COURSE STRUCTURE AND SYLLABUS

For

ELECTRONICS AND COMMUNICATION ENGINEERING
(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India
### I Year - I Semester

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Total Credits: **22**

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Total Credits: **24**

Total Course Credits = 48 + 44 + 42 + 46 = 180
Syllabus

I Year - I Semester

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ENGLISH - I

Introduction:

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

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.

READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports—are to be tested along with appropriate language and expressions.
4. Examinations:
   I mid exam + II mid exam (15% for descriptive tests + 10% for online tests) = 25%
   (80% for the best of two and 20% for the other)
   Assignments = 5%
   End semester exams = 70%
5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17
UNIT I:
1. 'Human Resources' from English for Engineers and Technologists.

**OBJECTIVE:**
To develop human resources to serve the society in different ways.

**OUTCOME:**
The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. 'An Ideal Family' from Panorama: A Course on Reading

**OBJECTIVE:**
To develop extensive reading skill and comprehension for pleasure and profit.

**OUTCOME:**
Acquisition of writing skills

UNIT 2:
1. 'Transport: Problems and Solutions' from English for Engineers and Technologists.

**OBJECTIVE:**
To highlight road safety measures whatever be the mode of transport.
OUTCOME:
The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama : A Course on Reading'

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 3:
1. 'Evaluating Technology' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the advantages and disadvantages of technology.

OUTCOME:
The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama : A Course on Reading'

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 4:
1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

OBJECTIVE:
To bring into focus different sources of energy as alternatives to the depleting sources.

OUTCOME:
The lesson helps to choose a source of energy suitable for rural India.

2. 'The Scarecrow' from Panorama : A Course on Reading
OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 5:
1. 'Our Living Environment' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the fact that animals must be preserved because animal life is precious.

OUTCOME:
The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 6:
1. 'Safety and Training' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

OUTCOME:
The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.
OUTCOME:

Acquisition of writing skills

NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

OVERALL COURSE OUTCOME:

1. Using English languages, both written and spoken, competently and correctly.
2. Improving comprehension and fluency of speech.

MODEL QUESTION PAPER FOR THEORY

PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A, B & C

A will be from the main text: 5 marks
B from non-detailed text: 3 marks
C on grammar and Vocabulary: 6 marks
Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes: At the end of the Course, Student will be able to:

1. Solve linear differential equations of first, second and higher order.
2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
3. Calculate total derivative, Jacobian and minima of functions of two variables.

UNIT I: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact.


UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$, $\sin ax$, $\cos ax$, polynomials in $x$, $e^{ax}V(x)$, $xV(x)$- Method of Variation of parameters.

Applications: LCR circuit, Simple Harmonic motion.

UNIT III: Laplace transforms:

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac’s delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT IV: Partial differentiation:

Introduction- Homogeneous function-Euler’s theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor’s and Mc Laurent’s series expansion of functions of two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange’s method (with constraints).
UNIT V: First order Partial differential equations:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT VI: Higher order Partial differential equations:

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type $e^{ax+by}, \sin(a+by), \cos(ax+by), x^n y^n$. Classification of second order partial differential equations.

Text Books:

Reference Books:
3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
UNIT I: Solution of Algebraic and Transcendental Equations:

UNIT II: Interpolation:

UNIT III: Numerical Integration and solution of Ordinary Differential equations:

Unit-IV: Functions of a complex variable
Complex function, Real and Imaginary parts of Complex function, Limit, Continuity and Derivative of complex function, Cauchy-Riemann equations, Analytic function, entire function, singular point, conjugate function, \( C - R \) equations in polar form, Harmonic functions, Milne-Thomson method, Simple applications to flow problems,

Unit-V: Series Expansion and Complex Integration
Line integral of a complex function, Cauchy’s theorem(only statement ) , Cauchy’s Integral Formula. Absolutely convergent and uniformly convergent of series of complex terms, Radius of convergence, Taylor’s series, Maclaurin’s series expansion, Laurent’s series.

Unit-VI: Singularities and Residue Theorem
Zeros of an analytic function, Singularity, Isolated singularity, Removable singularity, Essential singularity, pole of order m, simple pole, Residues, Residue theorem, Calculation of residues, Residue at a pole of order m, Evaluation of real definite integrals: Integration around the unit circle, Integration around semi circle, Indenting the contours having poles on the real axis.

Text Books:

Reference Books:
1. DEAN G. DUFFY, Advanced engineering mathematics with MATLAB, CRC Press
OBJECTIVES: Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

UNIT-I
INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton’s rings – construction and basic principle of Interferometers.

UNIT-II
DIFFRACTION: Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

UNIT-III
POLARIZATION: Types of Polarization – Methods of production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).


UNIT-IV
ELECTROMAGNETIC FIELDS: Scalar and Vector Fields – Electric Potential- Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

UNIT-V

UNIT-VI

Outcome: Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.
**List of Text Books:**

**List of Reference Books:**
Learning objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

UNIT-I:

UNIT-II:
Introduction to C Programming- Identifiers, The main () Function, The printf () Function
Programming Style - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.
Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT -III:
Control Flow-Relational Expressions - Logical Operators:
Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

UNIT-IV
Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.
UNIT-V:
Arrays & Strings
Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays - Matrices
Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

UNIT-VI:
Pointers, Structures, Files
Pointers: Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.
Structures: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.
Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Outcomes:
- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

Text Books:
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Reference Books:
3. Programming in C, Reema Thareja, OXFORD.
Objective: Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

Unit I

Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

Unit II

Objective: To introduce the students to use scales and orthographic projections, projections of points & simple lines.

Scales: Plain scales, diagonal scales and vernier scales

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to of the reference planes (HP,VP or PP)

Unit III

Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT

Unit IV

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.
Unit V

Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

Unit VI

Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Text Books:
1. Engineering Drawing by N.D. Butt, Chariot Publications

Reference Books:
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
OBJECTIVES:
To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

OUTCOME:
A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:
1. WHY study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
   Practice work.

UNIT 2:
1. Responding to Requests and asking for Directions
   Practice work.

UNIT 3:
1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing
   Practice work.

UNIT 4:
1. Letters and Sounds
   Practice work.

UNIT 5:
1. The Sounds of English
   Practice work.
UNIT 6:

1. Pronunciation
2. Stress and Intonation
   Practice work.

Assessment Procedure: Laboratory

1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

The rubric to assess the learners:

<table>
<thead>
<tr>
<th>Body language</th>
<th>Fluency &amp; Audibility</th>
<th>Clarity in Speech</th>
<th>Neutralization of accent</th>
<th>Appropriate Language</th>
<th>Total 10 marks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gesture &amp; Postures</td>
<td>Eye Contact</td>
<td>Grammar</td>
<td>Vocabulary &amp; expressions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Lab Assessment: Internal (25 marks)**
  1. Day-to-Day activities: 10 marks
  2. Completing the exercises in the lab manual: 5 marks
  3. Internal test (5 marks written and 5 marks oral)

- **Lab Assessment: External (50 marks)**
  1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
  2. Oral: Reading aloud a text or a dialogue- 10 marks
  3. Viva-Voce by the external examiner: 20 marks
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient Black Swan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr Shalini Verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
Objective: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

LIST OF EXPERIMENTS:
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of vibrations in stretched strings – Sonometer.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect in semiconductors.
18. Determination of Young’s modulus by method of single cantilever oscillations.
20. Determination of Planck’s constant using photocell.

Outcome: Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.
Objective: Training Engineering students to prepare a technical document and improving their writing skills.

LIST OF EXPERIMENTS
1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size
11. B-H curve
12. Michelson’s interferometer
13. Black body radiation

URL: www.vlab.co.in

Outcome: Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a technical/mini-project/ experimental report with scientific temper.
ENGINEERING WORKSHOP:
Course Objective: To impart hands-on practice on basic engineering trades and skills.
Note: At least two exercises to be done from each trade.

Trade:

Carpentry
1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

Fitting
1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

IT WORKSHOP:

OBJECTIVES:
- Understand the basic components and peripherals of a computer.
- To become familiar in configuring a system.
- Learn the usage of productivity tools.
- Acquire knowledge about the netiquette and cyber hygiene.
- Get hands on experience in trouble shooting a system?

1. System Assembling, Disassembling and identification of Parts / Peripherals

2. Operating System Installation—Install Operating Systems like Windows, Linux along with necessary Device Drivers.
3. MS-Office / Open Office
   b. **Spread Sheet** - organize data, usage of formula, graphs, charts.
   c. **Power point** - features of power point, guidelines for preparing an effective presentation.
   d. **Access** - creation of database, validate data.

4. **Network Configuration & Software Installation**-Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.

5. **Internet and World Wide Web**-Search Engines, Types of search engines, netiquette, cyber hygiene.

6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

7. **MATLAB**- basic commands, subroutines, graph plotting.

8. **LATEX**-basic formatting, handling equations and images.

**OUTCOMES:**
- Common understanding of concepts, patterns of decentralization implementation in Africa †
- Identified opportunities for coordinated policy responses, capacity building and implementation of best practices †
- Identified instruments for improved decentralization to the local level †
- Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels

**Text Books:**
7. *Comdex Information Technology course tool kit* Vikas Gupta, WILEY Dreamtech.
8. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education.
Introduction:

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

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.

READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.
WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports-- are to be tested along with appropriate language and expressions.
4. Examinations:
   - I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%
   - (80% for the best of two and 20% for the other)

   Assignments= 5%

   End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches) and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regulations)
UNIT 1:

1. 'The Greatest Resource- Education' from English Encounters

**OBJECTIVE:**
Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

**OUTCOME:**
The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. 'A P J Abdul Kalam' from The Great Indian Scientists.

**OBJECTIVE:**
The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

**OUTCOME:**
Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

UNIT 2:

1. 'A Dilemma' from English Encounters

**OBJECTIVE:** The lesson centres on the pros and cons of the development of science and technology.

**OUTCOME:** The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.
OBJECTIVE:
The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

OUTCOME:
The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

UNIT 3:
1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.
   
   OBJECTIVE:
The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences.

   OUTCOME:
The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.
   
   OBJECTIVE:
The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

   OUTCOME:
The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and strengthen it.

UNIT 4:
1. 'The Lottery' from English Encounters.
   
   OBJECTIVE:
The lesson highlights insightful commentary on cultural traditions.

   OUTCOME:
The theme projects society’s need to reexamine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.
   
   OBJECTIVE:
The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

   OUTCOME: The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.
UNIT 5:

1. 'The Health Threats of Climate Change' from English Encounters.

OBJECTIVE:

The essay presents several health disorders that spring out due to environmental changes.

OUTCOME:

The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. 'Prafulla Chandra Ray' from The Great Indian Scientists.

OBJECTIVE:

The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

OUTCOME:

Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

UNIT 6:

1. 'The Chief Software Architect' from English Encounters

OBJECTIVE:

The lesson supports the developments of technology for the betterment of human life.

OUTCOME:

Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Srinivasa Ramanujan' from The Great Indian Scientists.

OBJECTIVE:

The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

OUTCOME:

The lesson provides inspiration to the readers to think and tap their innate talents.

NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.
MODEL QUESTION PAPER FOR THEORY

PART- I
Six short answer questions on 6 unit themes
One question on eliciting student's response to any of the themes

PART-II
Each question should be from one unit and the last question can be a combination of two or more units.
Each question should have 3 sub questions: A,B & C
A will be from the main text: 5 marks
B from non-detailed text: 3 marks
C on grammar and Vocabulary: 6 marks
I Year - II Semester

![Table with columns L, T, P, C and row values 4, 0, 0, 3]

MATHEMATICS-III

Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:

1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
2. Solve simultaneous linear equations numerically using various matrix methods.
3. Determine double integral over a region and triple integral over a volume.
4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

UNIT I: Linear systems of equations:


UNIT II: Eigen values - Eigen vectors and Quadratic forms:

Applications: Free vibration of a two-mass system.

UNIT III: Multiple integrals:

Curve tracing: Cartesian, Polar and Parametric forms.
Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.
Applications: Finding Areas and Volumes.

UNIT IV: Special functions:

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.
Applications: Evaluation of integrals.

UNIT V: Vector Differentiation:

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.
Applications: Equation of continuity, potential surfaces

UNIT VI: Vector Integration:

Text Books:

Reference Books:
Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

**Learning Objectives:**

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace industries (Unit I).
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced (Unit II).
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory (Unit III).
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced (Unit IV).
- Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied (Unit V).
- With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced (Unit VI).

**UNIT I: HIGH POLYMERS AND PLASTICS**
Polymerisation : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)-Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates
Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.

**UNIT II: FUEL TECHNOLOGY**

*Explosives:*- Introduction, classification, examples: RDX, TNT and ammonium nitrite - rocket fuels.

**UNIT III: ELECTROCHEMICAL CELLS AND CORROSION**
Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

*Corrosion:*- Definition – Theories of Corrosion (electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating)
UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

**Nano materials:** Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications

**Liquid crystals:** Introduction – Types – Applications

**Superconductors:** Type-I & Type-2, properties & applications

**Green synthesis:** Principles - 3 or 4 methods of synthesis with examples – $R_4M_4$ principles

UNIT V: SOLID STATE CHEMISTRY

Types of solids - close packing of atoms and ions - BCC, FCC, structures of rock salt - cesium chloride- spinel - normal and inverse spinels.

Non-elemental **semiconducting Materials:** Stoichiometric, controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices: p-n junction diode as rectifier – junction transistor.

**Insulators** (electrical and electronic applications)

**Magnetic materials:** Ferro and ferri magnetism. Hall effect and its applications.

UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES

**Solar Energy:** Introduction, application of solar energy, conversion of solar energy (Thermal conversion & photo conversion) – photovoltaic cell: design, working and its importance

**Non-conventional energy sources:**
  (i) Hydropower include setup a hydropower plant (schematic diagram)
  (ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant
  (iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.
  (iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.
  (v) Biomass and biofuels

**Fuel cells:** Introduction - cell representation, $H_2$-$O_2$ fuel cell: Design and working, advantages and limitations. Types of fuel cells: Alkaline fuel cell - methanol-oxygen - phosphoric acid fuel cells - molten carbonate fuel cells.

Outcomes: The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano-materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.
Standard Books:
1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.

Reference Books:
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM
ELECTRICAL TECHNOLOGY:

Preamble:
This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:
• To learn the basic principles of electrical law’s and analysis of networks.
• To understand the principle of operation and construction details of DC machines.
• To understand the principle of operation and construction details of transformer.
• To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
• To understand the principles and construction of various measuring instruments.

Unit - I
DC Machines:
Principle of operation of DC generator – emf equation – types of DC machine – torque equation of DC motor – applications – three point starter, speed control methods – OCC of DC generator

Transformers: Principle of operation of single phase transformers – e.m.f equation – losses –efficiency and regulation.

Unit - II
AC Rotating Machines:

Unit III
Measuring Instruments:
Classification – Deflection, controlling, damping torque, ammeter, voltmeter, wattmeter, MI, MC instruments – Energy meter – Construction of CRO.

Learning Outcomes:
• Able to analyse the various electrical networks.
• Able to understand the operation of DC generator, DC Motor ,3-point starter and Speed control methods.
• Able to analyse the performance of transformer.
• Able to explain the operation of 3-phase alternator and 3-phase induction motors.
• Able to explain the working principle of various measuring instruments.
MECHANICAL TECHNOLOGY

Learning Objectives: The content of this course shall provide the student the basic concepts of various mechanical systems and exposes the student to a wide range of equipment and their utility in a practical situation. It shall provide the fundamental principles of fuels, I.C. Engines, transmission systems, heat transfer fundamentals and various manufacturing operations usually exist in any process plant.

UNIT-IV:

Energy Sources: Renewable and non-renewable energy resources, renewable energy forms and conversions. Thermodynamic principles and laws.


UNIT-V:


UNIT-VI:

Transmission of power and manufacturing methods:

Belt, rope and chain drives- Different types - power transmission by belts and ropes, initial tensions in the belt.

Gears: classification of gears, applications.

Metal joining: arc welding, resistance welding, gas welding, brazing and soldering

Metal forming: forging – operations, rolling and extrusion principles

Machine tool: lathe classification, specifications, and operations.

Outcomes:

After completing the course, the student shall be able to understand:

- Working of I.C. Engines
- Modes of Heat transfer
- Power transmission by drives and different manufacturing methods.
Text Books:

2. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group
3. Mechanical Engineering Science K R Gopala Krishna, Subhas publications

Reference Books:

1. Basic Electrical Engineering by M.S. Naidu and S. Kamakshiah, TMH Publications
4. Electrical Engineering – Prasad, Sivanagaraju, Cengage Learning
5. Theory of machines by Rattan, McGraw-Hill publications
6. Production Technology by P.N. Rao by I & II McGraw-Hill publications
I Year - II Semester

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ENVIRONMENTAL STUDIES

Course Learning Objectives:
The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:
The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.

Syllabus:


Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.
UNIT – II Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Limestone, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.


UNIT – IV Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.


The student should Visit an Industry/Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.
**Text Books:**
1. Environmental Studies, K.V. S. G. Murali Krishna, VGS Publishers, Vijayawada

**Reference:**
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
OBJECTIVES:

- To be familiar with basic techniques handling problems with Data structures
- Solve problems using data structures such as linear lists, stacks, queues, hash tables

UNIT-I: ARRAYS

UNIT-II: STACKS AND QUEUES
The Stack Abstract Data Type, The Queue Abstract Data Type, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT-III: LINKED LISTS

UNIT-IV: TREES
Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.

UNIT-V: GRAPHS
The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal S Algorithm, Prim s Algorithm, Sollin’s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.
UNIT-VI: SORTING
Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort,
Summary of Internal Sorting

OUTCOMES:

- Apply advanced data structure strategies for exploring complex data structures.
- Compare and contrast various data structures and design techniques in the area
  Of Performance.
- Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and
  trade offs

Text Books:
1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd

Reference Books:
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.

2. Trial experiment - Determination of HCl using standard Na$_2$CO$_3$ solution.

3. Determination of alkalinity of a sample containing Na$_2$CO$_3$ and NaOH.

4. Determination of KMnO$_4$ using standard Oxalic acid solution.

5. Determination of Ferrous iron using standard K$_2$Cr$_2$O$_7$ solution.

6. Determination of Copper using standard K$_2$Cr$_2$O$_7$ solution.


8. Determination of Copper using standard EDTA solution.


10. Determination of pH of the given sample solution using pH meter.

11. Conductometric titration between strong acid and strong base.

12. Conductometric titration between strong acid and weak base.

13. Potentiometric titration between strong acid and strong base.

14. Potentiometric titration between strong acid and weak base.

15. Determination of Zinc using standard EDTA solution.

16. Determination of Vitamin – C.

**Outcomes:** The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
Reference Books

PRESERVED LAB MANUAL FOR SEMESTER II:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

OBJECTIVES:

To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME:

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:

1. Debating - Practice work

UNIT 2:

1. Group Discussions -- Practice work

UNIT 3:

1. Presentation Skills - Practice work

UNIT 4:

1. Interview Skills - Practice work

UNIT 5:

1. Email, Curriculum Vitae - Practice work

UNIT 6:

1. Idiomatic Expressions
2. Common Errors in English - Practice work
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Elijah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
OBJECTIVES:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.

- Acquire knowledge about the basic concept of writing a program.

- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.

- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.

- Role of Functions involving the idea of modularity.

Programming

Exercise - 1 Basics
a) What is an OS Command, Familiarization of Editors - vi, Emacs
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math
a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I
a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a) Write a C Program to Find Whether the Given Number is
   i) Prime Number
   ii) Armstrong Number
b) Write a C Program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle
Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise – 7 Functions - Continued
Write a C Program to compute the values of sin x and cos x and e^x values using Series expansion. (use factorial function)

Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

Exercises - 9 Structures
a) Write a C Program to Store Information of a Movie Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise – 10 Arrays and Pointers
a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

Understand the difference between the above two programs

Exercise – 12 Strings
a) Implementation of string manipulation operations with library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
b) Implementation of string manipulation operations without library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
Exercise -13 Files
a) Write a C programming code to open a file and to print its contents on screen.
b) Write a C program to copy files

Exercise -14 Files Continued
a) Write a C program that merges two files and stores their contents in another file.
b) Write a C program to delete a file.

OUTCOMES:

• Apply and practice logical ability to solve the problems.

• Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment

• Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs

• Understand and apply the in-built functions and customized functions for solving the problems.

• Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

• Document and present the algorithms, flowcharts and programs in form of user-manuals

• Identification of various computer components, Installation of software

Note:

a) All the Programs must be executed in the Linux Environment. (Mandatory)
b) The Lab record must be a print of the LATEX (.tex) Format.
Objectives:

The main objectives of this course are:

- The basic concepts of semiconductor physics are to be reviewed.
- Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
- The application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
- The principal of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics are explained.
- The need of transistor biasing and its significance is explained. The quiescent point or operating point is explained.
- Small signal equivalent circuit analysis of BJT and FET transistor amplifiers in different configuration is explained.

Syllabus:

UNIT-I: Semiconductor Physics: Insulators, Semiconductors, and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semiconductors, extrinsic semiconductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.

UNIT-II: Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Photo diode, Tunnel Diode, SCR, UJT. Construction, operation and characteristics of all the diodes are required to be considered.

UNIT-III: Rectifiers and Filters: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, comparison of various filter circuits in terms of ripple factors.

UNIT-IV: Transistor Characteristics:

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.
UNIT- V: Transistor Biasing and Thermal Stabilization: Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in $V_{BE}$, $I_c$, and $\beta$, Stability factors, ($S, S', S''$), Bias compensation, Thermal runaway, Thermal stability.

FET Biasing- methods and stabilization.

UNIT- VI: Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of $h$-parameters, conversion of $h$-parameters, generalized analysis of transistor amplifier model using $h$-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

Text Books:


References:

3. Electronic Devices and Circuits – Bell, Oxford

Outcomes:

At the end of this course the student can able to:

- Understand the basic concepts of semiconductor physics.
- Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
- Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
- Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations.
- Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.
- Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.
UNIT – I: REVIEW OF NUMBER SYSTEMS & CODES:
   i) Representation of numbers of different radix, conversation from one radix to another radix, r-1’s compliments and r’s compliments of signed members, problem solving.
   ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9’s compliment code etc.,
   iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

UNIT – II: MINIMIZATION TECHNIQUES
   Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc.).

UNIT – III: COMBINATIONAL LOGIC CIRCUITS DESIGN
   Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

UNIT – IV: INTRODUCTION OF PLD’s
   PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

UNIT – V: SEQUENTIAL CIRCUITS I
   Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

UNIT – VI: SEQUENTIAL CIRCUITS II
   Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Mealey to Moore conversion and vice-versa.
TEXT BOOKS:
2. Switching Theory and Logic Design by A. Anand Kumar
3. Digital Design by Mano PHI.

REFERENCE BOOKS:
1. Modern Digital Electronics by RP Jain, TMH
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers
OBJECTIVES:

The main objectives of this course are given below:

- To introduce the terminology of signals and systems.
- To introduce Fourier tools through the analogy between vectors and signals.
- To introduce the concept of sampling and reconstruction of signals.
- To analyze the linear systems in time and frequency domains.
- To study z-transform as mathematical tool to analyze discrete-time signals and systems.

UNIT- I: INTRODUCTION:
Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals. Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT –II: FOURIER SERIES AND FOURIER TRANSFORM:
Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet’s conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

UNIT –III: SAMPLING THEOREM
Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-IV: ANALYSIS OF LINEAR SYSTEMS:
Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Cross-correlation and auto-correlation of functions, properties of correlation function, Energy density spectrum, Parseval’s theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT –V: LAPLACE TRANSFORMS:
Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T’s, Relation between L.T’s, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

TEXT BOOKS:


REFERENCE BOOKS:


OUTCOMES:

At the end of this course the student will able to:

- Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
- Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
- Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
- Understand the relationships among the various representations of LTI systems
- Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.
- Apply z-transform to analyze discrete-time signals and systems.
II Year  - I Semester

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NETWORK ANALYSIS

UNIT – I

**Introduction to Electrical Circuits**: Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff’s laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources also. (Text Books: 1,2,3, Reference Books: 3)

**A.C Fundamentals and Network Topology**: Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor- problem solving, Phase angle, Phasor representation, Addition and subtraction of phasors, mathematical representation of sinusoidal quantities, explanation with relevant theory, problem solving. Principal of Duality with examples.

**Network Topology**: Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule. (Text Books: 2,3, Reference Books: 3)

UNIT – II


UNIT – III

**Coupled Circuits**: Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving.

**Resonance**: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case-resistance present in both branches, anti resonance at all frequencies. (Text Books:2,3, Reference Books: 3)

UNIT – IV

**Network Theorems**: Thevinin’s, Norton’s, Milliman’s, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens- problem solving using dependent sources also. (Text Books: 1,2,3, Reference Books: 2)

UNIT – V

**Two-port networks**: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Inverse h-parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also. (Text Books: 1,2, Reference Books: 1,3)
UNIT – VI

**Transients**: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method. (Text Books: 1,2,3, Reference Books: 1,3)

**TEXT BOOKS:**
2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning
3. Electric Circuit Analysis by Hayt and Kimmarle, TMH

**REFERENCES:**
2. Basic Circuit Analysis by DR Cunningham, Jaico Publishers.

**COURSE OBJECTIVES:**
1. To understand the basic concepts on RLC circuits.
2. To know the behavior of the steady states and transients states in RLC circuits.
3. To know the basic Laplace transforms techniques in periods’ waveforms.
4. To understand the two port network parameters.
5. To understand the properties of LC networks and filters.

**COUSE OUTCOME:**
1. gain the knowledge on basic network elements.
2. will analyze the RLC circuits behavior in detailed.
3. analyze the performance of periodic waveforms.
4. gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g).
5. analyze the filter design concepts in real world applications.
OBJECTIVES:

- To give students an introduction to elementary probability theory, in preparation for courses on statistical analysis, random variables and stochastic processes.
- To mathematically model the random phenomena with the help of probability theory concepts.
- To introduce the important concepts of random variables and stochastic processes.
- To analyze the LTI systems with stationary random process as input.
- To introduce the types of noise and modelling noise sources.

UNIT I

UNIT II

UNIT III
OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV

UNIT V
UNIT VI  

TEXT BOOKS:

REFERENCE BOOKS:
5. Random Process – Ludeman, John Wiley

OUTCOMES:

After completion of the course, the student will be able to
- Mathematically model the random phenomena and solve simple probabilistic problems.
- Identify different types of random variables and compute statistical averages of these random variables.
- Characterize the random processes in the time and frequency domains.
- Analyze the LTI systems with random inputs.
- Apply these techniques to analyze the systems in the presence of different types of noise.
II Year - I Semester

L T P C
4 0 0 3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to all Branches)

• Course Objectives:
  • The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
  • To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
  • To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

UNIT-I
Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT – II
Production and Cost Analyses:
Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)- Managerial significance and limitations of Breakeven point.

UNIT – III
Introduction to Markets, Theories of the Firm & Pricing Policies:

UNIT – IV
Types of Business Organization and Business Cycles:

UNIT – V
Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)
UNIT – VI

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money-Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

**Course Outcome:**

* The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
* One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
* The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

**TEXT BOOKS**


**REFERENCES:**

2. V. Maheswari: Managerial Economics, Sultan Chand.2014
II Year - I Semester

ELECTRONIC DEVICES AND CIRCUITS LAB

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

Electronic Workshop Practice:

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias & Reverse bias)
   Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics (CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics (CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier
Equipment required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
Learning Objectives:

- To determine resonance frequency, Q-factor of RLC network.
- To analysis time response of first orders RC/RL network for non-sinusoidal inputs.
- To estimate parameters of two port networks
- To understand the concept network theorems in network reduction of electrical networks.
- To determine efficiency of dc shunt machine with actual loading.
- To analyse performance of 3 phase induction motor
- To understand the significance of regulation of an alternators through synchronous impedance method.

PART – A

Any five experiments are to be conducted from each part
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin’s and Norton’s equivalent circuits and verification by direct test.

PART – B

2. Speed control of D.C. Shunt motor by Armature & flux control methods
4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
5. Brake test on 3-phase Induction motor (performance characteristics).
6. Regulation of alternator by synchronous impedance method

Learning Outcomes:

- Able to analyse RLC circuits and understand resonant frequency and Q-factor.
- Able to determine first order RC/RL networks of periodic non-sinusoidal waveforms.
- Able to apply network theorems to analyze the electrical network.
- Able to describe the performance of dc shunt machine.
- Able to investigate the performance of 1-phase transformer.
- Able to perform tests on 3-phase induction motor and alternator to determine their performance characteristic
Objectives:

The main objectives of this course are:

- Small signal high frequency BJT transistor amplifier Hybrid-π equivalent circuit and the expressions for conductances and capacitances are derived.
- Cascading of single stage amplifiers is discussed. Expressions for overall voltage gain are derived.
- The concept of feedback is introduced. Effect of negative feedback on amplifier characteristics is explained and necessary equations are derived.
- Basic principle of oscillator circuits is explained and different oscillator circuits are given with their analysis.
- Power amplifiers Class A, Class B, Class C, Class AB and other types of amplifiers are analyzed.
- Different types of tuned amplifier circuits are analyzed.

Outcomes:

At the end of this course the student can able to:

- Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
- Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT.
- Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
- Know the classification of the power and tuned amplifiers and their analysis with performance comparison.

Syllabus:

UNIT-I  Small Signal High Frequency Transistor Amplifier models:

BJT: Transistor at high frequencies, Hybrid-π common emitter transistor model, Hybrid π conductances, Hybrid π capacitances, validity of hybrid π model, determination of high-frequency parameters in terms of low-frequency parameters, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

FET: Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT-II  Multistage Amplifiers : Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Analysis of multi stage amplifiers using FET, Differential amplifier using BJT.
UNIT -III
Feedback Amplifiers: Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

Unit-IV

UNIT-V
Power Amplifiers: Classification of amplifiers, Class A power Amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Distortion in amplifiers.

UNIT-VI
Tuned Amplifiers: Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, effect of cascading single tuned amplifiers on band width, effect of cascading double tuned amplifiers on band width, staggered tuned amplifiers, Stability of tuned amplifiers, wideband amplifiers.

Text Books:

References:
II Year - II Semester

CONTROL SYSTEMS

Course objectives

1. To introduce the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, and concepts of feedback

2. To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis

3. To develop the acquaintance in analyzing the system response in time-domain and frequency domain in terms of various performance indices

4. To analyze the system in terms of absolute stability and relative stability by different approaches

5. To design different control systems for different applications as per given specifications

6. To introduce the concepts of state variable analysis, design and also the concepts of controllability and observability

UNIT-1
Introduction
System Control System, Open Loop Control System, Closed loop Control System, Different Examples

Mathematical models of Physical Systems
Differential equations of physical systems, Transfer functions, Block diagram Algebra, Signal flow graphs with illustrative examples

Effects of Feedback
Feedback Characteristics and its advantages, Linearizing effect of feedback

UNIT-2
Controller Components
DC Servomotor (Armature Controlled and Field Controlled) with necessary derivation for transfer function, AC Servomotor and its transfer function, AC Tachometer, Potentiometer, Synchros, AC Position Control Systems

Time Response Analysis
Standard test Signals, Time response of first and second order systems, steady state errors and error constants, Effect of adding a zero to a system, Design specifications of second order systems, Performance indices

UNIT-3
Concepts of Stability and Algebraic Criteria
The concept of Stability, Necessary Conditions for Stability, Routh-Hurwitz Srability Criterion, Relative stability analysis,

The Root Locus Technique
Introduction, The Root Locus concepts, Construction of Root Loci
UNIT-4
Frequency response analysis
Introduction, Correlation between time and frequency response, Polar Plots, Bode Plots, Nyquist Stability Criterion

UNIT-5
Introduction to Design
The design problem, Preliminary consideration of classical design, Realization of basic Compensators, Cascade compensation in time domain and frequency domain, Tuning of PID Controllers

UNIT-6
State Variable Analysis and Design

Text Book

Reference Books

Course Outcomes
1. This course introduces the concepts of feedback and its advantages to various control systems
2. The performance metrics to design the control system in time-domain and frequency domain are introduced.
3. Control systems for various applications can be designed using time-domain and frequency domain analysis.
4. In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.
OBJECTIVES:

The main objectives of this course are to understand:

1. Fundamentals of steady electric and magnetic fields using various laws
2. The concept of static and time varying Maxwell equations and power flow using pointing theorem
3. Wave characteristics in different media for normal and oblique incidence
4. Various concepts of transmission lines and impedance measurements

SYLLABUS:


UNIT III: EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types. Illustrative Problems. [1,2,3]


UNIT VI: Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. Low loss radio frequency lines and UHF Transmission lines, UHF Lines as Circuit Elements; Impedance Transformations λ/4, λ /2, λ/8 Lines –. Smith Chart – Construction and Applications, Quarter wave transformer, Stub Matching-single & double, Illustrative Problems. [1,7]
TEXT BOOKS:

REFERENCE BOOKS:
4. Electromagnetic Field Theory and Transmission Lines: G SasiBhushana Rao,Wiley India 2013

OUTCOMES:
At the end of this course the student can able to:
1. Determine E and H using various laws and applications of electric & magnetic fields
2. Apply the Maxwell equations to analyze the time varying behavior of EM waves
3. Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media
4. Calculate Brewster angle, critical angle and total internal reflection
5. Derive the expressions for input impedance of transmission lines
6. Calculate reflection coefficient, VSWR etc. using smith chart
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.

UNIT II

UNIT III

UNIT IV

UNIT V

UNIT VI
PULSE MODULATION : Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, TDM Vs FDM
TEXT BOOKS:

REFERENCES:

Course Objectives:
Students undergoing this course, are expected to

1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Distinguish the figure of merits of various analog modulation methods
4. Develop the ability to classify and understand various functional blocks of radio transmitters and receivers
5. Familiarize with basic techniques for generating and demodulating various pulse modulated signals

Course Outcomes:
After undergoing the course, students will be able to

1. Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
2. Analyze noise characteristics of various analog modulation methods
3. Analyze various functional blocks of radio transmitters and receivers
4. Design simple analog systems for various modulation techniques.
OBJECTIVES

The student will be made

- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
- To study the design and analysis of various Multivibrators.
- To understand the functioning of different types of time-base Generators.
- To learn the working of logic families & Sampling Gates.

UNIT I
LINEAR WAVESHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs. RC network as differentiator and integrator; Attenuators , its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II
NON-LINEAR WAVE SHAPING: Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper; Clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampsers.

UNIT III
SWITCHING CHARACTERISTICS OF DEVICES: Diode as a switch, piecewise linear diode characteristics, Design and analysis of Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times. Bistable Multivibrator: Analysis And Design of Fixed Bias, Self Bias Bistable Multi Vibrator, Collector Catching Diodes, Commutating Capacitors, Triggering of Binary Circuits, Emitter Coupled Bistable Multivibrator (Schmitt Trigger).

UNIT IV

UNIT V
VOLTAGE TIME BASE GENERATORS: General features of a time base signal, Methods of generating time base waveform Exponential Sweep Circuits, Negative Resistance Switches, basic principles in Miller and Bootstrap time base generators, Transistor Miller time base generator, Transistor Bootstrap time base generator.

UNIT VI
LOGIC FAMILIES & SAMPLING GATES:
TEXT BOOKS:
2. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005

REFERENCES:
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002

OUTCOMES
After going through this course the student will be able to
• Design linear and non-linear wave shaping circuits.
• Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
• Design different multivibrators and time base generators.
• Utilize the non sinusoidal signals in many experimental research areas.
II Year - II Semester

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MANAGEMENT SCIENCE

Course Objectives:
*To familiarize with the process of management and to provide basic insight into select contemporary management practices
*To provide conceptual knowledge on functional management and strategic management.

UNIT I

UNIT II
Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT III

UNIT IV
Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

UNIT V

UNIT VI
Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Benchmarking, Balanced Score Card.

Course Outcome:
*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
*Will familiarize with the concepts of functional management project management and strategic management.
Text Books
1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, ‘Management Science’ Cengage, Delhi, 2012.

References
2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
Note: The students are required to design the circuit and perform the simulation using Multisim/ Equivalent Industrial Standard Licensed simulation software tool. Further they are required to verify the result using necessary hardware equipment.

List of Experiments : (Minimum of Ten Experiments has to be performed)
1. Determination of $f_T$ of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt’s Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Bootstrapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

Equipment required:

Software:
1. Multisim/ Equivalent Industrial Standard Licensed simulation software tool.
2. Computer Systems with required specifications

Hardware:
10. Regulated Power supplies
11. Analog/Digital Storage Oscilloscopes
12. Analog/Digital Function Generators
13. Digital Multimeters
14. Decade Résistance Boxes/Rheostats
15. Decade Capacitance Boxes
16. Ammeters (Analog or Digital)
17. Voltmeters (Analog or Digital)
18. Active & Passive Electronic Components
List of Experiments (Twelve experiments to be done- The students have to calculate the relevant parameters ) - 
(a. Hardware, b. MATLAB Simulink, c. MATLAB Communication tool box) 
A. Amplitude Modulation - Mod. & Demod.  
B. AM - DSB SC - Mod. & Demod.  
C. Spectrum Analysis of Modulated signal using Spectrum Analyser  
D. Diode Detector  
E. Pre-emphasis & De-emphasis  
F. Frequency Modulation - Mod. & Demod.  
G. AGC Circuits  
H. Sampling Theorem  
I. Pulse Amplitude Modulation - Mod. & Demod.  
J. PWM , PPM - Mod. & Demod.  
K. PLL  
L. Radio receiver characteristics  

Equipments & Software required: 

Software :  
  i.) Computer Systems with latest specifications  
  ii) Connected in Lan (Optional)  
  iii) Operating system (Windows XP)  
  iv) Simulations software (Simulink & MATLAB)  

Equipment:  
  1. RPS - 0 – 30 V  
  2. CRO - 0 – 20 MHz.  
  3. Function Generators - 0 – 1 MHz  
  4. Components  
  5. Multimeters  
  6. Spectrum Analyser
OBJECTIVES:

- Understand the architecture of a modern computer with its various processing units. Also the performance measurement of the computer system.
- In addition to this the memory management system of computer.

UNIT -I:

UNIT -II:
Machine Instruction and Programs:
Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

UNIT -III:
Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

UNIT -IV:

UNIT -V:
The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING Secondary Storage: Magnetic Hard Disks, Optical Disks

UNIT -VI:
Processing Unit: Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control, Micro programed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field
OUTCOMES:

- Students can understand the architecture of modern computer.
- They can analyze the Performance of a computer using performance equation.
- Understanding of different instruction types.
- 4. Students can calculate the effective address of an operand by addressing modes.
- 5. They can understand how computer stores positive and negative numbers.
- 6. Understanding of how a computer performs arithmetic operation of positive and negative numbers.

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVES

- To understand the basic operation & performance parameters of differential amplifiers.
- To understand & learn the measuring techniques of performance parameters of OP-AMP
- To learn the linear and non-linear applications of operational amplifiers.
- To understand the analysis & design of different types of active filters using opamps
- To learn the internal structure, operation and applications of different analog ICs
- To Acquire skills required for designing and testing integrated circuits

UNIT I

UNIT II

UNIT III

UNIT IV
ACTIVE FILTERS, ANALOG MULTIPLIERS AND MODULATORS: Design & Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters. Four Quadrant Multiplier, IC 1496, Sample & Hold circuits.

UNIT V

UNIT VI
DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).
TEXT BOOKS:

REFERENCES:
3. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.
5. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition

OUTCOMES

- Design circuits using operational amplifiers for various applications.
- Analyze and design amplifiers and active filters using Op-amp.
- Diagnose and trouble-shoot linear electronic circuits.
- Understand the gain-bandwidth concept and frequency response of the amplifier configurations.
- Understand thoroughly the operational amplifiers with linear integrated circuits.
OBJECTIVES

The main objectives of this course are:

- Introduction of digital logic families and interfacing concepts for digital design is considered.
- VHDL fundamentals were discussed to modeling the digital system design blocks.
- VHDL compilers, simulators and synthesis tools are described, which are used to verify digital systems in a technology-independent fashion.
- Design and implementation of combinational and sequential digital logic circuits is explained.

Outcomes:

At the end of this course the student can able to:

- Understand the structure of commercially available digital integrated circuit families.
- Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
- Model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping.
- Analyze and design basic digital circuits with combinatorial and sequential logic circuits using VHDL.

Syllabus:

UNIT-I
Digital Logic Families and Interfacing: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families. Bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.

(Text book-1)

UNIT-II
Introduction to VHDL: Design flow, program structure, levels of abstraction, Elements of VHDL: Data types, data objects, operators and identifiers. Packages, Libraries and Bindings, Subprograms. VHDL Programming using structural and data flow modeling.

(Text book-2)

UNIT-III

(Text book-2)
UNIT-IV

**Combinational Logic Design:** Binary Adder-Subtractor, Ripple Adder, Look Ahead Carry Generator, ALU, Decoders, encoders, multiplexers and demultiplexers, parity circuits, comparators, Barrel Shifter, Simple Floating-Point Encoder, Dual Priority Encoder. Design considerations of the above combinational logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

*(Text book-1)*

UNIT-V

**Sequential Logic Design:** SSI Latches and flip flops, Ring Counter, Johnson Counter, Design of Modulus N Synchronous Counters, Shift Registers, Universal Shift Registers, Design considerations of the above sequential logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

*(Text book-1)*

UNIT-VI:

**Synchronous and Asynchronous Sequential Circuits:** Basic design steps: State diagram, state table, state assignment, choice of flip flops and derivation of next state and output expressions, timing diagram. State assignment problem: One hot encoding. Mealy and Moore type FSM for serial adder, VHDL code for the serial adder. Analysis of Asynchronous circuits, State Reduction, State Assignment. A complete design example: The vending machine controller.

*(Reference text book-1)*

Text Books:


References:

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). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT II
**DIGITAL MODULATION TECHNIQUES:** Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

UNIT III
**DATA TRANSMISSION:** Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK, QPSK.

UNIT IV
**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.

UNIT V
**SOURCE CODING:** Introductions, Advantages, Shannon’s theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

UNIT VI
**LINEAR BLOCK CODES:** Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.
**CONVOLUTION CODES:** Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

**TEXT BOOKS:**
1. Digital communications - Simon Haykin, John Wiley, 2005

**REFERENCES:**
Students undergoing this course are expected to:

**Course Objectives:**

1. Understand different pulse digital modulation techniques and their comparison
2. Familiarize various digital modulation techniques and calculation of their error probabilities
3. Understand the concept of entropy and different source coding techniques
4. Familiarize with block codes, cyclic codes and convolutional codes

**Course Outcomes:**
After undergoing the course students will be able to:
1. Determine the performance of different waveform coding techniques for the generation and digital representation of the signals.
2. Determine the probability of error for various digital modulation schemes
3. Analyze different source coding techniques
4. Compute and analyze different error control coding schemes for the reliable transmission of digital information over the channel.
OBJECTIVES
The student will be able to

• understand the applications of the electromagnetic waves in free space.
• introduce the working principles of various types of antennas
• discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic system requirements.
• understand the concepts of radio wave propagation in the atmosphere.

UNIT I
ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, illustrated Problems.

UNIT II
THIN LINEAR WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beamwidths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum. Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, Concept of short magnetic dipole, D and R relations for small loops.

UNIT III

UNIT IV
UNIT V

UNIT VI

TEXT BOOKS

REFERENCES

OUTCOMES
After going through this course the student will be able to
- Identify basic antenna parameters.
- Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas
- Quantify the fields radiated by various types of antennas
- Design and analyze antenna arrays
- Analyze antenna measurements to assess antenna’s performance
- Identify the characteristics of radio wave propagation
1. Linear wave shaping.

2. Non Linear wave shaping – Clippers.

3. Non Linear wave shaping – Clampers.

4. Transistor as a switch.

5. Study of Logic Gates & Some applications.

6. Study of Flip-Flops & some applications.

7. Sampling Gates.

8. Astable Multivibrator.


12. UJT Relaxation Oscillator.


Equipment required for Laboratory:

1. RPS - 0 – 30 V

2. CRO - 0 – 20 M Hz.

3. Function Generators - 0 – 1 M Hz

4. Components

5. Multi Meters
Minimum Twelve Experiments to be conducted:

2. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
3. Integrator and Differentiator Circuits using IC 741.
4. Active Filter Applications – LPF, HPF (first order)
5. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
6. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
7. Function Generator using OP AMPS.
8. IC 555 Timer – Monostable Operation Circuit.
9. IC 555 Timer – Astable Operation Circuit.
11. IC 565 – PLL Applications.
12. IC 566 – VCO Applications.
13. Voltage Regulator using IC 723.

Equipment required for Laboratories:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components:- IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester
Note: The students are required to design and draw the internal logical structure of the following Digital Integrated Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

All the experiments are required to verify and implement the logical operations on the latest FPGA Hardware in the Laboratory.

List of Experiments :( Minimum of Ten Experiments has to be performed)

1. Realization of Logic Gates
2. Design of Full Adder using 3 modeling systems
3. 3 to 8 Decoder -74138
4. 8 to 3 Encoder (with and without parity)
5. 8 x 1 Multiplexer-74151 and 2x 4 De-multiplexer-74155
6. 4- Bit comparator-7485
7. D Flip-Flop-7474
8. Decade counter -7490
9. Shift registers-7495
10. 8-bit serial in-parallel out and parallel in-serial out
11. Fast In & Fast Out (FIFO)
12. MAC ( Multiplier & Accumulator)
13. ALU Design.

Equipment/Software required:

1. Xilinx Vivado software / Equivalent Industry Standard Software
2. Xilinx Hardware / Equivalent hardware
3. Personal computer system with necessary software to run the programs and Implement.
Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human being with proper personality.
*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

UNIT I: Human Values:

UNIT: II: Principles for Harmony:

UNIT III: Engineering Ethics and Social Experimentation:

UNIT IV: Engineers’ Responsibilities towards Safety and Risk:

UNIT V: Engineers’ Duties and Rights:

UNIT VI: Global Issues:

- Related Cases Shall be dealt where ever necessary.
Outcome:
*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

References:

4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications
UNIT-I:
8086 ARCHITECTURE: Main features, pin diagram/description, 8086 microprocessor family, 8086 internal architecture, bus interfacing unit, execution unit, interrupts and interrupt responses, 8086 system timing, minimum mode and maximum mode configuration.

UNIT-II:
8086 PROGRAMMING: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT-III:
8086 INTERFACING: Semiconductor memories interfacing (RAM,ROM), 8254 software programmable timer/counter, Intel 8259 programmable interrupt controller, software and hardware interrupt applications, Intel 8237a DMA controller, Intel 8255 programmable peripheral interface, keyboard interfacing, alphanumeric displays (LED,7-segment display, multiplexed 7-segment display, LCD), Intel 8279 programmable keyboard/display controller, stepper motor, A/D and D/A converters.

UNIT-IV:
80386 AND 80486 MICROPROCESSORS: Introduction, programming concepts, special purpose registers, memory organization, moving to protected mode, virtual mode, memory paging mechanism, architectural differences between 80386 and 80486 microprocessors.

UNIT-V:
Intel 8051 MICROCONTROLLER: Architecture, hardware concepts, input/output ports and circuits, external memory, counters/timers, serial data input/output, interrupts.
Assembly language programming: Instructions, addressing modes, simple programs.
Interfacing: keyboard, displays (LED, 7-segment display unit), A/D and D/A converters.

UNIT-VI:

Text Books:

References:
OBJECTIVES
The student will

- Understand fundamental characteristics of waveguides and Microstrip lines through electromagnetic field analysis.
- Understand the basic properties of waveguide components and Ferrite materials composition.
- Understand the function, design, and integration of the major microwave components oscillators, power amplifier.
- Understand a Microwave test bench setup for measurements.

UNIT I

UNIT II
MICROSTRIP LINES– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor.

UNIT III

UNIT - IV
HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants(Qualitative treatment).
M-type Tubes
Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron – Hull Cut-off Condition, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.
UNIT V

UNIT VI


TEXT BOOKS:

REFERENCES:
4. Microwave Engineering – G S N Raju , I K International
5. Microwave and Radar Engineering – G Sasibhushana Rao Pearson

OUTCOMES: After going through this course the student will be able to
- Design different modes in waveguide structures
- Calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction
- Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency of devices.
- Measure various microwave parameters using a Microwave test bench
Objectives:

The main objectives of this course are:

- Basic characteristics of MOS transistor and examines various possibilities for configuring inverter circuits and aspects of latch-up are considered.
- Design processes are aided by simple concepts such as stick and symbolic diagrams but the key element is a set of design rules, which are explained clearly.
- Basic circuit concepts are introduced for MOS processes we can set out approximate circuit parameters which greatly ease the design process.

Outcomes:

At the end of this course the student can able to:

- Understand the properties of MOS active devices and simple circuits configured when using them and the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon.
- Know three sets of design rules with which nMOS and CMOS designs may be fabricated.
- Understand the scaling factors determining the characteristics and performance of MOS circuits in silicon.

Syllabus:

UNIT-I:
Introduction and Basic Electrical Properties of MOS Circuits: Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS. \( I_{ds} \) versus \( V_{ds} \) Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology.

(Text Book-1)

UNIT-II:

(Text Book-1)

UNIT-III:

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic.

(Text Book-1)
UNIT-IV:

**Design for Testability:** Fault types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based Techniques and Built-In Self Test techniques.

*(Text Book-2)*

UNIT-V:
**FPGA Design:** FPGA design flow, Basic FPGA architecture, FPGA Technologies, FPGA families- Altera Flex 8000FPGA, Altera Flex 10FPGA, Xilinx XC4000 series FPGA, Xilinx Spartan XL FPGA, Xilinx Spartan II FPGAs, Xilinx Vertex FPGA. Case studies: FPGA Implementation of Half adder and full adder.

**Introduction to synthesis:** Logic synthesis, RTL synthesis, High level Synthesis.

*(Reference Text Book-1)*

UNIT-VI:
**Introduction to Low Power VLSI Design:** Introduction to Deep submicron digital IC design, Low Power CMOS Logic Circuits: Over view of power consumption, Low –power design through voltage scaling, Estimation and optimisation of switching activity, Reduction of switching capacitance. Interconnect Design, Power Grid and Clock Design.

*(Text Book-2)*

Text Books:


References:

1. Advanced Digital Design with the Verilog HDL, Michael D.Ciletti, Xilinx Design Series, Pearson Education
OBJECTIVES

The student will be able to

• Analyze the Discrete Time Signals and Systems
• Know the importance of FFT algorithm for computation of Discrete Fourier Transform
• Understand the various implementations of digital filter structures
• Learn the FIR and IIR Filter design procedures
• Know the need of Multirate Processing
• Learn the concepts of DSP Processors


UNIT IV    DESIGN OF FIR DIGITAL FILTERS & REALIZATIONS: Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters.

Basic structures of FIR systems, Lattice structures, Lattice-ladder structures


UNIT VI    INTRODUCTION TO DSP Processors: Introduction to programmable DSPs: Multiplier and Multiplier Accumulator, Modified bus structures and memory access schemes in P-DSPs ,Multiple Access Memory, Multiported memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Architecture of TMS320C5X: Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register ALU, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, some flags in the status registers, On- chip memory, On-chip peripherals.
TEXT BOOKS:

Reference Books:

OUTCOMES
After going through this course the student will be able to

- Apply the difference equations concept in the analysis of Discrete time systems
- Use the FFT algorithm for solving the DFT of a given signal
- Design a Digital filter (FIR&IIR) from the given specifications
- Realize the FIR and IIR structures from the designed digital filter.
- Use the Multirate Processing concepts in various applications(eg: Design of phase shifters, Interfacing of digital systems…)
- Apply the signal processing concepts on DSP Processor.
OBJECTIVES:
- Understanding the OOP’s concepts, classes and objects, threads, files, applets, swings and act.
- This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
- Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development.

UNIT-I:
Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

UNIT-II:
Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

UNIT-III:
Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw, throws and finally block, user-defined exceptions, Assertions.

UNIT-IV:
Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-V:
Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

UNIT-VI:

OUTCOMES:
- Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.
• Identify and Analyze Enterprise applications.

TEXT BOOKS:
1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.

REFERENCE BOOKS:
2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.
DATA MINING
OPEN ELECTIVE

OBJECTIVES:

- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

UNIT –I

UNIT –II
Data Pre-processing: Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT –III
Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

UNIT –IV
Classification: Alternative Techniques, Bayes’ Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

UNIT –V
Association Analysis: Basic Concepts and Algorithms: Problem Definition, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. (Tan & Vipin)

UNIT –VI

OUTCOMES:

- Understand stages in building a Data Warehouse
- Understand the need and importance of preprocessing techniques
- Understand the need and importance of similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules.
- Analyze Classification and Clustering algorithms
TEXT BOOKS:
1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

REFERENCE BOOKS:
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
INDUSTRIAL ROBOTICS
OPEN ELECTIVE

Course Objectives:

1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.
3. Mathematical approach to explain how the robotic arm motion can be described.
4. The students will understand the functioning of sensors and actuators.

UNIT-I

UNIT – II

UNIT – III
MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems.

UNIT – IV
Differential transformation and manipulators, Jacobians – problems

UNIT V
General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language..

UNIT VI
ROBOT ACTUATORS AND FEED BACK COMPONENTS:
Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.
ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.
TEXT BOOKS:
1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

REFERENCES:

Course outcomes:
Upon successful completion of this course you should be able to:

1. Identify various robot configuration and components,
2. Select appropriate actuators and sensors for a robot based on specific application
3. Carry out kinematic and dynamic analysis for simple serial kinematic chains
4. Perform trajectory planning for a manipulator by avoiding obstacles.
Preamble:

The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semiconductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

Learning Objectives:

- To study the characteristics of various power semiconductor devices and to design firing circuits for SCR.
- To understand the operation of single phase half wave and full-wave converters.
- To understand the operation of different types of DC-DC converters.
- To understand the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- To understand the operation of AC-AC converters and switch mode power supplies operation.

UNIT-I
Power Semi-Conductor Devices
Thyristors–Silicon controlled rectifiers (SCR’s) – Characteristics of power MOSFET and power IGBT – Basic theory of operation of SCR–Static characteristics – Turn on and turn off methods–Dynamic characteristics of SCR – Snubber circuit design – Firing circuits for SCR

UNIT–II
AC-DC Single-Phase Converters

UNIT–III
DC–DC Converters

UNIT – IV
DC–AC Converters

UNIT – V
AC – AC Single-Phase Converters
Static V-I characteristics of TRIAC and modes of operation – Single phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction – Principle of operation of Cyclo-Converters

UNIT – VI
Switch Mode Power Supplies
Overview of Switching Power Supplies – Linear Power Supplies – DC to DC converters with electrical isolation – Control of Switch Mode DC Supplies – PWM duty ratio control – Current mode control – Power Supply Protection
**Learning Outcomes:**
Student should be able to

- Explain the characteristics of various power semiconductor devices and analyse the static and dynamic characteristics of SCR’s.
- Design firing circuits for SCR.
- Able to explain the operation of single phase half wave and full–wave converters
- Analyse the operation of different types of DC-DC converters.
- Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- Analyse the operation of AC-AC converters.
- Able to explain switch mode power supplies operation and control

**Text Books:**

**Reference Books:**
1. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
2. Elements of Power Electronics–Philip T.Krein.oxford.
UNIT-I:

UNIT-II:

UNIT-III:

UNIT-IV:
PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

UNIT-V:
UNIT-VI:
MONITORS, RECORDERS AND SHOCK HAZARDS: Biopotential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

Text Books:


References:

ARTIFICIAL NEURAL NETWORKS
OPEN ELECTIVE

Course Objectives:

1. To Introduce the concept of Artificial Neural Networks, Characteristics, Models of Neuron, Learning Rules, Learning Methods, Stability and Convergence
2. To study the basics of Pattern Recognition and Feed forward Neural Networks
3. To study the basics of Feedback neural networks and Boltzmann machine
4. To introduce the Analysis of Feedback layer for different output functions, Pattern Clustering and Mapping networks
5. To study the Stability, Plasticity, Neocognitron and Different applications of Neural Networks

UNIT-I: Basics of Artificial Neural Networks
Introduction: Biological Neural Networks, Characteristics of Neural Networks, Models of Neuron, Topology, Basic Learning Rules
Activation and Synaptic Dynamics: Activation Dynamic Models, Synaptic Dynamic Models, Learning Methods, Stability & Convergence, Recall in Neural Networks

UNIT-II: Functional Units of ANN for Pattern Recognition Tasks: Pattern Recognition problem Basic Fundamental Units, Pattern Recognition Tasks by the Functional Units
Feed forward Neural Networks: Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks

UNIT-III:
Feedback Neural Networks: Analysis of linear auto adaptive feed forward networks, Analysis of pattern storage Networks, Stochastic Networks & Stimulated Annealing, Boltzmann machine

UNIT-IV:
Competitive Learning Neural Networks: Components of a Competitive Learning Network, Analysis of Feedback layer for Different Output Functions, Analysis of Pattern Clustering Networks and Analysis of Feature Mapping Network

UNIT-V:
Architectures for Complex Pattern Recognition Tasks: Associative memory, Pattern mapping Stability – Plasticity dilemma: ART, temporal patterns, Pattern visibility: Neocognitron

UNIT-VI:
Applications of Neural Networks: Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decision making
Text Book
1. B.Yagnanarayana“Artificial Neural Networks”, PHI

Reference Book
1. Laurene Fausett ,“Fundamentals of Neural Networks”, Pearson Education

Course Outcomes
1. This Course introduces Artificial Neural Networks and Learning Rules and Learning methods
2. Feed forward and Feedback Neural Networks are introduced
3. Applications of Neural Networks in different areas are introduced
LIST OF EXPERIMENTS

PART- A: (Minimum of 5 Experiments has to be performed)
8086 Assembly Language Programming using Assembler Directives
   15. Sorting.
   16. Multibyte addition/subtraction
   17. Sum of squares/cubes of a given n-numbers
   18. Addition of n-BCD numbers
   19. Factorial of given n-numbers
   20. Multiplication and Division operations
   21. Stack operations
   22. BCD to Seven segment display codes

PART- B: (Minimum of 3 Experiments has to be performed)
8086 Interfacing
   1. Hardware/Software Interrupt Application
   2. A/D Interface through Intel 8255
   3. D/A Interface through Intel 8255
   4. Keyboard and Display Interface through Intel 8279
   5. Generation of waveforms using Intel 8253/8254

PART- C: (Minimum of 3 Experiments has to be performed)
8051 Assembly Language Programs
   1. Finding number of 1’s and number of 0’s in a given 8-bit number
   2. Addition of even numbers from a given array
   3. Ascending / Descending order
   4. Average of n-numbers

PART- D: (Minimum of 3 Experiments has to be performed)
8051 Interfacing
   1. Switches and LEDs
   2. 7-Segment display (multiplexed)
   3. Stepper Motor Interface
   4. Traffic Light Controller
**Equipment Required:**

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. 8086 Microprocessor kits
4. 8051 microcontroller kits
5. ADC module
6. DAC module
7. Stepper motor module
8. Keyboard module
9. LED, 7-Segment Units
10. Digital Multimeters
11. ROM/RAM Interface module
12. Bread Board etc.
III Year - II Semester

P C
0 3 2

VLSI LABORATORY

**Note:** The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using 130nm technology with the Industry standard EDA Tools.

**List of Experiments:**

1. Design and Implementation of an Universal Gates
2. Design and Implementation of an Inverter
3. Design and Implementation of Full Adder
4. Design and Implementation of Full Subtractor
5. Design and Implementation of Decoder
6. Design and Implementation of RS-Latch
7. Design and Implementation of D-Latch
8. Design and Implementation asynchronous counter
9. Design and Implementation of static RAM cell
10. Design and Implementation of 8 bit DAC using R-2R latter network

**Software Required:**

2. Personal computer system with necessary software to run the programs and to implement.
1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
8. Companding
9. Source Encoder and Decoder
10. Linear Block Code-Encoder and Decoder
11. Binary Cyclic Code – Encoder and Decoder
12. Convolution Code – Encoder and Decoder

Equipment required for Laboratories:
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 M Hz.
5. Multimeters
6. Lab Experimental kits for Digital Communication
7. Components
UNIT I: Introduction to Intellectual Property Rights (IPR)

UNIT II: Copyrights and Neighboring Rights

UNIT III: Patents

UNIT IV: Trademarks

UNIT V: Trade Secrets

UNIT VI: Cyber Law and Cyber Crime

- Relevant Cases Shall be dealt where ever necessary.
References:
6. Cyber Law - Texts & Cases, South-Western’s Special Topics Collections.
OBJECTIVES
The student will be introduced to:
1. The Basic Principle of radar and radar range equation.
2. Different types of radars; CW, FM-CW, MTI and pulse Doppler radars.
3. Understand the different tracking techniques for radar.
4. Understand the characteristics of a matched filter receiver and its performance.
5. Understand the different types of displays, duplexers and antennas used in radar systems.

UNIT–I:
Radar Equation : Modified Radar Range Equation, SNR, probability of detection, probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Creeping Wave, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative 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. Illustrative Problems

UNIT–III:

UNIT –IV:
Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT –V:

UNIT –VI:
TEXT BOOKS:

REFERENCE BOOKS:
1. Introduction to Radar Systems, 3\textsuperscript{rd} edition – M.I. Skolnik, TMH Ed., 2005

OUTCOMES
After going through this course the student will be able to:
1. Derive the radar range equation and to solve some analytical problems.
2. Understand the different types of radars and its applications.
3. Understand the concept of tracking and different tracking techniques.
4. Understand the various components of radar receiver and its performance.
UNIT-1
**Introduction:** Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

**Image Transforms:** Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform, Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, KL Transform, SVD and Radon Transform, Comparison of different image transforms.

UNIT-2
**Intensity Transformations and Spatial Filtering:** Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, Combining spatial enhancement methods.

**Filtering in the Frequency Domain:** Preliminary concepts, The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

UNIT-3
**Image Restoration and Reconstruction:** A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, constrained least squares filtering ,geometric mean filter ,image reconstruction from projections.

UNIT-4
**Image compression:** Fundamentals, Basic compression methods: Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-Based coding, Bit-Plane coding, Block Transform coding, Predictive coding.

**Wavelets and Multiresolution Processing:** Image pyramids, subband coding, Multiresolution expansions, wavelet transforms in one dimensions & two dimensions, Wavelet coding.

UNIT-5
**Image segmentation:** Fundamentals, point, line, edge detection, thresholding, region –based segmentation.

**Morphological Image Processing:** Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology, Segmentation using morphological watersheds.

UNIT-6
**Color image processing:** color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.
Text Books

Reference Books

Course Objectives:

Students undergoing this course are expected to:

1. Familiarize with basic concepts of digital image processing and different image transforms
2. Learn various image processing techniques like image enhancement, restoration, segmentation and compression
3. Understand color fundamentals and different color models
4. Understand wavelets and morphological image processing

Course Outcomes:

After undergoing the course students will be able to

1. Perform image manipulations and different digital image processing techniques
2. Perform basic operations like – Enhancement, segmentation, compression, Image transforms and restoration techniques on image.
3. Analyze pseudo and fullcolor image processing techniques.
4. Apply various morphological operators on images
OBJECTIVES:

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research
- Problem Formulation—Approach—Analysis—

UNIT – I

UNIT – II
Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

UNIT – III

UNIT – IV

UNIT – V

UNIT – VI
Transport Layer – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp
Application Layer –The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery
OUTCOMES:

- Understand OSI and TCP/IP models
- Analyze MAC layer protocols and LAN technologies
- Design applications using internet protocols
- Understand routing and congestion control algorithms
- Understand how internet works

TEXT BOOKS:


REFERENCE BOOKS:

OBJECTIVES
The student will be introduced to the functionality of each of the components that comprise a fiber-optic communication system

- the properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.
- the principles of single and multi-mode optical fibers and their characteristics
- working of semiconductor lasers, and differentiate between direct modulation and external electro-optic modulation.
- Analyze the operation of LEDs, laser diodes, and PIN photo detectors (spectral properties, bandwidth, and circuits) and apply in optical systems.
- Analyze and design optical communication and fiber optic sensor systems.
- the models of analog and digital receivers.

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, Related problems.

UNIT II

UNIT III
- Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing-Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT IV
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, Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Related problems.

UNIT V
Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers.
UNIT VI
Optical system design - Point-to-point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS:

REFERENCES:

OUTCOMES
After going through this course the student will be able to

- Choose necessary components required in modern optical communications systems.
- Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
- Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.
- Choose the optical cables for better communication with minimum losses
  Design, build, and demonstrate optical fiber experiments in the laboratory.
UNIT I

INTRODUCTION: TV transmitter and receivers, synchronization. Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution, Composite video signal: Horizontal and vertical sync, scanning sequence, Colour signal generation and Encoding: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder.

UNIT II

TV SIGNAL TRANSMISSION AND PROPAGATION: Picture signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW, TV transmitter, TV signal propagation, interference, TV broadcast channels.
MONOCROME TV RECEIVER: RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits.
PAL–D colour receiver: Electron tuners, IF subsystem, Y-signal channel, chroma decoder, separation of U & V Colour phasors, synchronous demodulators, subcarrier generation, raster circuits.

UNIT III

VISION IF SUBSYSTEM: AGC, noise cancellation, video and intercarrier sound signal detection, Colour receiver IF subsystem, Receiver sound system: FM detection, FM Sound detectors, typical applications.TV Receiver Tuners: Tuner operation, VHF and UHF tuners.

COLOUR SIGNAL DECODING: PAL-D decoder, chroma signal amplifiers, separation of U and V signals, Color burst separation, Burst phase discriminator, Reference oscillator, Indent and color killer circuits, RO phase shift and 180 degrees PAL-SWITCH circuitry, U & V demodulators, Colour signal mixing.

UNIT-IV

HISTORY OF HDTV: Analog and Digital TV Compared, Going HD, Broadcast Engineering and Information Technology, The Road to HDTV, The Grand Alliance, A DTV Standard at Last, Producing HDTV, HD Goes Coast-to-Coast, DTV Conversion.

COMPRESSION TECHNIQUES: Compression, MPEG-2 Video Compression, MPEG-4, H.264, Motion – JPEG (M-JPEG) compression, Audio Compression, Compressed Data Streams, Packetized Transport.

UNIT V

DTV TRANSMITTER AND RECIEVER: Engineering Basics, Presentation, Transmission, Reception and Demodulation, Transport Stream Demultiplexing, Decoding and Decompression, Program Assembly and Presentation, Receiver Issues, Presentation Concerns.


UNIT VI

TEXT BOOKS


2. Television and Video Engineering – A.M.Dhake, 2nd Edition,


REFERENCES


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OBJECTIVES:
The student will

• Understand the means of measuring traffic.
• Understand the implication of the traffic level on system design.

UNIT -I:

UNIT -II:
Electronic Space Division Switching: Stored Program Control, Centralized SPC: Stand by mode, Synchronous duplex mode, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n-Stage Networks.

UNIT -III
Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching, Generalised time division Space switch, Basic Time division time switching: modes of operation, simple problems, Time Multiplexed Space Switching, Time Multiplexed Time division space Switch, Time Multiplexed Time Switching, Combination Switching: Time Space (TS) Switching, Space-time (ST) Switching, Three-Stage Combination Switching, n-Stage Combination Switching.

UNIT IV
Telephone Networks: Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, CCITT Signaling System no.6, CCITT Signaling System no.7, Packet Switching: Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks.

UNIT -V:
Switching Networks: Single- Stage Networks, Grading, Link Systems, Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, Call Packing, Rearrange-able Networks, Strict- Sense non-blocking Networks, Sectionalized Switching Networks

UNIT -VI:

TEXT BOOKS:
1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, 2000, PHI.
REFERENCES:
2. Data Communications and Networks- Achyut S. Godbole, 2004, TMH.

Outcomes

The student will be able to

• Evaluate the time and space parameters of a switched signal
• Establish the digital signal path in time and space, between two terminals
• Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions.
• Investigate the traffic capacity of the system.
• Evaluate methods of collecting traffic data.
• Evaluate the method of interconnecting two separate digital switches.
SYSTEM DESIGN THROUGH VERILOG
(Elective- I)

UNIT-I
INTRODUCTION TO VERILOG:
Verilog as HDL, Levels of design description, concurrency, simulation and synthesis, functional verification, system tasks, programming language interface(PLI), module, simulation and synthesis tools, test benches.

LANGUAGE CONSTRUCTS AND CONVENTIONS:
Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types, scalars and vectors, parameters, memory, operators, system tasks.

UNIT-II
GATE LEVEL MODELLING:
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, delays, strengths and contention resolution, net types, design of basic circuits.

UNIT-III
BEHAVIORAL MODELLING:
Introduction, operations and assignments, functional Bifurcation, initial construct, always construct, examples, assignments with delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non-blocking assignments, the case statement, simulation flow, if and if else constructs, assign-De assign construct, repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct, event.

UNIT-IV
DATAFLOW LEVEL AND SWITCH LEVEL MODELLING:
Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors, basic transistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations with strengths and delays, strength contention with trireg nets.

UNIT-V
SYNTHESIS OF COMBINATIONAL AND SEQUENTIAL LOGIC USING VERILOG:
Synthesis of combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitive cyclic behavior with examples, Synthesis of priority structures, Exploiting logic don’t care conditions. Synthesis of sequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis of sequential logic with flip-flops, Synthesis of explicit state machines.

UNIT-VI
VERILOG MODELS:
Static RAM Memory, A simplified 486 Bus Model, Interfacing Memory to a Microprocessor Bus, UART Design and Design of Microcontroller CPU.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

The main objectives of this course are given below:

• The basic concepts of an embedded system are introduced.
• The various elements of embedded hardware and their design principles are explained.
• Different steps involved in the design and development of firmware for embedded systems is elaborated.
• Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design is discussed.
• Fundamental issues in hardware software co-design were presented and explained.
• Familiarise with the different IDEs for firmware development for different family of processors/controllers and embedded operating systems.
• Embedded system implementation and testing tools are introduced and discussed.

Outcomes:

At the end of this course the student can able to:

• Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function.
• The hardware components required for an embedded system and the design approach of an embedded hardware.
• The various embedded firmware design approaches on embedded environment.
• Understand how to integrate hardware and firmware of an embedded system using real time operating system.

Syllabus

UNIT-I
INTRODUCTION: Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-II
EMBEDDED HARDWARE DESIGN: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.
UNIT-III
EMBEDDED Firmware Design: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV
REAL TIME OPERATING SYSTEM: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronisation, Device Drivers.
HARDWARE SOFTWARE CO-DESIGN: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

UNIT-V
EMBEDDED SYSTEM DEVELOPMENT: The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

UNIT-VI
EMBEDDED SYSTEM IMPLEMENTATION AND TESTING: The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

Text Books:

References:

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ANALOG IC DESIGN
ELECTIVE - II

OBJECTIVES
The student will be introduced to

- The student will be able to understand the behavior of MOS Devices and Small-Signal & Large-Signal Modeling of MOS Transistor and Analog Sub-Circuits.
- In this course, students can study CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.
- Another main object of this course is to motivate the graduate students to design and to develop the Analog CMOS Circuits for different Analog operations.
- The concepts of Open-Loop Comparators and Different Types of Oscillators like Ring Oscillator, LC Oscillator etc.

UNIT -I:

UNIT -II:
Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III:

UNIT -IV:

UNIT -V:
Comparators: Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.
UNIT VI:
Oscillators & Phase-Locked Loops: General Considerations, Ring Oscillators, LC Oscillators, Voltage Controlled Oscillators.
Simple PLL, Charge Pump PLLs, Non-Ideal Effects in PLLs, Delay Locked Loops, Applications.

Text Books:

References:

OUTCOMES
After going through this course the student will be able to

- Understand the concepts of MOS Devices and Modeling.
- Design and analyze any Analog Circuits in real time applications.
- Extend the Analog Circuit Design to Different Applications in Real Time.
- Understand of Open-Loop Comparators and Different Types of Oscillators.
OBJECTIVES:
- In this course the following principles and practice of cryptography and network security are covered:
- Classical systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers)
- Public-key cryptography (RSA, discrete logarithms),
- Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes,
- Email and web security, viruses, firewalls, digital right management, and other topics.

UNIT- I:
Basic Principles

UNIT- II:
Symmetric Encryption

UNIT- III:
Asymmetric Encryption
Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography

UNIT- IV:
Data Integrity, Digital Signature Schemes & Key Management
Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

UNIT -V:
Network Security-I
Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS

UNIT -VI:
Network Security-II
Security at the Network Layer: IPSec, System Security

OUTCOMES:
- To be familiarity with information security awareness and a clear understanding of its importance.
- To master fundamentals of secret and public cryptography
- To master protocols for security services
- To be familiar with network security threats and countermeasures
- To be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)

TEXT BOOKS:

REFERENCE BOOKS:
Minimum Twelve Experiments to be conducted:

Part – A (Any 7 Experiments (8 & 9 compulsory)):
1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. Impedance and Frequency Measurement.
7. Scattering parameters of Magic Tee.
9. Synthesis of Microstrip antennas (Rectangular Structure) Using HFSS.

Part – B (Any 5 Experiments):
10. Characterization of LED.
12. Intensity modulation of Laser output through an optical fiber.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:
1. Regulated Klystron Power Supply, Klystron mount
2. VSWR Meter
3. Micro Ammeter
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Crystal Diode detector
8. Micro wave components (Attenuation)
9. Frequency Meter
10. Slotted line carriage
11. Probe detector
12. Wave guide shorts
13. SS Tuner
14. Directional Coupler
15. E, H, Magic Tees
16. Circulators, Isolator
17. Matched Loads
18. Pyramidal Horn and Parabolic Antennas
19. Turntable for Antenna Measurements
20. HFSS Software
21. Fiber Optic Analog Trainer based LED
22. Fiber Optic Analog Trainer based laser
23. Fiber Optic Digital Trainer
24. Fiber cables - (Plastic, Glass)
List of the Experiments / programs

To Student has to perform at least FOUR Experiments in each part

PART-1( SIGNALS )

1) Generation of discrete time signals for discrete signals
2) To verify the Linear Convolution
   a) Using MATLAB
   b) Using Code Composer Studio (CCS)
3) To verify the Circular Convolution for discrete signals
   a) Using MATLAB
   b) Using Code Composer Studio (CCS)
4) To Find the addition of Sinusoidal Signals
5) To verify Discrete Fourier Transform (DFT) and Inverse Discrete Fourier Transform (IDFT)
   a) Using MATLAB
   b) Using Code Composer Studio (CCS)
6) Transfer Function Stability Analysis: using pole-zero plot, bode plot, Nyquist plot, z-plane plot.

PART-2 ( FILTERS )

7) Frequency Response of IIR low pass Butterworth Filter
8) Frequency Response of IIR high pass Butterworth Filter
9) Frequency Response of IIR low pass Chebyshev Filter
10) Frequency Response of IIR high pass Chebyshev Filter
11) Frequency Response of FIR low pass Filter using Rectangle Window
12) Frequency Response of FIR low pass Filter using Triangle Window

PART – 3( IMAGE PROCESSING )

13) An image processing in a false contouring system
14) To generate the histogram equalization to the image
15) To verify the Normalized Cross Correlation to the addition of noise and removal of noise using filters to an image.
16) Compute the edge of an image using spatial filters.
17) Perform the image motion blur and calculate PSNR to the noise image and also noise free image.
18) To verify the PSNR to the Second order Decomposition of Discrete Wavelet transforms and to the reconstructed image using inverse Discrete Wavelet transform
OBJECTIVES

The student will be introduced to:

1. Understand the basic cellular concepts like frequency reuse, cell splitting, cell sectoring etc., and various cellular systems.
2. Understand the different types of interference s influencing cellular and mobile communications.
3. Understand the frequency management, channel assignment and various propagation effects in cellular environment.
4. Understand the different types antennas used at cell site and mobile.
5. Understand the concepts of handoff and types of handoffs.
6. Understand the architectures of GSM and 3G cellular systems.

UNIT I

CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

CELLULAR CONCEPTS: Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

UNIT II

INTERFERENCE: Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-cochannel interference-different types.

UNIT III

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells.

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, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, antenna height gain, form of a point to point model.

UNIT IV

CELL SITE AND MOBILE ANTENNAS : Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.
UNIT V
HANDOFF STRATEGIES
Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, vehicle locating methods, dropped call rates and their evaluation.

UNIT VI
DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiple access schemes; TDMA, CDMA, OFDMA; architecture of 3G cellular systems.

TEXTBOOKS :

REFERENCES :

Outcomes:
At the end of this course the student can able to:
1. Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems.
2. Understand the frequency management, channel assignment strategies and antennas in cellular systems.
3. Understand the concepts of handoff and architectures of various cellular systems.
UNIT I

UNIT II

UNIT III
Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

UNIT IV

UNIT V
Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

UNIT VI
Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

TEXTBOOKS :

REFERENCES :
OUTCOMES

The student will be able to

• Select the instrument to be used based on the requirements.
• Understand and analyze different signal generators and analyzers.
• Understand the design of oscilloscopes for different applications.
• Design different transducers for measurement of different parameters.
OBJECTIVES

The student will be introduced to:

1. Understand the basic concepts, applications, frequencies used and types of satellite communications.
2. Understand the concept of look angles, launches and launch vehicles and orbital effects in satellite communications.
3. Understand the various satellite subsystems and its functionality.
4. Understand the concepts of satellite link design and calculation of C/N ratio.
5. Understand the concepts of multiple access and various types of multiple access techniques in satellite systems.
6. Understand the concepts of satellite navigation, architecture and applications of GPS.

UNIT I


UNIT II


UNIT III

SATELLITE LINK DESIGN[1] : Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT IV


UNIT V


LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS[1] : Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs.
UNIT VI

TEXT BOOKS:

REFERENCES :

Outcomes:
At the end of this course the student can able to:

1. Understand the concepts, applications and subsystems of Satellite communications.
2. Derive the expression for G/T ratio and to solve some analytical problems on satellite link design.
3. Understand the various types of multiple access techniques and architecture of earth station design.
4. Understand the concepts of GPS and its architecture.
UNIT I
OVERVIEW OF WIRELESS SENSOR NETWORKS:

ARCHITECTURES:

UNIT II
NETWORKING Technologies:
Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

UNIT-III
MAC Protocols for Wireless Sensor Networks:

UNIT-IV
ROUTING PROTOCOLS:

UNIT-V
TRANSPORT LAYER AND SECURITY PROTOCOLS:

UNIT- VI
SECURITY IN WSNs:

SENSOR NETWORK PLATFORMS AND TOOLS:

APPLICATIONS of WSN:
S Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications
TEXT BOOKS:

REFERENCES:

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DIGITAL IC DESIGN
ELECTIVE-III

OBJECTIVES

• The student will be able to understand the MOS Design.
• In this course, students can study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits.
• Another main object of this course is to motivate the graduate students to design and to develop the Digital Integrated Circuits for different Applications.
• The concepts of Semiconductor Memories, Flash Memory, RAM array organization.

UNIT-I:
MOS Design: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II:
Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III:
Sequential MOS Logic Circuits: Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV:

UNIT-V:
Interconnect: Capacitive Parasitics, Resistive Parasitics, Inductive Parasitics, Advanced Interconnect Techniques.

UNIT-VI:
Semiconductor Memories: Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.
Text Books:


References:


OUTCOMES
After going through this course the student will be able to

- Understand the concepts of MOS Design.
- Design and analysis of Combinational and Sequential MOS Circuits.
- Extend the Digital IC Design to Different Applications.
- Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.
OBJECTIVES:

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

UNIT I
Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

UNIT-II:

UNIT-III:
Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation
Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT-IV:
Concurrency: Process Synchronization, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples
Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form 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, allocation methods, free-space management
Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

UNIT VI:
Linux System: Components of LINUX, Interprocess Communication, Synchronisation, Interrupt, Exception and System Call.
OUTCOMES:

- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file systems.
- Perform administrative tasks on Linux Servers
- Introduction to Android Operating System Internals

TEXT BOOK:

REFERENCES: