B. E. SYLLABUS

ELECTRONICS & COMMUNICATION ENGINEERING

V & VI SEMESTER

With

Scheme of Teaching

& Examination
# DEPARTMENT: ELECTRONICS & COMMUNICATION ENGINEERING

<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Qualification</th>
<th>Position</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Rekha Bhandarkar</td>
<td>Ph.D</td>
<td>Professor/HOD</td>
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<tr>
<td>2</td>
<td>Dr. M.K. Parasuram</td>
<td>Ph.D</td>
<td>Director</td>
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<tr>
<td>3</td>
<td>Dr. Krishna Shenai</td>
<td>Ph.D</td>
<td>Director R&amp;D</td>
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<td>4</td>
<td>Dr. K. Rajesh Shetty</td>
<td>Ph.D</td>
<td>Professor/Dean Admissions &amp; Alumni Affairs</td>
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<td>5</td>
<td>Dr. K. V. S. S. S. Sairam</td>
<td>Ph.D</td>
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<td>6</td>
<td>Dr. Veena Devi Shastrimath V.</td>
<td>Ph.D</td>
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<td>7</td>
<td>Dr. K. S. Shivapракasha</td>
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<td>8</td>
<td>Mr. Durga Prasad</td>
<td>M.Tech(Ph.D)</td>
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<td>9</td>
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<td>Mrs. Padmavathi K.</td>
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<td>12</td>
<td>Mrs. Prabha Niranjan</td>
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<td>Mr. Mahaveera K.</td>
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<td>22</td>
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<td>23</td>
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<td>24</td>
<td>Mrs. Shubha B.</td>
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<td>25</td>
<td>Mr. Anil Kumar Bhat</td>
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<td>26</td>
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<td>27</td>
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<td>28</td>
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<td>Mr. Dileep Kumar M.J.</td>
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<td>Mr. Sudharshana</td>
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<td>35.</td>
<td>Mr. Karthik</td>
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<td>37.</td>
<td>Mrs. Prajgnamala</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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DEPARTMENT: ELECTRONICS & COMMUNICATION ENGINEERING

Vision:
Empowering people, Partnering in Community Development by achieving expertise requiring the knowledge of state of the art technology in the field of Electronics and Communication.

Mission:
To impart specialized education in the field of Electronics & Communication that contributes to the socio-economic development of the region and to generate technical manpower with high degree of credibility, integrity and ethical standards by providing vibrant learning environment.

Program Educational Objectives (PEOs):

PEO1: The Graduate should have a solid Foundation in Mathematical, science and Electronics Engineering Fundamentals required to solve Electronics and Communication Engineering problems and also which will help to pursue higher Studies and life-long learning needed for a successful professional career.

PEO2: To inculcate in graduates professional, effective communication skills, teamwork Skills, multidisciplinary approach, and an ability to relate engineering issues to Broader social context.
Program Outcomes (POs):

**PO1.** Identify, analyze and solve basic electronics & communication engineering problems, by applying knowledge of mathematics, science and engineering with modern engineering tools.

**PO2.** Identify, formulate, and analyze complex engineering problems reaching substantiated conclusions in electronics and communication engineering.

**PO3.** Design optimum solutions for complex electronics and communication engineering problems and design system components or processes that meet the specified needs.

**PO4.** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5.** Use modern engineering tools for modeling and simulation in electronics and communication engineering with an understanding of the limitations.

**PO6.** Understand electronics and communication engineering practices in the context of global, economic, environmental and societal realities.

**PO7.** Understand the impact of the electronics and communication engineering solutions in environmental context, and demonstrate the knowledge of, and need for sustainable development.

**PO8.** Know ethical principles and commit to professional ethics and responsibilities and norms of the electronics and communication engineering practice.

**PO9.** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10.** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
**PO11.** Demonstrate knowledge and understanding of the engineering and management principles and apply these to manage projects and in multidisciplinary environments.

**PO12.** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning of technological change.
### DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
#### SCHEME OF TEACHING AND EXAMINATION

#### V SEMESTER B.E.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>CODE</th>
<th>COURSE</th>
<th>Theory/Tuto./Prac./Self Study</th>
<th>Total Hrs./Week</th>
<th>C.I.E.</th>
<th>S.E.E.</th>
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<td>1.</td>
<td>14EC501</td>
<td>Digital Signal Processing</td>
<td>4+0+0+0</td>
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26 Hours/week
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<th>Total Hrs. / Week</th>
<th>C.I.E.</th>
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<td>Embedded Systems</td>
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### ELECTIVE – I

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<td>Fiber Optics</td>
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<tr>
<td>14EC512</td>
<td>DSP Processors &amp; Architecture</td>
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<tr>
<td>14EC513</td>
<td>Object Oriented Programming with C++</td>
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<td>14EC514</td>
<td>Project Management</td>
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<td>14EC515</td>
<td>Consumer Electronics</td>
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### ELECTIVE – II

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<td>Modern Radar &amp; Navigational Aids</td>
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<td>14EC612</td>
<td>Embedded Linux</td>
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<td>14EC613</td>
<td>Computer Operating Systems</td>
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<tr>
<td>14EC614</td>
<td>Comp. Org. &amp; Architecture</td>
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<td>14EC615</td>
<td>Machine Learning and its Applications</td>
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### ELECTIVE – III

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<td>Fuzzy Logic</td>
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<tr>
<td>14EC622</td>
<td>Advanced Signal Processing</td>
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<td>14EC623</td>
<td>Data Base Management System</td>
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<td>14EC624</td>
<td>Control Systems</td>
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<tr>
<td>14EC625</td>
<td>Error Control Coding</td>
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</table>
DIGITAL SIGNAL PROCESSING

Sub Code : 14EC501  Credit : 04
Hrs/Week : 4+0+0+0  Total Hours: 52

Course Learning Objectives:

This course will enable students to
1. Understand the concept of Frequency Domain Sampling, Computation of DFT and properties of DFT.
2. Understand Linear Filtering methods using Overlap Add and Overlap Save Algorithms.
4. Understand Goertzel and Chirp z Algorithms their implementation and application.
5. Design and Analyze the characteristics of Analog filters using Butterworth & Chebyshev approximation techniques.
6. Design IIR filter using Impulse Invariance Technique and Bilinear transformation and FIR filter using windowing techniques.
7. Design Linear Phase FIR filters using frequency sampling technique.

UNIT – I


UNIT – II

Efficient Computation of DFT: Fast Fourier Transform Algorithms: Efficient Computation of the DFT: FFT Algorithms, Direct Computation of the DFT. Radix – 2 FFT algorithms, Decimation in time FFT algorithm and In-place computations. Decimation in frequency FFT algorithm and In-place computations, Chirp Z- Transform, Goertzel Algorithm. 10 Hours

UNIT- III

Design Of Analog Filters And Frequency Transformations: Characteristics of commonly used Analog filters and Design of Butterworth and Chebyshev analog filters. Frequency Transformations in the Analog Domain, Frequency Transformations in the Digital domain, Bilinear, Impulse Invariance Transformations. 10 Hours

UNIT - IV

Design of IIR Digital Filters from Analog Filters and FIR Filter Design: IIR Butterworth and Chebyshev Filter Design by Impulse Invariance, IIR Filter Design by Bilinear Transformation.

**UNIT – V**

**Linear Phase FIR Filter Design:** A comparison of IIR & FIR digital filters, Design of Linear Phase FIR filters using windows, FIR filter design using Frequency Sampling method, Design of Linear Phase FIR filters using Frequency Sampling method, Design of FIR Differentiators, Design of Hilbert Transformers.

**Digital Filter Structures:** Basic IIR Filter structures: direct forms (I & II), Cascade and parallel realizations, signal flow graph, Transposed structure.

Basic FIR filter structures: Direct form structure, Frequency sampling structure, Lattice structure, Linear phase FIR structure.  

**Course Outcomes:**

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

1. Analyze the behavior of discrete-time systems in time and frequency domain.
2. Analyze and implement FFT algorithms.
3. Convert a given analog filter to a digital filter.
4. Visualize applications of DSP in various fields.
5. Design, analyze and implement digital filters.
6. Relate theoretical concepts to practical applications.

**Mapping of POs & COs:**

<table>
<thead>
<tr>
<th>POs</th>
<th>a</th>
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<th>c</th>
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L: Low  
M: Medium  
H: High

**TEXT BOOK:**


**REFERENCE BOOKS:**

DIGITAL COMMUNICATION

Sub Code : 14EC502  
Credit : 04
Hrs/Week : 4+0+0+0  
Total Hours: 52

Course Learning Objectives:

This course will enable students to

1. Study the basic Nyquist’s sampling theorem to sample a given signal and to study the methods for reconstruction of the signal from samples.
2. Study different types of signal distortion in sampling and to learn methods for generation of natural and flat top samples.
3. Learn about Pulse amplitude modulation and Time division multiplexing.
4. Techniques used in geometric interpretation of signals, designing a correlation receiver and Matched filter receiver.
5. Study about maximum likelihood estimation of the received signal.
6. Study different types of Waveform Coding Techniques- PCM, DPCM, DM.
7. Difficulties in base-band shaping for data transmission, design of suitable filters
8. Learn ISI and its solutions, Nyquist’s criterion, Correlative coding techniques.
9. Study the design of Coherent and Non-coherent digital modulation techniques, Coherent Quadrature modulation techniques.
10. Understand the Spread Spectrum technique, Pseudo Noise sequences, Direct Sequence spread spectrum, Frequency Hop spread spectrum.

UNIT – I

Introduction: Sources and signals, Basic signal processing operations in digital communication, Channels for digital communication.
Sampling Process: Sampling theorem, Quadrature sampling of BP signal, Reconstruction of a message from its samples, Signal distortion in sampling, Practical aspects of sampling and signal recovery, PAM, TDM.  
10 Hours

UNIT – II

Waveform Coding Techniques: PCM, Channel noise and error probability, Quantization noise and SNR, Robust quantization, DPCM, DM, Coding speech at low bit rates, Applications.  
12 Hours

UNIT - III

Base-band shaping for data transmission: Discrete PAM signal, Power spectra of discrete PAM signals, ISI, Nyquist’s criterion for distortionless base-band binary transmission, Correlative coding, eye pattern, Base-band M-ary PAM systems, Adaptive equalization for data transmission.  
10 Hours

UNIT - IV

Digital modulation techniques: Digital modulation formats, Coherent binary modulation techniques, Coherent quadrature modulation techniques, Non-coherent binary modulation
techniques, Comparison of binary and quaternary modulation techniques, M-ary modulation techniques, Effect of ISI-bit versus symbol error probability, Synchronization and applications.  

12 Hours

UNIT - V

Spread spectrum modulation: Pseudo noise sequences, notion of spread spectrum, Direct sequence spread coherent binary PSK, Signal space dimensionality and processing gain, Probability of error, Frequency hop spread spectrum, Applications.  

8 Hours

Course Outcomes:

At the end of the course, the student will be able to understand:
1. The basic sampling theorem, Reconstruction of the signal from samples and types of signal distortion in sampling and generation of natural and flat top samples.
2. Pulse amplitude modulation and Time division multiplexing.
3. The geometric interpretation of signals, Correlation receiver and Matched filter receiver
4. The maximum likelihood estimation.
5. Different types of Waveform Coding Techniques- PCM, DPCM, DM.
7. The ISI and its solutions, Nyquist’s criterion, Correlative coding.
8. Coherent and Non-coherent digital modulation techniques, Coherent Quadrature modulation techniques.

Mapping of POs & COs:

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L: Low  
M: Medium  
H: High

TEXT BOOKS:


REFERENCE BOOK:

TRANSMISSION LINES & WAVEGUIDES

Sub Code : 14EC503  
Credit : 04
Hrs/Week : 4+0+0+0  
Total Hours: 52

Course Learning Objectives:

This course will enable students to

1. Derive the general solution for line in terms of voltage and current, derive the expression for cut off frequency, inductance and capacitance, and design the low pass and high pass filters.
2. Learn the parameters of open and co-axial wires at high frequencies, concept of standing waves and standing nodes and input impedance of open and short circuited lines.
3. Apply the smith chart for finding any parameter of the transmission line.
4. Understand concept of TM, TE and TEM waves and derive the E and H field equations.
5. Apply Maxwell’s equations to derive the field equations for TM and TE waves propagating inside the waveguide.

UNIT - I
Transmission- Line Theory: The transmission Line general solution, the distortion less Line. The telephone cable, Reflection on a line not terminated in $Z_0$, Open and short circuited Lines, Reflection loss, Insertion loss, Constant K LPF & HPF.  
10 Hours

UNIT - II
Line At Radio Frequencies: Parameters of open wire Line at high frequencies, parameters of the coaxial Line at high frequencies, Constants for the Line of zero dissipation, Standing waves; nodes; standing wave ratio, input impedance of open and short circuited Lines.  
10 Hours

UNIT - III
Impedance Matching: The quarter wave Line; impedance matching, the exponential Line for impedance transformation, The smith circle diagram, Applications of the smith chart, Quarter, Half and eighth wave Lines of small dissipation.  
10 Hours

UNIT - IV
Guided Waves: Applications of restrictions to Maxwell’s equation, types of propagation; TM, TE and TEM waves in parallel planes. TE, TM, TEM waves in infinitely conducting planes. Characteristics of TE, TM & TEM waves, wave impedance.  
12 Hours

UNIT - V
Wave Guides: Application Maxwell’s equations to the rectangular wave guides, The $TM_{m,n}$ wave in the rectangular guide, $TE_{m,n}$ wave in the rectangular guide, The TEM wave in the coaxial Line, Excitation of wave guides, Guide terminations, Resonant cavities.  
10 Hours

Course Outcomes:

At the end of the course the student will be able to
1. Derive the general solutions for a line in terms of Voltage and Current.
2. Draw the waveforms for waves propagating within the lines at various time intervals.
3. Derive expressions for cut off frequency and inductance and Capacitance. (L3)
4. Design any filters(LPF/HPF) for the given specifications and write the final circuit(L3)
5. Understand the concept of Standing waves and draw standing wave pattern for any load termination.
6. Apply the Smith chart for finding any parameter of the line.
7. Distinguish between TE, TM and TEM waves and derive E and H field equations.
8. Use Maxwell’s equations to determine field equations for TM,TE and TEM waves propagating inside a waveguide

Mapping of POs & COs:

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L: Low  M: Medium  H: High

TEXT BOOKS:


REFERENCE BOOKS:

Syllabus of V & VI Semester B.E. / Electronics & Communication

SYSTEM DESIGN USING MICROPROCESSOR / MICROCONTROLLER

Sub Code : 14EC504
Hrs/Week : 4+0+0+S*

* Self Study to be exercised under the supervision of course instructor and to be restricted to not more than 10% of the total teaching hours.

Course Learning Objectives :

This course will enable students to

1. Understand the fundamentals of memory, processing unit of an embedded systems.
2. Distinguish Microcontroller and Microprocessor.
3. Understand the need of Interrupts, Timers/Counters.
4. Design of real time system using 8051.
5. Design basic interfacing circuits using keypad, LCD, stepper motor, etc.

UNIT – I

Introduction to 16 bit Microprocessor 8086: Introduction to Microprocessor, computer and its organization, Internal Architecture of 8086 microprocessor, Programming Model, Program-Memory addressing, Address bus, data bus and control bus, Addressing Modes. 8 Hours

UNIT – II

16 bit Microprocessor Instruction Set and Assembly Language Programming: Programmer’s model of 8086, operand types, operand addressing, assembler directives, instruction set - Data transfer group, Arithmetic group, logical group, control transfer group, miscellaneous instruction groups, MACROS, programming(with BIOS function). 12 Hours

UNIT - III

Microprocessor Peripheral Interfacing: Introduction, Generation of I/O Ports, Programmable Peripheral Interface (PPI)-Intel 8255, Keyboard and Display Interface. Interrupts: Basic interrupts processing, Hardware interrupt, expanding interrupt structure (Self Study). 10 Hours

UNIT – IV

8 bit Microcontroller 8051- H/W Architecture, Instruction Set and Programming: Introduction to 8051 Microcontroller, Architecture, Memory organization, I/O Port configuration, Programmer’s model of 8051, Operand types, Operand Addressing, Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions, Programming, I/O Interfacing, interrupts, timer configuration. 14 Hours
UNIT - V


Course Outcomes:

At the end of the course the student will be able to:
1. Realize the use/meaning of Memory, Central Processing Unit, Arithmetic and logical unit (ALU), Address Bus, Data Bus and Control lines of an embedded system.
2. Distinguish Microcontroller and Microprocessor design Architecture and the functionality.
3. Understand the Assembly Language Programming for the Microprocessor and Microcontroller.
4. Write assembly language program for 8086 & 8051 in sequential logic using all possible kinds of Mnemonics.
5. Design and use Timer/ Counter programming application in 8051 Microcontroller.
6. Design and use interrupt in 8086 & 8051.
7. Design any real time system using timer/counter or interrupts (if necessary) application of 8051.
8. Design and study basic interfacing like matrix keypad, DC Motor speed control, Analog to Digital Conversion, Stepper Motor and Liquid Crystal Display.

Mapping of POs & COs:

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L: Low  M: Medium  H: High

TEXT BOOKS:


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MICROPROCESSOR / MICROCONTROLLER APPLICATIONS LAB

Sub Code : 14EC505  Credit : 02
Hrs/Week : 0+0+3+0

Course Learning Objectives:

1. Assembly language programming skills are explored using 8086 microprocessor and 8051 microcontroller.
2. Usage of different types and operands, function calls are adopted to achieve an efficient programming logic.
3. Real time examples are used to demonstrate the working of basic interfacing experiments with 8051 microcontroller.

List of Experiments

I) SOFTWARE PROGRAMMING USING 8086 ASSEMBLY LANGUAGE

1. Data transfer instructions:
   I. Byte and word data transfer in different Addressing modes.
   II. Block move (with and without overlap)
   III. Block interchange

2. Arithmetic & logical operations:
   1. Addition and Subtraction of Byte, Word and multiple byte data.
   2. Multiplication and Division of signed and unsigned Hexadecimal numbers.
   3. ASCII adjustment instructions
   4. Code conversions
   5. Arithmetic programs to find square cube, LCM, GCD, factorial of numbers

3. Bit manipulation instructions:
   1. Whether given data is positive or negative
   2. Whether given data is odd or even
   3. Logical 1’s and 0’s in a given data
   4. Bit wise and nibble wise palindrome

4. Branch/Loop instructions like:
   1. Arrays: addition/subtraction of N numbers, Finding largest and smallest numbers and ascending and descending order.
   2. Near and Far Conditional and Unconditional jumps, Calls and Returns

5. Programs on String manipulation like string transfer, string reversing, searching for a string.

II) HARDWARE PROGRAMMING USING 8051

7. Interfacing simple switches’ and LED’s
8. Interfacing Seven segment Display
9. Interfacing Hex Keyboard interface to 8051
10. Interfacing ADC0809/08 with 8051
11. Generate different waveforms Sine, Square, Triangular, Ramp etc. using DAC interface to 8051 and change the frequency and amplitude
12. Stepper and DC motor control interface to 8051

Course Outcomes:

At the end of the course the student will be able to
1. Classify the machine language and assembly language.
2. Develop the coding logic for the algorithm.
3. Document the code in the systematic approach.

*********************
BASIC COMMUNICATION LAB

Sub Code : 14EC506
Hrs/Week : 0+0+3+0
Credit : 02

Course Learning Objectives :
This course will enable students to:
1. Design and study the characteristics of narrow and wide – band pass and band elimination filters
2. Understand the generation and detection of DSB-SC and SSB signals
3. Design different types of attenuators – T, π, lattice
4. Design a modulator using IC 8038 to frequency modulate a message signal.
5. Study the design and application of pre-emphasis and de-emphasis circuits
6. Study Amplitude Modulation, demodulation
7. Design circuits for various pulse modulation schemes – PAM, PWM, PPM
8. Study the working of Transistor mixer circuit

List of Experiments

1. Active low-pass and High-pass filters
2. Active band pass and band elimination filters
3. Balanced modulation and SSB generation
4. Various types of Attenuators.
5. Frequency modulation and Demodulation
6. Pre-emphasis and De-emphasis circuits.
7. AM-IC circuit (modulation and demodulation using IC).
8. PAM (modulation and demodulation).
9. Pulse modulation and demodulation
   10. PPM (modulation and demodulation).
   11. PWM (modulation and demodulation).
   12. Transistor mixer – up/down conversions.

Course Outcomes:

Upon successful completion of this lab, students will be able to:
1. Design narrow and wide - band pass and band elimination Filters.
2. Understand the generation and detection of DSB-SC and SSB Signals.
3. Design different type of attenuators for the given specifications.
4. Understand the Frequency Modulation.
5. Design pre-emphasis and de-emphasis circuits.

20
6. Understand the Amplitude Modulation and also to design appropriate demodulator circuit to get back the original signal.
7. Design circuits for the following pulse modulation schemes – PAM, PWM, PPM.
8. Understand the working of a Transistor mixer.

Mapping of POs & COs:

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IMMERSIVE GROUP WORKSHOP (IGW)

Sub Code : 14EC507  Credit : 00
Hrs/Week : 0+0+3+0

Module 1: Minds-on and hands-on simulation project
- Understanding Task environment – Goals, responsibilities, Task focus
- Working in Teams towards common goals
- Organizational performance expectations – technical and behavioural competencies.
  7.5 Hours

Module 2: Re-enforcement of critical individual skills and behaviours
- Application of individual effectiveness skills in team and organizational context – improving self awareness, goal setting, time management, communication and presentation skills.
  3.5 Hours

Module 3: Etiquettes and Ethics
- Professional etiquettes at workplace – dressing, telephone, e-mail, meeting and general behaviour
- Basic honesty & respect for law / rules
- Conflict of interest
- Use of organizational resources
Module 4: Interpersonal Behaviour & relationship skills
1. Establishing trust based relationships in team & organizational environment
   • Trust equation – credibility, responsiveness, integrity, self-interest

Module 5: Dealing with Conflicts

Pedagogical tools & techniques used in the workshop
1. Organizational templates for simulating a organizational context- structures, units, roles and activities
2. Metaphoric scenarios for simulating real –life tasks and dynamics in a team/project context
3. LEGO™ building blocks for simulating last-mile technical activity in teams
4. Case studies, Role play scenarios group learning activities, observation and feedback.

Note: Evaluation is done and a grade of P (pass) or NP (not pass) is awarded

FIBRE OPTICS

Sub Code : 14EC511
Hrs/Week : 3+0+0+0
Credit : 03
Total Hours : 39

Course Learning Objectives :

This course will enable students to:
1. Competing the different light propation mechanisms with fundamentals.
2. Justifying the impact of LED and LASER services and their applications.
3. Formulating the different scenarios of fiber optics measurement through industry and medical applications.
4. Elaborating the fiber optics connectivity modes by means of physical components.
5. Minimize the different fiber optic losses by improving the transmission characteristics.
UNIT – I


UNIT – II


Laser for measurement of distance, velocity, acceleration,– material processing – laser heating, welding melting and trimming of materials – removal and vaporization.

UNIT – III

Laser In Holography And Medical Application: Holography – basic principle; methods; holographic interferometry and applications, holography for non-destructive testing. Medical applications of lasers; laser and tissue interaction – laser instruments for surgery, removal of tumors, brain surgery, plastic surgery.

Course Outcomes:

At the end of the course student will be able to

1. Determine the evaluation of Networking Principles and Light Propagation Mechanisms.
2. Know the concepts like quality of services w.r.t network services w.r.t sources and detectors.
3. Solve the problems of fiber optic Communication multi-stage applications w.r.t industrial & medical applications.
4. Understand the concepts and working modes of OFNS (Optical Fiber Network Sensors), various components, network systems and applications of OFN.
Mapping of PO’s & CO’s

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TEXT BOOKS:

REFERENCE BOOKS:

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DSP PROCESSORS AND ARCHITECTURE

Sub Code : 14EC512  Credit : 03
Hrs/Week : 3+0+0+0  Total Hours : 39

Course Learning Objectives:

This course will enable students to

1. Learn to represent real-time signals in digital format and understand transform-domain representations of the signals.
2. Understand the architectural features for the programmable DSP device.
3. Study the linear systems approach to signal processing problems using high-level programming language.
4. Demonstrate the linear filters on real-time DSP chips.
5. Present the applications of linear filters and their real-time implementation challenges.

UNIT - I


Architectures for Programmable Digital Signal-Processors: Introduction, Basic Architectural Features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Features for External Interfacing. 15 Hours

UNIT - II


Implementation of Basic DSP Algorithms: Introduction, the Q-notation, FIR Filters, IIR Filters, Interpolation and Decimation Filters (one example in each case). 15 Hours

UNIT - III


Interfacing Memory and Parallel I/O Peripherals to DSP Devices: Introduction, Memory Space Organization, Memory interface. Introduction to TMS320C6713 Processor (Architecture). 9 Hours

Course Outcome:

At the end of the course student will be able to
1. Realize the knowledge of digital signal processing techniques for implementation of different algorithms.
2. Develop innovative algorithms using MATLAB DSP toolbox for analysis and processing of real-time signals.
3. Apply the DSP processors TMS 320C 54XX for implementation of DSP algorithms and its interfacing techniques with various I/O peripherals.

Mapping of POs & COs:

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TEXT BOOK:


REFERENCE BOOKS:


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OBJECT ORIENTED PROGRAMMING WITH C++

Sub Code : 14EC513  Credit : 03
Hrs/Week : 3+0+0+0  Total Hours : 39

Course Learning Objectives:

The course presents basic Object Oriented Programming using C++ programming that aims to:

1. Arm the students with the basic object oriented programming concepts.
2. Introduce different techniques like Inheritance, Polymorphism, Virtual Functions and Constructors.
3. Arm the students with the necessary constructs of OOP C++ programming.
4. Introduce concepts like template classes and STL libraries.

UNIT - I
Principles of OOP: OOP paradigm, Procedural Vs. Object Oriented Programming, Benefits and applications of OOP.
C++ Features: Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures.
C++ Functions: Call and Return by reference, Inline functions, Overloading of functions, default arguments, friend functions, virtual functions.
Objects and classes: Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, type conversion.

UNIT - II
Inheritance: Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class.
Polymorphism: Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism.
I/O and File management: Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, manipulators, File stream, C++ File stream classes, File management functions, File modes, Binary and random files.

UNIT - III
Templates, Exceptions and STL: What is template? function templates and class templates, Introduction to exception, try-catch-throw, multiple catch, catch all, rethrowing exception, implementing user defined exceptions, Overview and use of Standard Template Library.

Course Outcomes:

A student who successfully fulfills the course requirements will have demonstrated:
1. An understanding of the concepts of objects, classes, inheritance and polymorphism.
2. An ability to write simple functions, overload operators in C++ and an ability to control I/O and File management techniques.
3. An ability to incorporate exception handling in object-oriented programs.
4. An ability to use template classes and the STL library in C++.
5. An ability to write object-oriented programs of moderate complexity in C++.

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TEXT BOOK:


REFERENCE BOOKS:


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PROJECT MANAGEMENT

Sub Code : 14EC514  Credit : 03
Hrs/Week : 3+0+0+0  Total Hours : 39

Course Learning Objectives

This course will enable students to
1. Understand key concepts of project management and project lifecycle
2. Practice the key stages of managing projects.
3. Develop increased awareness of available resources to further develop project management skills.
4. Understand how to apply new knowledge to their own projects and set realistic goals for moving forwards.

UNIT – I

Introduction: Characteristics of project, neat types and forms. Systems approach: Concepts project as a system, design algorithm.
Project organization: Formal and informal organization, forms of organization of structures, project organization, matrix organization, pure project organization, selection of structures.

UNIT – II

Work definition: Planning, work break down, responsibility integration with organizational structure detailed project plan.
Project scheduling: Activities, events Gantt charts network scheduling pert, CPM resource constraints.
Project costing: Estimation and budgeting, project cost, account systems cost, schedules, forecasting, financial evaluation of a project, social costs.

UNIT – III

Project control and management: Phases types, variance analysis problems, role of project manager, team work and leadership.
Project termination: Varieties of project termination processes, final report.
Computers in project management: Monitoring information, system software packages, utility and limitations.

Course Outcomes:

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

1. Manage the selection and initiation of individual projects and of portfolios of projects in the enterprise.
2. Conduct project planning activities that accurately forecast project costs, timelines, and quality. Implement processes for successful resource, communication, risk and change management.
3. Demonstrate effective project execution and control techniques that result in successful projects.
4. Demonstrate a strong working knowledge of ethics and professional responsibility.
5. Demonstrate effective organizational leadership and change skills for managing projects project teams.

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TEXT BOOK:

REFERENCE BOOKS:

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CONSUMER ELECTRONICS

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Course Learning Objectives:

1. Methods of enhancing the audio and video signals in the field of engineering
2. Management of data communication in multimedia communication systems of different consumer electronics are discussed
3. Basic principles of different consumer electronics gadgets are highlighted.
UNIT – I

SOUND: Properties of sound and its propagation, Transducers (Microphone, Loud Speakers), enclosures, mono-stereo, Amplifiers, Multiplexers, mixers, Synthesizers.
VISION: CTV concepts and types, Color Cameras, Displays. 15 Hours

UNIT - II

RECORDING AND PLAYBACK: Discs, Magnetic tapes and discs, Optical discs; recording and playback, audio and video systems, Theatre Sound, Studios, Editing.
COMMUNICATIONS AND BROADCASTING: Fiber optics, Radio and TV broad casting
DATA SERVICES: Data services, mobiles, terrestrial & Satellite Systems, GPS. 14 Hours

UNIT- III

UTILITIES: Fax, Xerographic Process , Calculators, Microwave Ovens, Washing Machines, A/C & Refrigeration, Dishwashers, ATMs , Set -Top Boxes, Auto Electronics, Industrial Electronics 10 Hours

Course Outcomes:

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

1. Advance in a unique mix of skills required for emerging careers and take up higher studies in entertainment / white-goods industry.
2. Have a better grasp of sound recording and appreciate the breadth of video industry and their markets.
3. Have broader view of telecommunication choices available.

Mapping of POs & COs:

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TEXT BOOKS:


REFERENCE BOOK:


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EMBEDDED SYSTEMS

Sub Code : 14EC601 Credit : 04
Hrs/Week : 4+0+0+0 Total Hours : 52

Course Learning Objectives:
This course will enable students to
1. Recognize design challenges in embedded system design processes.
2. Distinguish different memory types.
3. Design an optimized RT level and General purpose processor.
4. Understand different software architectures and operating system services.

UNIT – I

Introduction: Overview of embedded systems, embedded system design challenges, common design metrics and optimizing them. Survey of different embedded system design technologies, trade-offs. Custom Single-Purpose Processors, Design of custom single purpose processors. 10 Hours

UNIT - II

Processor design: RT level design and optimizing the design. General purpose processors, General-purpose processor design. Standard Single-Purpose Peripherals: Timers/ counters, UART, PWM, LCD, Keypad controllers. 10 Hours

UNIT – III

Memory: Introduction, memory write ability and storage performance, common memory types, composing memory, memory hierarchy, Memory management unit, advanced memories. 10 Hours

UNIT – IV

Interrupts: Basics - Shared Data Problem - Interrupt latency. Survey Of Software Architecture: Round Robin, Round Robin with Interrupts, Function Queue, scheduling, RTOS architecture. 10 Hours

UNIT - V

Introduction to RTOS: Tasks - states - Data - Semaphores and shared data - operating systems services - Massage Queues - Mail Boxes –Timers – Events - Memory Management – Interrupts. Basic design using RTOS - Overview Encapsulating Semaphores & Queues, Hard real time Scheduling, Saving memory, Power. 12 Hours

Course Outcomes:

32
At the end of the course the student will be able to
1. Design an embedded system, recognize design challenges. And to describe different IC and Processor technologies.
2. Optimize the RT level design, and to design a General purpose processor and appreciate the use of peripherals.
3. Explain different memory types. And to discuss advanced memories.
4. Explain shared data problem, Interrupt latency, and different software architecture.
5. Explain semaphores, different operating system services, and real time scheduling; understand power and memory saving techniques.

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TEXT BOOKS:

REFERENCE BOOKS:
MICROWAVE DEVICES & COMMUNICATION

Sub Code : 14EC602 Credit : 04
Hrs/Week : 4+0+0+0 Total Hours : 52

Course Learning Objectives:

This course will enable students to

1. Learn the application of Smith chart to solve impedance matching problems in transmission lines.
2. Study the characteristic impedance and different types of losses in micro-strip lines.
3. Study S-parameters for different microwave devices and microwave junctions.
4. Study low power and high power microwave Amplifiers and oscillators and their applications.
5. Analyse parametric amplifiers, Gunn diode, Tunnel diode etc.
6. Study propagation of waves, antenna parameters, RADAR, radio meters used in radiometry.

UNIT - I

Micro Strip lines: Characteristic impedance, parameters, losses and quality factor Q of micro strip lines, coplanar strip lines and shielded strip lines parameters and its properties. Applications

Power and impedance relations: eighth, quarter and half wave line, impedance matching. Construction, single and double stub matching using Smith Chart. 10 Hours

UNIT - II

Microwave devices: Symmetrical Z and Y matrices for reciprocal network, S-matrices of a multiport network. E-plane Tee, H-plane Tee and Hybrid Tee, Hybrid ring, Attenuators, Directional Couplers, Faraday rotation principle, Isolators, Circulators, Phase Shifters, Resonators. 10 Hours

UNIT - III

High frequency Limitations of conventional microwave devices, Velocity modulation, power output and efficiency and electronic admittance, Reflex Klystrons, Helix TWTS, Slow wave structure, amplification process, convection current, axial electric field, wave modes and gain consideration. 12 Hours

UNIT - IV

Mode of oscillation, Magnetron oscillators, cylindrical magnetron, Parametric devices, nonlinear reactance and Manley Rowe power relations, Parametric amplifier, Gunn diode - Gunn Effect, differential negative resistance, two valley model theory, Modes of operations, Tunnel diode, IMPATT Diode. 10 Hours

UNIT - V

System aspects of antenna, Wireless communication system, Radar system, Radiometer systems, Microwave propagation of waves, Ground waves, Sky wave propagation, Space waves Troposphere scatter propagation. 10 Hours
Course Outcomes:

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

1. The application of Smith chart to solve impedance matching problems using single stub and double stubs.
2. The measurement of Characteristic impedance, losses of different types of micro-strip lines.
3. The S-parameters for different microwave devices and junctions.
4. The Low power and high power microwave amplifiers and oscillators.
5. The working of parametric amplifiers (using varactor diodes), Gunn diode, Tunnel diode etc.
6. The microwave propagation of waves and different types of RADAR.

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TEXT BOOKS:

REFERENCE BOOK:

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VLSI CIRCUITS

Sub Code : 14EC603 Credit : 04
Hrs/Week : 4+0+0+S* Total Hours : 52

* Self Study to be exercised under the supervision of course instructor and to be restricted to not more than 10% of the total teaching hours.

Course Learning Objectives :
This course will enable students to
1. Understand the fundamentals of digital VLSI design, design flow, CMOS fabrication process.
2. Design CMOS circuits for any given complex logic function and draw the layout diagrams for them.
3. Perform DC analysis and transient analysis of a given CMOS circuit.
4. Design for minimum delay using driving large capacitive load and logical effort techniques.
5. Design advanced CMOS logic circuits such as C$^2$ MOS circuit and Domino CMOS circuits.
6. Design basic CMOS Analog Circuits: single stage amplifiers, differential amplifiers and current mirrors.

UNIT – I

Introduction to VLSI: Design flow, VLSI chip types, Moore’s law, ideal switches, NMOS, PMOS transistor, current equations, threshold voltage. MOSFET operation, CMOS inverter, noise margin, basic logic gates in CMOS, complex logic gates in CMOS, transmission gate circuits, clocking and data flow, SR-latch, clocked SR-latch, A CMOS Positive Level Sensitive D-latch, Positive edge triggered D register. 10 Hours

UNIT - II

Basic CMOS Technology: Semiconductor technology overview, basic CMOS technology, p well / n well / twin well process. Physical structure of CMOS integrated circuits: Integrated circuits layers, sheet resistance, P and N- MOSFET layers, CMOS layers, interconnect layers. Stick diagram, Lambda rules for layout, electrical rules, and layout of basic structures, cell concepts, FET sizing and unit transistor, Physical design of logic gates, design hierarchies. Self Study. Latch-up in CMOS and prevention. 12 Hours

UNIT – III

Electronic analysis of CMOS logic gates: DC characteristics of the CMOS inverter, inverter switching characteristics, power dissipation, DC characteristics of NAND and NOR gates, NAND and NOR transient response, analysis of complex logic gates, gate design for transient performance, pass transistors. 10 Hours

UNIT - IV

Designing with high speed CMOS logic networks: Gate delays, driving large capacitive loads, logic efforts, Timing Analysis (T2) Self Study. 10 Hours

UNIT – V

Advanced techniques in CMOS logic circuits: Mirror circuits, pseudo-NMOS, tri-state circuits, clocked CMOS, dynamic CMOS logic circuits.
MOS Analog Circuits: Basic current mirror, single stage CS (T3, 3.2.1 & 3.2.3) and CD (T3,3.3) MOS amplifiers, differential amplifier(with current source load). 10 Hours
Course Outcomes:

1. Able to design static CMOS circuits, latches and flip-flops.
2. Able to explain the salient steps of fabrication process and design the stick diagram, layout for any given CMOS function.
3. Able to perform DC analysis of any CMOS gate and design CMOS gates with the desired switching characteristics.
4. Able to design logics to drive large capacitive loads.
5. Able to design dynamic CMOS logic circuits and basic MOS amplifiers.

Mapping of POs & COs:

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L: Low  M: Medium  H: High

TEXT BOOKS:

REFERENCE BOOKS:

ANTENNAS & WAVE PROPAGATION

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<th>Sub Code</th>
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<td>Hrs/Week</td>
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Course Learning Objectives:
This course will enable students to
1. Recall the concepts of electromagnetic theory to understand the antenna functionality
2. Possess the basic concepts of radiation of electromagnetic energy from a radiator
3. Analyze the radiation pattern in terms of power, radiation intensity or electric field and hence determine antenna parameters from it.
4. Describe the construction and design features of commercial antennas
5. Translate the phenomenon of wave propagation as ground and sky waves

UNIT – I

Antenna Basics: Basic antenna parameters, patterns, beam area, Radiation Intensity, Beam efficiency, Directivity and Gain, Antenna aperture, Effective height,

Point Sources: Introduction, point sources, Power patterns, Power theorem and applications, Radiation intensity, Examples of Power patterns, field patterns, Phase patterns.

Antenna Arrays: Arrays of two isotropic point sources, Non- isotropic similar point sources, pattern multiplication, pattern synthesis, Linear array of n- isotropic sources of equal amplitude and spacing.

UNIT – II

Null Directions; Null directions of arrays, Array of two driven /\alpha_2 elements (broad side case, end-fire case and general case with equal currents of any phase)

ELECTRIC DIPOLE AND THIN LINEAR ANTENNAS: The short electric dipole, the fields of short dipole, radiation resistance, thin linear antenna, radiation resistance of / \alpha_2 antennas.

LOOP ANTENNA: The small loop, The Loop antenna (general case), Far – field Patterns of circular Loop Antennas and Uniform Current, The small loop as a special case, Radiation resistance of loops.

UNIT – III

HELICAL ANTENNA AND YAGI-UDA ARRAY: Helical antenna, Helical geometry, The Helix Modes, Practical Design considerations of Monofilar axial-mode helical antenna, dipole arrays with parasitic elements, the yagi-uda array, Axial- mode pattern and phase velocity of wave propagation on Monofilar Helices, wide band characteristics of Monopilar axial- mode helical antenna.

ANTENNA TYPES: Slot antenna, Babinet’s principle and Complementary antenna, Horn antenna, The rectangular Horn Antenna, Reflector antenna (Flat sheet reflector, corner reflector, paraboloidal reflector), Broad band frequency independent antenna, Basics, Rumsey’s principle, The log- periodic antennas.

Antennas for special applications: Antennas for terrestrial mobile communication systems, Antennas for Ground Penetrating Radar (GPR), Embedded antennas, Ultra-wide band antennas for digital applications, plasma antennas.

UNIT - IV

WAVE PROPAGATION: Ground wave propagation, plain-earth reflections, space waves and surface waves, elevated dipole antenna above plain earth, wave tilt, spherical earth propagations, Tropospheric waves.
UNIT - V

IONOSPHERIC PROPAGATION: The Ionosphere, Reflection and Refraction of waves by Ionosphere, Regular and irregular variations of Ionosphere, Attenuation factor, Sky wave transmission, Effect of earth’s magnetic field, wave propagation in Ionosphere, Faraday rotation and measurement of total electron content.

10 Hours

Course Outcomes:

At the end of the course student will be able to

1. Define basic antenna parameters.
2. Draw the phase/power/field patterns for any type of antenna.
3. Develop general equations and draw field pattern for array of antenna.
4. Develop theoretical maxima, half power beam width (HPBW), beam width between first nulls (BWFN) etc. using the field equation.
5. Derive E and H field equations for Electrical dipole and Loop antenna.
6. Understand the design parameters for Helical, Yagi Slot, Horn and Reflector antenna.
7. Understand the design equations of frequency dependent and independent antennas.
8. Know the principle of operations of antennas that are used for special communication purposes.
9. Understand the principle of ground, tropospheric and ionospheric wave propagation.
10. Derive expressions for basic parameters of Electromagnetic wave propagating in free space using geometrical configurations.

Mapping of POs & COs:

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L: Low                              M: Medium                              H: High

TEXT BOOKS:

REFERENCE BOOKS:

MODERN RADAR AND NAVIGATION AIDS

Sub Code : 14EC611  Credit : 03
Hrs/Week : 3+0+0+0  Total Hours : 39

Course Learning Objectives:
This course will enable students to
1. Work with different radar range equations and calculate the effect of various external / internal factors on radar accuracies
2. Learn border view of radar subsystems, Radar measurement and Navigation
3. Apply the knowledge to obtain signal levels in simple direction finders for Navigational instruments
4. Study radar measurement processes, evaluate Doppler shifts and blind speeds.
5. Learn the elements of electronic navigation and integrate with emerging technologies.

UNIT - I

Elementary Modern radar: Radar overview, Radar range equation, Radar search and detection, Radar antennas, Radar transmitters, Radar receivers. 15 Hours

UNIT - II

Influencing factors: Propagation effects, clutter, target reflectivity, target fluctuations, detection criteria, detection theory, exciter, signal processing, pulse compression.

Radar Measurements: Parameter Measurements, Doppler phenomenology, Doppler processing. 16 Hours

UNIT - III

Navigation: Radio direction finding, VOR, Hyperbolic systems of navigation-LORAN, DECCA, OMEGA; DME, TACAN; Doppler navigation, inertial navigation, GPS.
Aids to approach and landing: ILS, MLS, precision approach radar. 8 Hours

Course Outcomes:
At the end of the course the student will be able to
1. Have an appreciation of the working of different radars and calculate radar range values.
2. Describe basic radar subsystems & solve simple numerical problems.
3. Understand the effect of various external / internal factors on radar accuracies.
4. Explain radar measurement processes & evaluate doppler shifts and blind speeds.
5. Discuss different concepts in navigational instruments and obtain signal levels in simple direction finders

**Mapping of POs & COs:**

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L: Low  M: Medium  H: High

**TEXT BOOKS:**


**REFERENCE BOOKS:**


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**EMBEDDED LINUX**

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<tr>
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**NOTE:**

1. CIE Evaluation: MSE-1 + MSE-2 + Mini project : 15Marks + 15 Marks +20 Marks
2. No. of Hours allotted for Lab: 11 Hrs

**Course Learning Objectives:**

1. Working of basic Linux operating system and usage of basic Linux commands are introduced.
2. Able to understand basic Linux character driver modules and use of its development tools.
3. Covers the basic design framework of an embedded system.

UNIT – I

12 Hours

UNIT – II

Introduction to Linux Device Drivers: An Introduction to Device Drivers: Building and Running Modules, Char Drivers, Debugging Techniques.  
Development Tools: Embedded IDE, cross Compilers, Targets, and tool chains.  
10 Hours

UNIT - III

6 Hours

Course Outcomes:

At the end of the course the student will be able to
1. Understand the basic terminology of Linux operating system.
2. Identify and analyze the building blocks of Linux device drivers necessary for the hardware interface.
3. Prepare a design frame work for the embedded system based on generic or Linux based system platform.

Mapping of POs & COs:

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L: Low  M: Medium  H: High
TEXT BOOKS:

COMPUTER OPERATING SYSTEMS

Sub Code : 14EC613 Credit : 03
Hrs/Week : 3+0+0+0 Total Hours : 39

Course Learning Objectives:

This course will enable students to

1. Define and Describe operating systems, Resource allocation, Operating System structure, Operating System operations and services.
2. Explain Process concept, Operations on processes, Inter process communication, Multi-Threaded Programming and Process management.
3. Explain memory management concepts as applicable to kernel and programs in an Operating System.
4. Define and Describe Virtual memory, Paging policies and Scheduling of processes in an Operating System.

UNIT – I

Introduction And Overview Of Operating Systems: Operating system, Goals of an O.S, Operation of an O.S, Resource allocation and related functions, User interface related functions, Classes of operating systems, O.S and the computer system, Batch processing system, Multi programming systems, Time sharing systems, Real time operating systems, distributed operating systems.

Structure of the Operating Systems: Operation of an O.S, Structure of the supervisor, Configuring and installing of the supervisor, Operating system with monolithic structure, layered design, Virtual machine operating systems, Kernel based operating systems, and Microkernel based operating systems. 15 Hours

UNIT – II

Memory Management: Memory allocation to programs, Memory allocation preliminaries, Contiguous and noncontiguous allocation to programs, Memory allocation for program controlled data, kernel memory allocation. 15 Hours
UNIT – III

Virtual Memory: Virtual memory basics, Virtual memory using paging, Demand paging, Page replacement, Page replacement policies, Memory allocation to programs, Page sharing, UNIX virtual memory.

Scheduling: Fundamentals of scheduling, Long-term scheduling, Medium and short term scheduling, Real time scheduling, Process scheduling in UNIX

9 Hours

Course Outcomes:

At the end of the course the students will be able to

1. Understand the structure, operations and services of an Operating System.
2. Distinguish between processes and threads, and management of these in an Operating System.
3. Explain the interrelationship between the Process Control Block and Event Control Block.
4. Describe the memory allocation to processes and differentiate between contiguous and non contiguous memory allocation methods.
5. Discuss Paging techniques and policies in Virtual memory management.
6. Understand the need for scheduling and scheduling processes.

Mapping of POs & COs:

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TEXT BOOK:


REFERENCE BOOK:

COMPUTER ORGANIZATION & ARCHITECTURE

Sub Code : 14EC614 Credit : 03
Hrs/Week : 3+0+0+0 Total Hours : 39

Course Learning Objectives:

This course will enable students to

1. Recall and describe basic structure of computers, machine instructions and programs.
2. Recall and describe different addressing modes, output operations, Stacks and Queues, Subroutines and Additional Instructions, IEEE standard for Floating point Numbers.
4. Describe Semiconductor RAM Memories, Read Only Memories, Cache Memories, Performance Considerations and Virtual Memories.
5. Recall and describe execution of a Complete Instruction, Multiple Bus Organization, Microprogrammed Control and Hardwired Control.

UNIT – I

Basic Structure of Computers Computer types: Functional units, Basic operational Concepts, Bus structures, Performance, Historical Perspective. Machine Instructions and Programs. Numbers, Arithmetic operations and characters, Memory locations and addresses, characters and character strings addressing modes, assembly language, stack and queues, subroutines, instructions, encoding of machine instruction.

Input /Output Organization: Interrupts, DMA, Bus Arbitration, Buses, and Interface Circuits. 15 Hours

UNIT – II

The memory system: Semiconductor RAM Memories, Read only memories, Cache memories, Virtual memories, Secondary storage. Arithmetic: Addition and Subtraction of signed numbers, ALU unit, Design of fast adders, Multiplication of positive numbers, Fast multiplication, Integer Division, Floating point numbers and operations. 15 Hours

UNIT - III

Basic Processing Unit: Register transfers, Execution of a complete instruction, Multiple bus organization, Hardwired control, Microprogrammed control, Embedded systems. 9 Hours

Course Outcomes:

After studying this course, students will be able to acquire knowledge of:

1. The basic structure of computers & machine instructions and programs.
2. Addressing Modes, Assembly Language, Stacks, Queues and Subroutines.
3. Input/output Organization such as accessing I/O Devices, Interrupts.
4. Memory system basic Concepts, Semiconductor RAM Memories, Static memories, Asynchronous DRAMS, Read Only Memories, Cache Memories and Virtual Memories.
5. Some Fundamental Concepts of Basic Processing Unit, Execution of a Complete Instruction, Multiple Bus Organization, Hardwired Control and Microprogrammed Control.

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L:Low   M: Medium   H: High

TEXT BOOK:

REFERENCE BOOK:

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MACHINE LEARNING AND ITS APPLICATIONS

Sub Code : 14EC615 Credit : 03
Hrs/Week : 3+0+0+0 Total Hours : 39

Course Learning Objectives :

This course will enable students to:
2. Critical understanding of basic statistical significance tests.
3. Practice machine learning algorithms for solving healthcare and biomedical problems.
4. Identify potential applications of machine learning in practice and execution of machine learning tools such as WEKA.

UNIT - 1


UNIT - II

Statistical Significance Test: Multivariate Data Analysis, Methods in Analysis of Two-Class Problem and Multi-Class Problem.  

UNIT – III

Classifiers: Decision Tree, k-Nearest Neighbor (k-NN) classifier and Support Vector Machine (SVM) classifier, Advances in Machine-Learning systems, Introduction to WEKA.  

Course Outcomes:

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

1. Recognize the characteristics of pattern recognition that make it useful to real-world problems.
2. Appreciate the significance of statistical techniques in machine learning for discrimination of patterns.
3. Design and implement various machine learning algorithms in a range of healthcare applications using advanced simulation tools.

Mapping of POs & COs:

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REFERENCE BOOKS:

FUZZY LOGIC

Sub Code : 14EC621
Hrs/Week : 3+0+0+0
Credit : 03
Total Hours : 39

Course Learning Objectives:
The course presents basics of Fuzzy Logic that aims to:
1. Introduce concept of Fuzzy logic, Classical and Fuzzy relations, Member functions and Fuzzy arithmetic.
2. Arm the students with the basics of Fuzzy rule based system.
3. Introduce Fuzzy classification.

UNIT - I

Introduction: Background, Uncertainty and imprecision, Uncertainty in information, Fuzzy sets and membership, Classical sets, Fuzzy sets, Sets as points in hypercubes.
Membership functions: Standards, fuzzification, assignments, Inference, Rank. Neural networks, Genetic algorithms, Inductive reasoning.
Fuzzy arithmetic: Lambda-cuts, Defuzzification methods, fuzzy, Fuzzy transform (Mapping), Practical considerations, Approximate methods, DSW algorithm, Comparisons.

16 Hours

UNIT - II

Classical logic and fuzzy logic: Classical predicate logic-tautologies, Contradictions, Equivalence, Logical proofs, Deductive Inferences, Fuzzy logic, Fuzzy tautologies, contradictions, Equivalence and logical proofs, Other forms of the implication operation.
Fuzzy rule-based systems: Natural language, hedges, Rule-based system-canonical rule forms, Decomposition, Likelihood and truth qualification, Aggregation, Graphical techniques of inference.
Fuzzy synthetic evaluation, ordering, decision making under fuzzy states.

15 Hours

UNIT - III

Fuzzy classification: Classification by equivalence relations-crisp relations, Fuzzy relations cluster analysis, Cluster validity, c-Means clustering-hard c-Means (HCM), Fuzzy c-Means (FCM), classification metric, Hardening the fuzzy c-Partition, Similarity relations from clustering.

8 Hours

Course Outcomes:
A student who successfully fulfills the course requirements will have demonstrated:
1. An understanding of the concepts of Fuzzy logic, Classical and Fuzzy relations
2. An understanding of Fuzzy rule based system
3. An understanding of Fuzzy classification
Mapping of POs & COs:

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TEXT BOOK:

REFERENCE BOOK:

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ADVANCED SIGNAL PROCESSING

Sub Code : 14EC622  Credit : 03
Hrs/Week : 3+0+0+0  Total Hours : 39

Course Learning Objectives:

1. Homomorphic signals and systems are discussed with cepstral analysis.
2. Different types of adaptive filters with its application are elaborated.
3. Introduces multirate digital signal processing along with different forms of filter bank applications.

UNIT – I

Review of prerequisites for advanced digital signal processing: Signals, Fourier representations, DFT & FFT, IIR and FIR filters
Homomorphism signal processing: Homomorphic system, complex Cepstrum, properties of complex cepstrum, complex cepstrum of exponential signals, Real Cepstrum, Implementation of cepstrum using DFT, Hilbert transform relations in cepstral analysis, Homomorphic systems: convolution and deconvolution, Examples of Homomorphic signal processing, Communication signal processing and speech processing  16 Hours

UNIT – II


Multi-rate Signal Processing: Multi-rate Systems, Decimation and Interpolation (integer and fractional), Decimation Filters, Interpolation File \[ \text{15 Hours} \]

UNIT - III
Interpolated FIR filters for decimation and interpolation filters. Uniform DFT filter banks, QMF banks Perfect Reconstruction, Poly Phase Filter structure, Poly Phase Filter structure for Decimation and Interpolation, Filter Banks, Half band and Multiband filters, PR systems. \[ \text{8 Hours} \]

Course Outcomes:

At the end of the course student will be able to

1. Understand the concept of cepstral analysis in speech signal processing.
2. Adopt the adaptive filtering techniques for the stochastic random process.
3. Design and use filter banks in the field of multirate signal processing.

Mapping of POs & COs:

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TEXT BOOKS:
4. DSP Handbook.

REFERENCE BOOKS:
DATA BASE MANAGEMENT SYSTEM

Sub Code : 14EC623
Credit : 03
Hrs/Week : 3+0+0+0
Total Hours : 39

Course Learning Objectives:

This course will enable students to

1. Describe databases and database management systems.
2. Understand database structures and their working principles.
4. Learn how to relate tables together in a database.
5. Recognize structured query language (SQL) statements and write queries using SQL.
6. Construct the stages of database project design-query processing and optimizing database, concurrency control using locking techniques.
7. Understand the issues associated with Transaction Processing and Recovery

UNIT – I

Introduction: DBMS Administrators, designers, Users, Developers & maintenance users of DBMS.


Relational data model & Relational algebra: Queries in relational algebra. 16 Hours

UNIT – II

SQL- A Relational Database language, Different clauses & example queries.

Database Design: I, II, III Normal forms, BCNF, Join dependencies, IV & V Normal forms. 14 Hours

UNIT-III

Query processing & Optimization, Transactions, Recovery & Concurrency control. Security & Integrity constraints. 9 Hours

Course Outcomes:

At the end of the course student will be able to

1. Comprehend database structures and their working principles.
2. Design simple database models using Entity- Relationship Modeling.
3. Write queries using SQL.

4. 

5. Construct the stages of database project design with respect to query processing and optimization integrated with security constraints.

6. Identify the issues associated with Transaction Processing and Recovery.

**Mapping of POs & COs:**

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**TEXT BOOK:**


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**CONTROL SYSTEMS**

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**Course Learning Objectives:**

This course will enable students to:

1. Develop the theoretical aspects of Control systems and feedbacks, to find the mathematical models of physical systems, to determine transfer functions using different techniques and to analyze steady state and transient behavior of Control systems.

2. Study the concepts of RH criteria, Root Locus, Nyquist Plot, to perform stability analysis in time and frequency domain.

3. Study the concepts of Bode Plot, to understand the correlation between time and frequency response analysis.

**UNIT – I**

**Modeling of Systems:** The control system, Mathematical models of physical systems- Differential equations of physical systems- Electrical systems, Mechanical system.
**Block diagrams and signal flow graphs:** Transfer functions, Block diagram algebra, and Signal flow graphs. Time response of feed back control systems: Unit step response of First and second order systems, Time response specifications, Time response specifications of second order systems, steady-state errors and error constants.  

**UNIT – II**

**Stability in the time domain:** Concepts of stability, Necessary conditions for Stability, Routh-stability criterion, Relative stability analysis.  
**Root – Locus Techniques:** Introduction, the root locus concepts.  
**Stability in the frequency domain:** Mathematical preliminaries, Nyquist stability criterion, (Inverse polar plots excluded), Assessment of relative stability using Nyquist criterion, (Systems with transportation lag excluded).

**UNIT - III**

**Frequency domain analysis:** Introduction, Correlation between time and frequency response, Bode plots (construction and analysis of Bode plots for simple systems).

**Course Outcomes:**

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

1. Model the system in the different analogues form, understand the open loop and closed loop (feedback) systems, determine the transfer function of the system using different techniques, analyze steady state and transient behavior of Control systems.
2. Understand time domain and frequency domain analysis of control systems required for stability analysis.
3. Correlate between time and frequency response analysis.

**Mapping of POs & COs:**

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**TEXT BOOK:**


**REFERENCE BOOKS:**

Syllabus of V & VI Semester B.E. / Electronics & Communication

ERROR CONTROL CODING

Sub Code : 14EC625  Credit : 03
Hrs/Week : 3+0+0+0  Total Hours : 39

Course Learning Objectives:

This course will enable students to learn how to apply error control coding to achieve error detection and correction in digital communication systems.

UNIT - I

Introduction to coding theory, potential and need of error control coding.

Linear Block Codes: Introduction, Syndrome and error detection, Minimum distance of a block code, Error-detecting and Error-Correcting capabilities of block code, Standard array and Syndrome decoding, Probability of an undetected error for linear codes over BSC, Single-parity-check codes, Repetition Codes and Self-Dual codes, hamming codes, Reed-Muller codes. 13 Hours

UNIT - II

Cyclic Codes: Introduction, Generator and Parity-check matrices of cyclic codes, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes, Cyclic Hamming Codes, Error-Trapping Decoding, Golay Codes, Shortened Cyclic Codes. 13 Hours

UNIT - III

Convolutional Codes: Encoding, Convolutional Encoder representation, State representation and State diagram, Tree diagram, Trellis diagram, Properties of Convolutional Codes, Hard and Soft decision, Viterbi convolutional decoding algorithm, Other decoding algorithms- Sequential decoding and Feedback decoding. 8 Hours

Course Outcomes:

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

1. Demonstrate the encoding and decoding procedures of various error control codes.
2. Compare the error correction capability of different error control codes and their performances.
3. Apply error control coding to achieve error detection and correction in digital transmission systems

Mapping of POs & COs:

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REFERENCE BOOKS:

DIGITAL SIGNAL PROCESSING LAB

Sub Code: 14EC605
Credit: 03
Hrs/Week: 0+0+3+0

Course Learning Objectives:

This course will enable students to:
1. Explain and apply sampling theorem on analog signals
2. Study the impulse response of a given LTI system by using deconvolution operation and verify the result using convolution operation
3. Study, analyze and implement linear convolution of one sided and two sided aperiodic sequences
4. Study and implement circular convolution of two periodic sequences
5. Analyze autocorrelation and cross correlation of a given sequence and verify symmetry and energy properties
6. Study and obtain impulse response, step response and steady state response of a system described by a difference equation
7. Analyze and understand N-point DFT computation using ‘fft’ command on a given discrete time signal and plot its magnitude and phase spectrum
8. Perform linear and circular convolution of two given sequences using DFT-IDFT method
9. Study and implement FIR and IIR filters for the given specifications
10. Implement linear convolution, circular convolution, impulse response of an LTI system and FIR filter design on DSP processor using Code Composer Studio platform.

LIST OF EXPERIMENTS USING MATLAB

<table>
<thead>
<tr>
<th>Experiment No.</th>
<th>Title</th>
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<tbody>
<tr>
<td>1</td>
<td>i) Familiarization with MATLAB software and general functions</td>
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<td>ii) Generation of Elementary signals</td>
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</table>
• Sinusoidal
• Square
• Complex waveform
• Unit Step
• Unit Ramp
• Exponential
• Noise

2 Verification of Sampling theorem
   1. Under Sampling
   2. Sampling at Nyquist rate
   3. Over Sampling

3 Finite and Infinite Response of an LTI System
   i) Impulse Response
   ii) Frequency Response

4 Linear Convolution of two given sequences.
   i) One sided sequences
   ii) Two sided sequences

5 Circular Convolution of two given sequences.
   i) Equal length sequences
   ii) Unequal length sequences

6 Auto Correlation of a given sequence and verification of its properties.
   i) Symmetry (Even)
   ii) Energy
   iii) Periodicity

7 Cross Correlation of a given sequence and verification of its properties.
   i) Conjugate Symmetry

8 Response of a system described by given difference equation.
   i) Impulse Response
   ii) Step Response
   iii) Steady state Response
   iv) Complete Response with a given initial condition

9 Computation of N point DFT of a given sequence and plot high density, high resolution Magnitude and Phase Spectrum.
   i) Using FFT command
   ii) Without using FFT command

10 Convolution of two given sequences using DFT and IDFT.
   i) Linear Convolution
   ii) Circular Convolution

11 Design and implementation of FIR filter to meet the given specifications using Rectangular /Bartlett /Hanning /Hamming /Blackman window for the following types of filters.
   i) LPF
   ii) HPF
   iii) BPF
   iv) BSF
Design and Implementation of Analog and Digital IIR filter to meet the given specifications for the following types of filters.

i) LPF  
ii) HPF  
iii) BPF  
iv) BSF

**LIST OF EXPERIMENTS USING DSP PROCESSOR**

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<th>Experiment No.</th>
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<td>Circular convolution of two given sequences.</td>
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<td>Computation of N point DFT of a given sequence.</td>
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<td>Impulse response of a given system of a given system of first and second order.</td>
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**Course Outcomes:**

Upon successful completion of this lab, students will be able to:

1. Apply sampling theorem to know at what condition reconstruction is possible.
2. Understand linear convolution, its relationship with circular convolution, how linear convolution can be computed by circular convolution and DFT, IDFT method to compute circular convolution.
3. Verify the properties of a signal such as Energy, Symmetry and Periodicity.
4. Find the impulse response of an LTI system for a given difference equation. Analyze and observe magnitude and phase characteristics of N-point DFT to obtain high resolution, high density spectrum.
5. Analyze and observe frequency response characteristics of FIR filters using windowing techniques and frequency response characteristics of digital IIR Butterworth & Chebyshev filters using bilinear transformation technique.
6. Implement DSP algorithms using C programming with TMS320C6713 floating point DSP processor with CC Studio Platform.

**Mapping of POs & COs:**

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L: Low  
M: Medium  
H: High
Course Learning Objectives

This course will enable students to:

1. Study the sampling theorem to generate flat top samples and to reconstruct the original signal using kit.
2. Understand various binary digital modulation and demodulation schemes such as ASK, FSK, PSK using kits.
3. Measure transmission line parameters such as free space wavelength, guide wavelength and VSWR using microwave test bench with Reflex Klystron as source.
4. Study optical fiber line and to measure various losses and numerical aperture.
5. Carry out measurement of resonant characteristics of microstrip ring Resonator and determine isolation and coupling coefficient of microstrip line based on directional coupler.
6. Design and conduct an experiment to determine parameters of antenna for Dipole and Yagi antenna.

LIST OF EXPERIMENTS

1) Verification of sampling theorem using flat top samples.
2) ASK generation and detection (binary).
3) FSK generation and detection (binary).
4) PSK generation and detection (binary).
5) DPSK encoder and decoder.
6) QPSK modulator.
7) Measurement of guide wavelength ($\lambda_g$), frequency and VSWR with using microwave test bench Reflex Klystron as source.
8) Measurement of antenna parameters.
9) Determination of coupling coefficient and isolation characteristics of microstrip line Directional coupler.
10) Study of optical fibers
11) a) Measurement of resonant characteristics of microstrip ring resonator
    b) Measurement power division & Isolation characteristics of microstrip 3dB power divider.
Course Outcomes:

Upon successful completion of this lab, students will be able to:

1. Verify the generation of samples and reconstruction of the original signal from the samples.
2. Understand various binary digital modulation and demodulation schemes.
3. Measure microwave parameters using microwave test bench with Reflex Klystron as source.
4. Understand the working of optical fiber cables and to measure various losses and numerical aperture.
5. Measure parameters of microstrip ring Resonator and determine isolation and coupling coefficient of microstrip line based on directional coupler.
6. Design an experiment to determine parameters of Dipole antenna and Yagi antenna.

Mapping of POs & COs:

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L: Low  M: Medium  H: High

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EMPLOYABILITY SKILL DEVELOPMENT

Sub Code : 14IL001/002
Hrs/Week : 1+0+0+0

Credits : Nil (MLC)
Total Hours : 12

UNIT - I

Analytical Aptitude Skill: concept of analytical skill, definition-logical thinking and testing of Analytical Aptitude

UNIT - II

Quantitative Aptitude skill-Concept-definition-Preliminary requirement for development of quantitative skill-testing of quantitative skill.

UNIT - III
Verbal and ability skill – Knowledge and Vocabulary and grammar-comprehension-Verbal Reasoning skill

REFERENCE BOOKS:


Examination pattern:
This course is a mandatory learning course without credit. Continuous internal examination (CIE) consists of 2 internal exams (20 marks each) and tasks (10 marks). There is no semester end examination (SEE). The student will be awarded PP or NP grade as per autonomous regulations.