduct

OUTCOMES:

After going through this course the student will be able to

1. To apply the concepts in the design of microprocessor/microcontroller based systems in real time applications

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(R15A0487) DIGITAL SIGNAL PROCESSING LAB

Note:

1. Minimum of 12 experiments has to be conducted.
2. The programs shall be implemented in software (Using MATLAB / Lab view / C programming/ Equivalent) and hardware (Using TI / Analog devices / Motorola / Equivalent DSP processors).

List of Experiments:

1. To find DFT / IDFT of given DT signal
2. Program to obtain Linear Convolution of two finite length sequences
3. Program for computing Auto-correlation.
4. To find frequency response of a given system (in Transfer Function/ Differential equation form).
5. Implementation of FFT of given sequence
6. Determination of power spectrum of a given signal(s).
7. Implementation of LP FIR filter for given sequence
8. Implementation of HP FIR filter for given sequence
9. Implementation of LP IIR filter for given sequence
10. Implementation of HP IIR filter for given sequence
11. Generation of sinusoidal signal through filtering
12. Generation of DTMF signals
13. Implementation of Decimation Process
14. Implementation of Interpolation Process
15. Implementation of I/D sampling rate converters.
16. Impulse response of first order and second order systems.

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(R15A0420) VLSI DESIGN

OBJECTIVES

1. To understand MOS transistor fabrication processes.
2. To understand basic circuit concepts
3. To have an exposure to the design rules to be followed for drawing the layout of circuits
4. Design of building blocks using different approaches.
5. To have a knowledge of the testing processes of CMOS circuits.

UNIT I

Introduction: Brief Introduction to IC technologies: MOS, PMOS, NMOS, CMOS & BiCMOS Technologies.

Basic Electrical Properties of MOS and BiCMOS Circuits: I_{DS} - V_{DS} relationships, MOS transistor Threshold Voltage-V_T, figure of merit-ω_0 ,Transconductance-g_m, g_{ds} ; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Lambda(λ)-based design rules for wires, contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

UNIT III

Gate level Design: Logic gates and other complex gates, Switch logic, Alternate gate circuits.

Basic Circuit Concepts: Sheet Resistance R_s and its concepts to MOS, Area Capacitances calculations, Inverter Delays, Fan-in and fan-out.

UNIT IV

Subsystem Design: Shifters, Adders, Multipliers, Parity generators, Comparators.

VLSI Design styles: Design Approach for Full-custom and Semi-custom devices, parameters influencing low power design.

UNIT V

CMOS Testing: CMOS Testing, Need for Testing, Test Principles, Design Strategies for Test, Chip Level and Board Level Test Techniques**.**

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems, Kamran Eshraghian, Eshraghian Dougles, A. Pucknell, 2005, PHI.
2. Modern VLSI Design – Wayne Wolf, 3 Ed., 1997, Pearson Education.
3.CMOS VLSI Design-A Circuits and Systems Perspective, Neil H.E Weste, David Harris, Ayan Banerjee, 3rd Edn, Pearson, 2009.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011.
2. Principals of CMOS VLSI Design – N.H.E Weste, K. Eshraghian, 2 Ed., Addison Wesley.
3.VLSI Design-K.Lal Kishore,V.S.V.Prabhakar,I.K.International,1997.
4.Introduction to VLSI Design-Mead & Convey,BS Publications,2010.
5.CMOS Logic Circuit Design-John P.Uyemura, Springer, 2007.

OUTCOMES

1. Acquire quality knowledge about the fabrication process of IC using MOS Transistor
2. Draw the layout of any logic circuits which helps to understand and estimate parasitic of any logic circuit
3. Provide design concepts required to design building blocks of data path using gates.
4. Design simple logic circuits using PLA, PAL, FPGA and CPLD
5. Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve the testability of the system.

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(R15A0421) MICROWAVE ENGINEERING

OBJECTIVES

1. To analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.
2. To Use S-parameter terminology to describe circuits.
3. To explain how microwave devices and circuits are characterized in terms of their "S" Parameters.
4. To give students an understanding of microwave transmission lines.
5. To Use microwave components such as isolators, Couplers, Circulators, Tees, Gyrators etc..
6. To give students an understanding of basic microwave devices (both amplifiers and oscillators).
7. To expose the students to the basic methods of microwave measurements.
8.

UNIT I:

Waveguides & Resonators: Introduction, Microwave spectrum and bands, applications of Microwaves, Rectangular Waveguides-Solution of Wave Equation in Rectangular Coordinates, TE/TM mode analysis, Expressions for fields, Cutoff frequencies, filter characteristics, dominant and degenerate modes, sketches of TE and TM mode fields in the cross-section, Mode characteristics - Phase and Group velocities, wavelengths and impedance relations, Rectangular Waveguides – Power Transmission and Power Losses, Impossibility of TEM Modes, losses, Q-factor,

Cavity resonators-introduction, Rectangular and cylindrical cavities, dominant modes and resonant frequencies, Q-factor and coupling coefficients, Illustrative Problems.

UNIT II:

Waveguide Components-I: Scattering Matrix - Significance, Formulation and properties, Wave guide multiport junctions - E plane and H plane Tees, Magic Tee,2-hole Directional coupler, S Matrix calculations for Directional coupler, Coupling mechanisms - Probe, Loop, Aperture types, Wave guide discontinuities - Waveguide Windows, tuning screws and posts, Irises, Transitions, and matched loads, Illustrative Problems.

Waveguide Components-II: Ferrites composition and characteristics, Faraday rotation, Ferrite components - Gyrator, Isolator, Circulator.

UNIT III:

Linear beam Tubes: Limitations and losses of conventional tubes at microwave frequencies, Classification of Microwave tubes, **O type tubes** - 2 cavity klystrons-structure, Reentrant cavities, velocity modulation process and Applegate diagram, bunching process and small signal theory Expressions for o/p power and efficiency, Reflex Klystrons-structure, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency, oscillating modes and o/p characteristics, Effect of Repeller Voltage on Power o/p, Significance, types and characteristics of slow wave structures, structure of TWT and amplification process (qualitative treatment), Suppression of oscillations, Gain considerations.

UNIT IV:

Cross-field Tubes: Introduction, Cross field effects, Magnetrons-different types, cylindrical travelling wave magnetron-Hull cutoff and Hartree conditions, modes of resonance.

Microwave Semiconductor Devices: Introduction to Microwave semiconductor devices, classification, applications, Transfer Electronic Devices, Gunn diode - principles, RWH theory, Characteristics, Basic modes of operation - Gunn oscillation modes, LSA Mode, Illustrative Problems.

UNIT V:

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Precautions; Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types., Power Meter, , Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q. Impedance Measurements.S-Matrix for E-plane T, H-plane T and Magic T, illustrative problems

TEXT BOOKS:

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition,1994.
2. Microwave and Radar Engineering- M.Kulkarni, Umesh Publications,1998.

REFERENCES :

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.
5. Elements of Microwave Engineering – R. Chatterjee, Affiliated East-West Press Pvt. Ltd., New Delhi,1988.

OUTCOMES

1. Understand the significance of microwaves and microwave transmission lines
2. Analyze the characteristics of microwave tubes and compare them
3. Be able to list and explain the various microwave solid state devices
4. Can set up a microwave bench for measuring microwave parameters

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(R15A0422) CELLULAR AND MOBILE COMMUNICATIONS

OBJECTIVES:

The course Objectives are

1. To provide the students with an understanding of the cellular concept frequency reuse, handoff strategies.
2. To enable the students to analyze and understand wireless and mobile cellular communication systems over stochastic fading channels .
3. To provide the students with an understanding of Co-channel and Non-Co channel Interference.
4. To give students an understanding of cell coverage for signal and traffic diversity techniques and mobile antennas.
5. To give the students an understanding of frequency management channel assignment and types of handoff.

UNIT I

CELLULAR SYSTEMS:

Limitations of Conventional System, Basic Cellular Mobile System, First, second, third and fourth Generation cellular wireless systems, Operation of Cellular System, Uniqueness of Mobile Radio Environment –Fading, coherence bandwidth, Doppler Spread.

Fundamentals of cellular Radio System Design: concept of frequency reuse channels, Co-channel Interference, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Trunking and grade of service

UNIT II

CO-CHANNEL & NON CO-CHANNEL INTERFERENCE:

Measurement of Real Time Co-Channel Interference, design of Antenna system, Antenna parameters and their effects, diversity techniques: Space Diversity, Polarization diversity, frequency diversity and time diversity.

Non-co channel interference-adjacent channel interference, Near End far end interference, effect on coverage and interference by power decrease, antenna height decrease

UNIT III

CELL COVERAGE FOR SIGNAL AND TRAFFIC:

Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation.

UNIT IV

CELL SITE AND MOBILE ANTENNAS:

Space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, Mobile Antennas.

Frequency Management And Channel Assignment : Numbering and grouping, setup access and paging channels ,channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment

UNIT V

HANDOFFS AND DROPPED CALLS:

Handoff Initiation, types of handoff, delaying handoff, advantages of Handoff, power difference handoff, forced handoff, mobile assisted and soft handoff, Intersystem handoff. Introduction to Dropped Call Rates and their Evaluation.

TEXTBOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

REFERENCES:

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2001.
2. Modern Wireless Communication –Simon Haykin Michael Moher, Persons Eduction,2005.
3. Wireless Communication theory and Techniques,Asrar U.H .Sheikh ,Springer,2004.

OUTCOMES:

1. The student will be able to understand impairments due to multipath fading channel
2. The student will be able to understand the fundamental techniques to overcome the different fading effects
3. The student will be able to understand co-channel and non co-channel interferences
4. The student will be able to familiar with cell coverage/signal and traffic, diversity techniques and mobile antennas
5. The student will be able to understand the frequency management, channel assignment and types of handoffs

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(R15A0514) COMPUTER NETWORKS

OBJECTIVES:

The students will be able to:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced Courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and Maintenance of individual networks.

UNIT I:

Introduction: Introduction to networks, Internet, Protocols and Standards, The OSI model, Layers in OSI Model, TCP/IP Suite, Addressing,

Physical Layer: Physical Layer Introduction, Transmission media,

UNIT II:

Data link layer: Introduction, Cyclic codes, checksum, Framing, Flow and error control, HDLC, Point to point protocols

Media Access Sub Layer: Random Access, Controlled access, channelization

UNIT III:

Ethernet, Fast Ethernet, Giga bit Ethernet, wireless LANS, Connecting lans, Backbone networks, Virtual lans, Wireless wans

UNIT IV:

Network Layer: Logical addressing, internetworking, tunneling, address mapping, ICMP, IGMP, Forwarding, Unicast routing protocols, multicast routing protocols

UNIT V:

Transport Layer: Process to process delivery, TCP and UDP protocols, SCTP ,Data traffic , congestion, Congestion Control, QoS, integrated services, Differentiated services, QoS in Switched networks.

Application Layer: Domain name space, DNS in internet , Electronic Mail, FTP, WWW, HTTP, SNMP

TEXT BOOKS:

1. Data Communications and Networking- Behrouz A Forouzan Fourth Edition TMH, 2006.
2. Computer Networks- Andrew S Tanenbaum, 4th Edition, Pearson Education

REFERENCE BOOKS:

1. An Engineering approach to computer Networks- S.Keshav, 2nd Edition, Pearson Education
2. Computer and communication Networks- Nader F Mir, Pearson Education
3. Data and Computer Communications, G.S.Hura and M. Singhal, CRC Press, Taylor and Francis Group.
4. Data Communications and Computer Networks,P.C.Gupta, PHI
5. Computer Networking : A top-down Approach Featuring the Internet, James F.Kurose, K.W.Rose, 3rd Edition, Pearson Education

OUTCOMES:

1. Have a good understanding of the OSI Reference Model and in particular have a good knowledge of Layers 1-3.
2. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
3. Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols
4. Have an understanding of the issues surrounding Mobile and Wireless Networks.
5. Have a working knowledge of datagram and internet socket programming

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(R15A0423) SATELLITE COMMUNICATIONS

OBJECTIVES

1. To prepare the student to excel in basic knowledge of satellite communication principles.
2. To provide students with solid foundation in orbital mechanics and launches for the satellite communication
3. To train the students with the basic knowledge of link design of satellite with a design examples.
4. To provide the better understanding of multiple access systems and earth station technology.
5. To prepare the students with knowledge in satellite navigation and GPS and satellite packet communication

UNIT -I:

Communication Satellite: Orbit and Description: A Brief history of satellite Communication, satellite Frequency Bands, Satellite Systems, Applications, Orbital Period and Velocity, effects of orbital Inclination, Azimuth and Elevation, Coverage angle and slant Range, Eclipse, Orbital Perturbations, Placement of a Satellite in a Geo-Stationary orbit.

UNIT -II:

Satellite Sub-Systems: Attitude and Orbit Control system, TT&C subsystem, Attitude Control subsystem, Power systems, Communication subsystems, Satellite Antenna Equipment.
Satellite Link: Basic Transmission Theory, System Noise Temperature and G/T ratio, Basic Link Analysis, Interference Analysis, Design of satellite Links for a specified C/N, (With and without frequency Re-use), Link Budget.

UNIT -III:

Propagation Effects: Introduction, Atmospheric Absorption, Cloud Attenuation, Tropospheric and Ionospeheric Scintillation and Low angle fading, Rain induced attenuation, rain induced cross polarization interference. Multiple Access: Frequency Division Multiple Access (FDMA) -Intermodulation, Calculation of C/N, Time Division Multiple Access (TDMA) - Frame Structure, Burst Structure, Satellite switched TDMA, On-board Processing, Demand Assignment Multiple Access (DAMA) –Types of Demand Assignment, Characteristics, CDMA Spread Spectrum Transmission and Reception.

UNIT -IV:

Earth Station Technology: Transmitters, Receivers, Antennas, Tracking Systems, Terrestrial Interface, Power Test Methods, Lower Orbit Considerations. Satellite Navigation and Global Positioning Systems: Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers, GPS C/A Code Accuracy, Differential GPS.

UNIT -V:

Satellite Packet Communications: Message Transmission by FDMA: M/G/1 Queue, Message Transmission by TDMA, PURE ALOHA-Satellite Packet Switching, Slotted Aloha, Packet Reservation, Tree Algorithm.

TEXT BOOKS:

1.Satellite Communications –Timothy Pratt, Charles Bostian, Jeremy Allnutt, 2ndEdition, 2003, John Wiley & Sons.
2.Satellite Communications Engineering –Wilbur, L. Pritchand, Robert A. Nelson and Heuri G. Suyderhoud, 2ndEd., Pearson Publications.
3.Digital Satellite Communications-Tri.T.Ha, 2ndEdition, 1990, Mc.Graw Hill.

REFERENCE BOOKS:

1.Satellite Communications-Dennis Roddy, 2ndEdition, 1996, McGraw Hill.
2.Satellite Communications: Design Principles –M. Richcharia, 2ndEd., BSP, 2003.
3.Digital Satellite Communications –Tri. T. Ha, 2ndEd., MGH, 1990.
4.Fundamentals of Satellite Communications –K. N. Raja Rao, PHI, 2004.

OUTCOMES

1. Student will understand the historical background, basic concepts and frequency allocations for satellite communications
2. Students will demonstrate the orbital mechanics, launch vehicles and launchers
3. Student will demonstrate the design of satellite links for specified C/N with system design examples
4. Students will be able to visualize satellites sub systems like telemetry, tracking, command and monitoring power systems etc.,
5. Students will understand the various multiple access systems for satellite communication systems and satellite packet communications.

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CORE ELECTIVE – III

(R15A0424) EMBEDDED SYSTEMS DESIGN

OBJECTIVES:

For embedded systems, the course will enable the students to:

1. Understand the basics of an embedded system.
2. Understand the typical components of an embedded system.
3. To understand different communication interfaces.
4. To learn the design process of embedded system applications.
5. To understands the RTOS and inter-process communication.

UNIT-I INTRODUCTION TO EMBEDDED SYSTEMS

History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded systems, The embedded system design process-requirements, specification, architecture design, designing hardware and software, components, system integration, Applications of embedded systems, and characteristics of embedded systems.

UNIT-II TYPICAL EMBEDDED SYSTEM

Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTs; Memory-ROM, RAM, memory according to the type of interface, memory shadowing, memory selection for embedded systems, Sensors, actuators, I/O components: seven segment LED, relay, piezo buzzer, push button switch, other sub-systems: reset circuit, brownout protection circuit, oscillator circuit real time clock, watch dog timer.

UNIT-III COMMUNICATION INTERFACE

Onboard communication interfaces-I2C, SPI, UART, 1 wire interface, parallel interface**; External communication interfaces**-RS232 and RS485,USB, infrared, Bluetooth, Wi-Fi, ZigBee, GPRS.

UNIT-IV EMBEDDED FIRMWARE DESIGN AND DEVELOPMENT

Embedded firmware design approaches-super loop based approach, operating system based approach; Embedded firmware development languages-assembly language based development, high level language based development.

UNIT-V RTOS BASED EMBEDDED SYSTEM DESIGN

Operating system basics, types of operating systems, tasks, process and threads, multiprocessing and multitasking, task scheduling: non-preemptive and pre-emptive scheduling; task communication-shared memory, message passing, Device Drivers, how to choose RTOS.

TEXT BOOKS:

1. Introduction to Embedded Systems - shibu k v, Mc Graw Hill Education.
2. Computers as Components –Wayne Wolf, Morgan Kaufmann (second edition).

REFERENCE BOOKS:

1. Embedded System Design -frank vahid, tony grivargis, john Wiley.
2. Embedded Systems- An integrated approach - Lyla b das, Pearson education 2012.
3. Embedded Systems – Raj Kamal, TMH

OUTCOMES:

Upon completion of this course, the students will be able to:

1. Understand the design process of an embedded system
2. Understand typical embedded System & its components
3. Understand embedded firmware design approaches
4. Learn the basics of OS and RTOS

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CORE ELECTIVE – III

(R15A0434) BIO-MEDICAL INSTRUMENTATION

Course Learning Objectives

- Identify and obtain biological parameters and relationship between them.
- Understand the principles involved in acquiring different bio-signals.
- Represent these principles in form of mathematical equations.

UNIT I

Bio-signals and their characteristics, organization of cell, Nernst equation of membrane, Resting and Action potentials.

Bio-amplifiers, characteristics of medical instruments, problems encountered with measurements from living systems.

Bio-potential electrodes – Body surface recording electrodes, Internal electrodes, micro electrodes.

Bio-chemical transducers – reference electrode, the pH electrodes, Blood gas electrodes.

UNIT II

Heart and cardiovascular system Heart electrical acvitity, blood pressure and heart sounds.

Cardiovascular measurements electro cardiography – electroeardiogram, ECG Amplifier, Electrodes and leads, ECG recorder principles. Types of ECG recorders. Principles of blood pressure and blood flow measurement.

UNIT III

Anatomy of the nervous system-neuronal communication, electro encepherogram (EEG), EEG Measurements EEG electrode-placement system, interpretation of EEG, EEG system Block diagram, pre-amplifiers and amplifiers,

Anatomy of vision, electrophysiology of the Eye (ERG) Spatial properties of ERG, the electrooculogram (EOG), Ophthalmoscopes, Tonometer for eye pressure measurement.

UNIT IV

Therapeutic equipment, Pacemaker, Defibrillator, Shortwave diathermy. Hemodialysis machine. Respiratory Instrumentation - Mechanism of respiration, Spirometry, Pneumotachograph, Ventilators.

UNIT V

Modern medical imaging systems-Radiography, computed Radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Medicine, Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Ultrasonography.

TEXT BOOKS

1. Biomedical Instrumentation and Measurements – by Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer, PHI.

2. Medical Instrumentation, Application and Design – by John G. Webster, John Wiley.

REFERENCES

1. Principles of Applied Biomedical Instrumentation – by L.A. Geoddes and L.E. Baker, John Wiley and Sons.
2. Hand-book of Biomedical Instrumentation – by R.S. Khandpur, McGraw-Hill, 2003.
3. Introduction to Biomedical equipment technology-by Joseph Carr and Brown.
4. Biomedical Electronics and Instrumentation by Omkar N Pandey and Rakesh Kumar

Course Outcomes

After going through this course the student will be able to

- Apply fundamental knowledge of mathematics coupled with electronics and use it for designing bio amplifiers for different applications.
- Understand or become aware of artifacts caused by an incorrect diagnosis of the symptoms through sample data.
- Apply these equations to analyze real time problems by making good assumptions and learn systematic engineering method design robust amplifiers.

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CORE ELECTIVE - IV

(R15A0426) DIGITAL IMAGE PROCESSING

Course Objectives:

The course objectives are:

1. Provide the student with the fundamentals of digital image processing
2. Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.
3. Introduce the students to some advanced topics in digital image processing.
4. Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

UNIT I

Digital image fundamentals & Image Transforms:- Digital Image fundamentals, Sampling and quantization, Relationship between pixels.

Image Transforms: 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Discrete Wavelet Transform.

UNIT II

Image enhancement (spatial domain) : Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, gray level Transformation, local or neighborhood operation, median filter, spatial domain high-pass filtering.

Image enhancement (Frequency domain): Filtering in Frequency Domain, Obtaining Frequency Domain Filters from Spatial Filters, Generating Filters Directly in the Frequency Domain, Low Pass(smoothing) and High Pass (sharpening) filters in Frequency Domain

UNIT III

Image Restoration: Degradation Mode, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration.

UNIT IV

Image segmentation: Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation

Morphological Image Processing : Dilation and Erosion, Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or Miss Transformation.

UNIT V

Image Compression:

Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS:

1. Digital Image Processing- Rafeal C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S. Essakkirajan, T. Veerakumar-TMH,2010

REFERENCE BOOKS:

1 Digital Image Processing and analysis-human and computer vision application with using CVIP Tools – Scotte Umbaugh,2nd Ed, CRC Press,2011
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
3.Fundamentals of Digital Image Processing-A.K. Jain, PHI,1989
4.Digital Image Processing and computer Vision-Somka, Halavac, Boyle - Cengage learning (Indian edition)2008,
5. Digital Image Processing using Matlab, Rafeal C. Gonzalez, Richard E. Woods, Steven L. Eddins, Pearson Education.
6. Introduction to Image Processing & Analysis-John C. Russ, J. Christian Russ, CRC Press, 2010
7. Digital Image Processing with MATLAB & Labview - Vipula Singh Elsevier

COURSE OUTCOMES:

1. Upon Successfully completing the course, the student should:
2. Have an appreciation of the fundamentals of Digital Image Processing including the topics of filtering, transforms and morphology, and image analysis and compression
3. Be able to implement basic image processing algorithms in MATLAB.
4. Have the skill base necessary to further explore advanced topics of Digital Image Processing.
5. Be in a position to make a positive professional contribution in the field of Digital Image Processing.
6. At the end of the course the student should have a clear impression of the breadth and practical scope of Digital Image Processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.

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CORE ELECTIVE – IV

(R15A0427) SPEECH PROCESSING

OBJECTIVES:

1. Focus on the fundamentals of digital speech processing and their application to coding, synthesis and recognition.
2. Emphasize on how digital signal processing techniques can be applied in problems related to speech communication.
3. Provide an overview of the way in which digital speech processing is being applied in present day applications.

UNIT – I

FUNDAMENTALS OF DIGITAL SPEECH PROCESSING

Anatomy & Physiology of Speech Organs, The process of Speech Production, The Acoustic Theory of Speech Production, Loss less tube models, Digital Speech Processing, Digital models for speech signals.

UNIT – II

TIME DOMAIN MODELS FOR SPEECH PROCESSING

Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate ,Speech vs. silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT – III

LINEAR PREDICTIVE CODING (LPC) ANALYSIS

Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Auto Correlation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT – IV

SPEECH ENHANCEMENT

Nature of interfering sounds, Speech enhancement techniques: Single Microphone Approach: Spectral Subtraction, Wiener filter, Multi microphone Approach, Spectral restoration: MMSE-STSA, MMSE-LSA.

UNIT – V

SPEECH & SPEAKER RECOGNITION

Speech recognition

Basic pattern recognition approaches, parametric representation of speech, evaluating the similarity of speech patterns, Accommodating both spectral and temporal variability, Speech Recognition Systems: Isolated Digit Recognition System, Continuous digit Recognition System

Speaker recognition

Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

TEXT BOOKS:

1. Digital processing of speech signals - L.R Rabiner and S.W.Schafer. Pearson Education.
2. Speech Communications: Human & Machine - Douglas O'Shaughnessy, 2nd ed., IEEE Press.
3. Fundamental of speech recognition: L.R Rabinar, Biing-Hwang Jung, Pearson Education.

REFERENCES:

1. Discrete Time Speech Signal Processing: principles and Practice - Thomas F. Quateri 1 ed., PE.
2. Speech & Audio Signal Processing- Ben Gold & Nelson Morgan, 1 ed., Wiley.
3. Speech and Language Processing, Jurafsky, Pearson Education.
4. Voice and Speech Processing, Thomas Parsons, McGraw Hill Series
5. Signal Processing of Speech, Owens F.J., Macmillan New Electronics

OUTCOMES

Upon completion of the course the student will be able to:

1. Understand the fundamentals of digital speech processing and their application to coding, synthesis and recognition.
2. Emphasize on how digital signal processing techniques can be applied in problems related to speech communication.
3. Provide an overview of the way in which digital speech processing is being applied in present day applications.

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CORE ELECTIVE – IV

(R15A0428) MULTIMEDIA AND SIGNAL CODING

OBJECTIVES:

1. To provide an introduction to the fundamental principles and techniques in Multimedia Signal coding and compression.
2. To give an overview of current multimedia standards and technologies.
3. To provide techniques related to computer and multimedia networks.
4. To provide knowledge related to Multimedia Network Communications and Applications.

UNIT-I:

Introduction to Multimedia: Multimedia, World Wide Web, Overview of Multimedia Tools, Multimedia Authoring, Graphics/ Image Data Types, and File Formats.

Color in Image and Video: Color Science – Image Formation, Camera Systems, Gamma Correction, Color Matching Functions, CIE Chromaticity Diagram, Color Monitor Specifications, Out-of-Gamut Colors, White Point Correction, XYZ to RGB Transform, Transform with Gamma Correction, L*A*B* Color Model. Color Models in Images – RGB Color Model for CRT Displays, Subtractive Color: CMY Color Model, Transformation from RGB to CMY, Under Color Removal: CMYK System, Printer Gamuts, Color Models in Video – Video Color Transforms, YUV Color Model, YIQ Color Model, YBR Color Model.

UNIT-II:

Video Concepts: Types of Video Signals, Analog Video, Digital Video.

Audio Concepts: Digitization of Sound, Quantization and Transmission of Audio.

UNIT-III:

Compression Algorithms:

Lossless Compression Algorithms: Run Length Coding, Variable Length Coding, Arithmetic Coding, Lossless JPEG, Image Compression. **Lossy Image Compression Algorithms:** Transform Coding: KLT And DCT Coding, Wavelet Based Coding. **Image Compression Standards:** JPEG and JPEG2000.

UNIT-IV:

Video Compression Techniques: Introduction to Video Compression, Video Compression Based on Motion Compensation, Search for Motion Vectors, H.261- Intra-Frame and Inter Frame Coding, Quantization, Encoder and Decoder, Overview of MPEG1 and MPEG2.

UNIT-V:

Audio Compression Techniques: ADPCM in Speech Coding, G.726 ADPCM, Vocoders – Phase Insensitivity, Channel Vocoder, Formant Vocoder, Linear Predictive Coding, CELP, Hybrid Excitation Vocoders, MPEG Audio – MPEG Layers, MPEG Audio Strategy, MPEG Audio Compression Algorithms, MPEG-2 AAC, MPEG-4 Audio.

TEXT BOOKS:

1. Fundamentals of Multimedia – Ze- Nian Li, Mark S. Drew, PHI, 2010.
2. Multimedia Signals & Systems – Mrinal Kr. Mandal Springer International Edition 1st Edition, 2009.

REFERENCE BOOKS:

1. Multimedia Communication Systems – Techniques, Stds & Netwroks K.R. Rao, Zorans. Bojkoric, Dragorad A. Milovanovic, 1st Edition, 2002.
2. Fundamentals of Multimedia Ze- Nian Li, Mark S.Drew, Pearson Education (LPE), 1st Edition, 2009.
3. Multimedia Systems John F. Koegel Bufond Pearson Education (LPE), 1st Edition, 2003.
4. Digital Video Processing – A. Murat Tekalp, PHI, 1996.
5. Video Processing and Communications – Yaowang, Jorn Ostermann, Ya-QinZhang, Pearson, 2002.

OUTCOMES

1. Upon successfully completion of the course, the student should:
2. Understand the fundamentals behind the multimedia signal processing
3. Understand the fundamentals behind the multimedia compression
4. Understand the basic principles behind the existing multimedia compression and communication standards
5. Understand future multimedia technologies and apply the acquired knowledge to specific multimedia related problems and projects at work
6. Take advance courses in this area.

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(R15A0488) eCAD & VLSI LAB

Note: Minimum of 12 programs from Part –I and 2 programs from Part -II are to be conducted.

Design and implementation of the following CMOS digital/analog circuits using Cadence / Mentor Graphics / Synopsys / Equivalent CAD tools. The design shall include Gate-level design, Transistor-level design, Hierarchical design, Verilog HDL/VHDL design, Logic synthesis, Simulation and verification.

Part –I: VLSI Front End Design programs:

Programming can be done using any complier. Down load the programs on FPGA/CPLD boards and performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates
2. Design of 2-to-4 decoder
3. Design of 8-to-3 encoder (without and with parity)
4. Design of 8-to-1 multiplexer
5. Design of 4 bit binary to gray converter
6. Design of Multiplexer/ Demultiplexer, comparator
7. Design of Full adder using 3 modeling styles
8. Design of flip flops: SR, D, JK, T
9. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any Sequence Counter
10. Design of a N- bit Register of Serial- in Serial –out, Serial in parallel out, Parallel in Serial out and Parallel in Parallel Out.
11. Design of Sequence Detector (Finite State Machine- Mealy and Moore Machines).
12. Design of 4- Bit Full Adder.
13. Design of ALU to Perform – ADD, SUB, AND-OR, 1's and 2's Complement, Multiplication and Division.
14. Ripple Carry Adder
15. Carry Look Ahead Adder

Part –II: VLSI Back End Design programs:

Design and implementation of the following CMOS digital/analog circuits using Cadence / Mentor Graphics / Synopsys / Equivalent CAD tools. The design shall include Gate-level design/Transistor-level design/Hierarchical design/Verilog HDL or VHDL design, Logic synthesis, Simulation and verification, Scaling of CMOS Inverter for different technologies, study of secondary effects (temperature, power supply and process corners), Circuit optimization with respect to area, performance and/or power, Layout, Extraction of parasitics and back annotation, modifications in circuit parameters and layout consumption, DC/transient analysis, Verification of layouts (DRC, LVS).

1. Introduction to layout design rules
2. Layout, physical verification, placement & route for complex design, static timing analysis, IR drop analysis and crosstalk analysis of any 2 of the following:
    1. Basic logic gates
    2. CMOS inverter
    3. CMOS NOR/ NAND gates
    4. CMOS XOR and MUX gates

3. Analog Circuit simulation (AC analysis) of CS & CD Amplifier

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(R15A0489) MICROWAVE AND DIGITAL COMMUNICATIONS LAB

LIST OF EXPERIMENTS

Part – A (Any 6 Experiments) :

1. Characteristics of gunn diode
2. Characteristics of the reflex klystron tube
3. Attenuation measurement
4. Impedance measurement
5. Frequency measurement
6. Characteristics of multihole directional coupler
7. Determination of standing wave ratio and reflection coefficient
8. Measurement of waveguide parameters
9. Study of magic tee

Part – B (Any 6 Experiments):

1. Time Division Multiplexing and Demultipluxing
2. Amplitude shift keying modulation & demodulation
3. Frequency shift keying modulation & demodulation
4. Phase shift keying modulation & demodulation
5. Differential phase shift keying modulation & demodulation
6. Pulse code modulation & demodulation
7. Differential pulse code modulation & demodulation
8. Delta modulation & demodulation

Equipment required for Microwave Laboratory:

1. Regulated Klystron Power Supply
2. VSWR Meter
3. Micro Ammeter - 0 – 500 μA
4. Multimeter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Reflex Klystron Tube
8. Crystal Diodes
9. Micro wave components (Attenuation)
10. Frequency Meter
11. Slotted line carriage
12. Probe detector
13. wave guide shorts

14. Directional Coupler
15. E, H, Magic Tee
16. Circulators, Isolator
17. Matched Loads

Equipment required for Digital Communications Lab:

1. TDM,ASK,FSK,PSK,PCM,DPCM,DPSK,DM Modulation & Demodulation Kits
2. Digital Storage Oscilloscopes, Coaxial Probes, Patch Cords

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CORE ELECTIVE – V

(R15A0429) RADAR SYSTEMS

OBJECTIVES

1. To learn Radar Fundamentals like Radar Equation, Operating frequencies & Applications.
2. To understand the basic concepts of different types of Radars for surveillance & Tracking.
3. To know the various types of tracking techniques involved.
4. To understand Radar Receivers, MTI filters, displays and antennas.

UNIT I

Basics of Radar: Introduction, Maximum Unambiguous Range, Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Related Problems.

Radar Equation: SNR, Envelope Detector-False AlarmTime and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Related Problems.

UNIT-II

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Related Problems.

FM-CW Radar: FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

UNIT-III

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two- coordinates), Angular Accuracy, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT-IV

Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

UNIT-V

Radar Receivers: Noise Figure and Noise Temperature, Displays – types, Introduction to Phased Array Antennas –Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Applications, Advantages and Limitations.

TEXT BOOK:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Edition, Tata McGraw-Hill, 2007.

REFERENCES:

1. Introduction to Radar Systems – Merrill I. Skolnik, 3rd Edition Tata McGraw-Hill, 2001.
2. Radar: Principles, Technology, Applications-Byron Edde, Pearson Education, 2004.
3. Principles of Modern Radar: Basic Principles-Mark A. Richards, James A. Scheer, William A. Holm, Yesdee,2013.
4. 'Radar Hand Book ' Ed. By M.I Skolnik, 2nd Edition, Tata McGraw Hill.
5. 'Understanding Radar Systems' by Simon Kinsley and Shaun Quegan, Scitech Publishing, McGraw-Hill.

OUTCOMES

1. Demonstrate an understanding of the factors affecting the radar performance using Radar Range Equation.
2. Analyze the principle of FM-CW radar and apply it in FM-CW Altimeter.
3. Differentiate between a MTI Radar and a Pulse Doppler Radar based on their working principle.
4. Demonstrate an understanding of the importance of Matched Filter Receivers in Radars.
5. Familiarize with the different types of Radar Displays and their application in real time scenario

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CORE ELECTIVE – VII

(R15A0430) DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES

OBJECTIVES

1. To introduce architectural features of programmable DSP Processors of TI and Analog Devices.
2. To recall digital transform techniques.
3. To give practical examples of DSP Processor architectures for better understanding.
4. To develop the programming knowledge using Instruction set of DSP Processors.
5. To understand interfacing techniques to memory and I/O devices.

UNIT –I:

Introduction to Digital Signal Processing:

Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations:

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT –II:

Architectures for Programmable DSP Devices:

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT -III:

Programmable Digital Signal Processors:

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT –IV:

Analog Devices Family of DSP Devices:

Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor.

Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT –V:

Interfacing Memory and I/O Peripherals to Programmable DSP Devices:

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach to Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. Embedded Signal Processing with the Micro Signal Architecture Publisher: Woon-Seng Gan, Sen M. Kuo, Wiley-IEEE Press, 2007

REFERENCE BOOKS:

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing – Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. 2000, S. Chand & Co.
4. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
5.The Scientist and Engineer's Guide to Digital Signal Processing by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997 6.Embedded Media Processing by David J. Katz and Rick Gentile of Analog Devices, Newnes, ISBN 0750679123, 2005

OUTCOMES

Upon completion of the course the student will be able to:

1. To distinguish between the architectural features of general purpose processors and DSP processors
2. Understand the architectures of TMS 320C54XX and ADSP2100 DSP devices
3. Able to write assembly language programs using instruction set of TMS320C54XX
4. Can interface various devices to DSP Processors

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CORE ELECTIVE - V

(R15A0431) RF CIRCUIT DESIGN

Course Objectives:

The Course Objectives are:

1. To educate students fundamental RF circuit and system design skills.
2. To introduce students the basic transmission line theory, single and multiport networks, RF component modelling.
3. To offer students experience on designing matching and biasing networks & RF transistor amplifier design.

UNIT-I:

Introduction: Importance of RF Design-Dimensions and Units-Frequency Spectrum-RF Behavior of Passive Components: High Frequency Resistors, High Frequency Capacitors, High Frequency Inductors.-Chip Components and Circuit Board Considerations: Chip Resistors, Chip Capacitors, and Surface Mount Inductors

Review of Transmission Lines: Types of Transmission Lines-Equivalent Circuit representation-R, L, C, G parameters of Different Line configurations-Terminated Lossless Transmission Lines-Special Terminations: Short Circuit, Open Circuit and Quarter Wave Transmission Lines-Sourced and Loaded Transmission Lines: Power Considerations, Input Impedance Matching, Return Loss and Insertion Loss.

UNIT-II:

Single and Multi-Port Networks: The Smith Chart: Reflection Coefficient, Normalized Impedance-Impedance Transformation: Standing wave Ratio, Special Transformation Conditions-Admittance Transformation-Parallel and Series RL & RC Connections-Basic Definitions of Single and Multi-Port Networks-Interconnecting Networks.

RF Filter Design: Scattering Parameters: Definition, Meaning, Chain Scattering Matrix, Conversion Between S-and Z-parameters, Signal Flow Chart Modeling, Generalization-Basic Resonator and Filter Configurations: Low Pass, High Pass, Band Pass and Band Stop type Filters-Filter Implementation using Unit Element and Kuroda's Identities Transformations-Coupled Filters.

UNIT-III:

Active RF Component Modeling: RF Diode Models: Nonlinear and Linear Models-Transistor Models: Large Signal and Small Signal BJT Models, Large Signal and Small Signal FET Models-Scattering Parameter, Device
Characterization.

UNIT-IV:

Matching and Biasing Networks: Impedance Matching Using Discrete Components: Two Component Matching Networks, Forbidden Regions, Frequency Response and Quality Factor, T and Pi Matching Networks-

Amplifier Classes of Operation and Biasing Networks: Classes of Operation and Efficiency of Amplifiers, Biasing Networks for BJT, Biasing Networks for FET.

UNIT-V:

RF Transistor Amplifier Design: Characteristics of Amplifiers-Amplifier Power Relations: RF Source, Transducer Power Gain, Additional Power Relations-Stability Considerations: Stability Circles, Unconditional Stability and Stabilization Methods-Unilateral and Bilateral Design for Constant Gain-Noise Figure Circles-Constant VSWR Circles.

RF Oscillators and Mixers: Basic Oscillator Model: Negative Resistance Oscillator, Feedback Oscillator Design, Design steps, Quartz Oscillators-

Fixed Frequency High Frequency Oscillator -Basic Characteristics of

Mixers: Concepts, Frequency Domain Considerations, Single Ended Mixer Design, Single and Double Balanced Mixers.

TEXT BOOKS:

1. RF Circuit Design –Theory and Applications -Reinhold Ludwig, Pavel Bsetchko – Pearson Education India, 2000.
2. Radio Frequency and Microwave Communication Circuits –Analysis and Design - Devendra K.Misra –Wiley Student Edition –John Wiley & Sons, Inc.

REFERENCE BOOKS:

1. Radio Frequency and Microwave Electronics –Matthew M. Radmanesh –PEI.
2. RF Circuit Design –Christopher Bowick, Cheryl Aljuni and John Biyler,Elsevier Science, 2008.
3. Secrets of RF Circuit Design -Joseph J.Carr, TMH, 2000.
4. Design of RF and Microwave Amplifiersand Oscillators Peter L.D. Abrif, Artech House, 2000.
5. The Design of CMOS Radio Frequency Integrated Circuits -Thomas H.Lee, 2/e - Cambridge University Press, 2004.

Course Outcomes:

Upon completion of the course, the students will be able to:

1. Explore fundamental RF circuit and system design skills.
2. Understand the basic transmission line theory, single and multiport networks, RF component modeling.
3. Design matching and biasing networks & RF transistor amplifiers.

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CORE ELECTIVE – VI

(R15A0432) WIRELESS COMMUNICATIONS AND NETWORKS

OBJECTIVES

1. To provide the students with the fundamental treatment about many practical and theoretical concepts that forms basic of wireless communication to equip the students with various kinds of wireless networks and its operations.
2. To prepare the students to understand the concept of frequency reuse and be able to apply it in the design of mobile cellular system
3. To prepare the students to understand various modulation schemes and multiple access techniques that are used in wireless communications
4. To provide an analytical perspective on the design and analysis the traditional and emerging wireless networks and to discuss the nature of and solution methods to the fundamental problems in the wireless networking
5. To train the students to understand the architecture and operation of various wireless WAN such as GSM, IS-95, GPRS and SMS
6. To train students to understand wireless LAN architectures and operations
7. To prepare students to understand the emerging technique OFDM and its importance in the wireless communications

UNIT -I

INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS: Evolution of mobile radio communications, examples of wireless communication systems-paging systems, cordless telephone systems, cellular telephone systems, comparison of common wireless communication systems, trends in cellular radio and personal communications. MODERN WIRELESS COMMUNICATION SYSTEMS: Second generation (2G) cellular networks, third generation (3G) wireless networks, wireless local loop (WLL) and LMDS, wireless local area networks (WLANs), Bluetooth and personal area networks (PANs).

UNIT –II:

Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnel Zone Geo metry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models-Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT –III:

Mobile Radio Propagation: Small–Scale Fading and Multipath Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model

of a multipath channel-Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT –IV

WI-FI AND THE IEEE 802.11 WIRELESS LAN STANDARD: IEEE 802 Architecture, IEEE 802.11 Architecture and Services, 802.11Medium Access Control, 802.11 Physical Layer, Other IEEE 802.11 Standards, Wi-Fi Protected Access.BLUETOOTH AND IEEE 802.15: Overview, radio specification, baseband specification, link manager specification, logical link control and adaptation protocol, IEEE 802.15.

UNIT -V

MOBILE DATA NETWORKS: Introduction, data oriented CDPD network, GPRS and higher data rates, short messaging service in GSM, mobile application protocols.WIRELESS ATM & HIPERLAN: Introduction, Wireless ATM, HIPERLAN, HIPERLAN-2.

TEXT BOOKS:

1.Theodore S. Rappaport (2002), Wireless Communications -Principles Practice,2nd edition, Prentice Hall of India, New Delhi.
2.William Stallings (2009), Wireless Communications and Networks,2nd edition, Pearson Education, India.
3.Kaveh PahLaven, Prashanth Krishna Murthy (2007), Principles of Wireless Networks -A Unified Approach, Pearson Education, India.

REFERENCE BOOKS:

1.Dr. Kamilo Feher (2003), Wireless Digital Communications,Prentice Hall of India, New Delhi.
2.Jochen Schiller (2009), Mobile Communications, 2nd edition, Pearson Education, India.
3.Andreas F. Molisch (2006), Wireless Communications, Wiley –India, New Delhi.

OUTCOMES

Upon completion of the course the student will be able to:

1. Understand the principles of wireless communications
2. Understand fundamentals of wireless networking
3. Understand cellular system design concepts
4. Analyze various multiple access schemes using wireless communication
5. Understand Wireless WANs and their performance analysis
6. Demonstrate wireless LAN and their specifications
7. Familiar with some of the existing and emerging wireless standards
8. Understand the concept of OFDM

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CORE ELECTIVE – VI

(R15A0573) NETWORK SECURITY AND CRYPTOGRAPHY

OBJECTIVES:

To make the students

1. To understand the principles of encryption algorithms, conventional and public key cryptography.

UNIT 1:

Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – stereography - stream and block ciphers - Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion and diffusion - fiestal structure - data encryption standard(DES) - strength of DES - differential and linear crypt analysis of DES - block cipher modes of operations - triple DES.

UNIT 2:

IDEA encryption and decryption - strength of IDEA - confidentiality using conventional encryption - traffic confidentiality - key distribution - random number generation - Introduction to graph - ring and field - prime and relative prime numbers - modular arithmetic - Fermat's and Euler's theorem - primality testing - Euclid's Algorithm - Chinese Remainder theorem - discrete algorithms.

UNIT 3:

Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm - introductory idea of Elliptic curve cryptography - Elganel encryption - Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks - security of hash functions and MACS.

UNIT 4:

MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service - electronic mail security-pretty good privacy (PGP) - S/MIME.

UNIT 5:

IP Security: Architecture - Authentication header - Encapsulating security payloads - combining security associations - key management.

Web Security: Secure socket layer and transport layer security - secure electronic transaction (SET) - System Security: Intruders - Viruses and related threads - firewall design principals - trusted systems.

TEXT BOOKS:

1.William Stallings, "Cryptography and Network Security: Principals and Practice", Prentice Hall

2.Cryptography and Network Security: Atul Kahate, McGraw Hill

REFERENCE BOOKS:

1. Network Cryptography and Security: C K Shyamala, N Harini,Dr TR Padmanabhan.wiley india,1st Edition .
2. Network Cryptography and Security: Forouzan Mukhopadhyay,Mc Graw Hill.2nd Edition.
3. Information Security, Principles and Practice: Mark Stamp. Wiley India

OUTCOMES

Upon completion of the course the student will be able to:

1. Acquire an understanding of Network security and its changing character
2. Understand Conventional encryption and cryptography
3. Analyze issues related to network IP security
4. Identify and investigate web security requirements
5. Know the concept of SNMP and design principles of firewall

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CORE ELECTIVE – VI

(R15A0433) TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS

OBJECTIVES:

The following are the course objectives:

1. To learn Switching, Signaling and traffic in the context of Telecommunication network.
2. To expose through the evolution of switching systems from manual and electromechanical systems to stored-program-controlled digital systems
3. To study signaling, packet switching and networks

UNIT - I:

Switching Systems: Evolution of Telecommunications; Basics of a switching systems; Function of a switching system; Crossbar switching- Principal of crossbar switching; Crossbar switch configuration; Cross-Point technology; Crossbar exchange Organization; A General Trunking; Electronic switching; Digital switching systems.

Telecommunications Traffic: Introduction; The Unit Of Traffic; Congestion; Traffic Measurement; A mathematical model ; Lost-call Systems-Theory; Traffic Performance; Loss systems in Tandem; Use of Traffic tables; Queuing Systems-The Second Erlang Distributions; Probability of Delay; Finite Queue Capacity; Some Other Useful Results; Systems with a Single Server; Queues in Tandem; Delay Tables; Applications of Delay Formulae.

UNIT - II:

Switching Networks: Single Stage Networks; Grading-Principle Two Stage Networks; Three stage networks; Four stage Networks

Time Division Switching: Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching.

Control of Switching Systems: Call Processing Functions-Sequence of Operations; Signal Exchanges; State Transition Diagrams; Common Control Reliability; Availability and Security; Stored Program Control.

UNIT - III:

Signaling: Introduction; Customer Line Signaling; Audio Frequency Junctions and Trunk Circuits; FDM Carrier Systems- Out band Signaling; In band (VF) Signaling; PCM Signaling; Inter Register Signaling; Common Channel Signaling Principles-General Signaling Networks; CCITT Signaling System Number 6; CCITT Signaling System Number 7; The High Level Data Link Control Protocol; Signal Units; The Signaling Information Field.

UNIT - IV:

Packet Switching: Introduction; Statistical Multiplexing; Local Area and Wide Area Networks-Bus Networks; Ring Networks; Comparison of Bus and Ring Networks; Optical Fiber Networks; Large Scale Networks-General; Datagrams and Virtual Circuits; Routing;

Flow Control; Standards; Frame Relay; Broadband Networks-General; The Asynchronous Transfer Mode; ATM Switches.

UNIT – V:

Networks: Introduction; Analog Networks; Integrated Digital Networks; Integrated Services Digital Networks; Cellular Radio Networks; Intelligent networks; Private Networks; Charging; Routing – General, Automatic Alternative Routing.

TEXT BOOKS :

1. J. E Flood, "Telecommunications Switching and Traffic Networks", Pearson Education, 2006
2. Tyagarajan Viswanathan, "Telecommunications Switching Systems and Networks", Prentice Hall of India Pvt. Ltd., 2006

REFERENCE BOOKS:

1. John C Bellamy, "Digital Telephony", John Wiley International Student Student Edition, 3rd Edition, 2000.
2. Behrouz A. Forouzan, "Data Communications and Networking," TMH, 2nd Edition, 2002.
3. Tomasi, "Introduction to Data Communication and Networking", Pearson Education, 1st Edition, 2007

OUTCOMES:

On completion of this course, it is expected that the student will be able to:

1. Understand the main concepts of telecommunication network Design
2. Analyse and evaluate fundamental telecommuinication traffic models.
3. Understand basic modem signaling system.
4. Solve traditional interconnection switching system design problems.
5. Understand the concept of packet switching