<table>
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<th>Name</th>
<th>Qualification</th>
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<tr>
<td>1</td>
<td>Dr. Rajesh Shetty K.</td>
<td>Ph.D</td>
<td>Professor/HOD</td>
</tr>
<tr>
<td>2</td>
<td>Dr. M.K. Parasuram</td>
<td>Ph.D</td>
<td>Director</td>
</tr>
<tr>
<td>3</td>
<td>Prof. S. Chandrakanth Naik</td>
<td>M.S/MBA</td>
<td>Asso. Professor</td>
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<tr>
<td>4</td>
<td>Dr. Rekha Bhandarkar</td>
<td>Ph.D</td>
<td>Professor</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Rathnamala Rao</td>
<td>Ph.D</td>
<td>Professor</td>
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<tr>
<td>6</td>
<td>Dr. Ajay Singhal</td>
<td>Ph.D</td>
<td>Professor</td>
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<tr>
<td>7</td>
<td>Prof. H. Manjunath Pai</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
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<tr>
<td>8</td>
<td>Mr. Durga Prasad</td>
<td>M.Tech(Ph.D)</td>
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<td>9</td>
<td>Mr. Mahaveera K.</td>
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<td>10</td>
<td>Mrs. Sushma P.S.</td>
<td>M.Tech</td>
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<tr>
<td>11</td>
<td>Mrs. Sunitha Lasrado</td>
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<td>12</td>
<td>Mrs. Shrividya G.</td>
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<td>Mrs. Padmavath K.</td>
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<tr>
<td>16</td>
<td>Mr. Satheesh Rao</td>
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<tr>
<td>17</td>
<td>Mr. Sukesh Rao M.</td>
<td>M.Tech(Ph.D)</td>
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<tr>
<td>18</td>
<td>Mr. Ravindra K.S.</td>
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<td>19</td>
<td>Mr. Pradyumna G.R.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>20</td>
<td>Mrs. Roopa B. Hegde</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
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<tr>
<td>21</td>
<td>Mrs. Usha Desai</td>
<td>M.Tech(Ph.D)</td>
<td>Asst. Prof Gd II</td>
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<td>22</td>
<td>Mrs. Charishma</td>
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<td>23</td>
<td>Mrs. Niju Rajan</td>
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<td>Mrs. Shubha B.</td>
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<td>26</td>
<td>Mr. Anil Kumar Bhat</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<td>27</td>
<td>Ms. Ranjitha Ravindran</td>
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<td>28</td>
<td>Ms. Ankitha Rao</td>
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<td>29</td>
<td>Mr. Bomme Gowda</td>
<td>B.E(M.Tech)</td>
<td>Asst. Professor</td>
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<td>30</td>
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<td>31</td>
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<td>Mr. Sudharshana</td>
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<td>37</td>
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<td>Mr. Prajwal Hegde N.</td>
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<td>39</td>
<td>Mr. Karthik</td>
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<td>40</td>
<td>Mrs. Anupama B.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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</table>

**Department of E & C Engineering, NMAMIT, Nitte**

**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: B.E. Electronics & Communication Engineering

Program Educational Objectives (PEO’s):

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 (PO’s):

PO1: Students will be able to identify, analyze and solve basic Electronics Engineering Problems, in Specific areas, by applying knowledge of Mathematics, science and Engineering with modern Engineering tools.

PO2: Students will demonstrate an ability to visualize and work on Laboratory and Multidisciplinary tasks.

PO3: Students will be able to understand engineering practice in the context of global, Economic, Environmental and societal realities
# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
## SCHEME OF TEACHING
### V Semester:

<table>
<thead>
<tr>
<th>SL. NO</th>
<th>SUBJECT CODE</th>
<th>SUBJECTS</th>
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<th>HRS./WEEK</th>
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### Elective-I

- 12EC511 Fiber Optics
- 12EC512DSP Processors & Architecture
- 12EC513 Programming in C++
- 12EC514 Project Management
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF TEACHING

VI Semester:

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<tr>
<th>SL. NO</th>
<th>SUBJECT CODE</th>
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Elective-II

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<tr>
<td>12EC611</td>
<td>Radar &amp; Navigational aids</td>
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<tr>
<td>12EC612</td>
<td>ARM Processor</td>
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<tr>
<td>12EC613</td>
<td>Computer Operating Systems</td>
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<tr>
<td>12EC614</td>
<td>Comp. Org. &amp; Architecture</td>
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Elective-III

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<td>12EC621</td>
<td>Fuzzy Logic</td>
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<td>12EC622</td>
<td>Advanced Signal Processing</td>
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<td>12EC623</td>
<td>Data Base Management System</td>
</tr>
<tr>
<td>12EC624</td>
<td>Control Systems</td>
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DIGITAL SIGNAL PROCESSING

Subject Code : 12EC501  Credits : 04
Hrs/Week : 4  Total Hours : 52

UNIT - I
Discrete Fourier Transform: Its Properties And Applications:
Discrete Fourier Transform (DFT), Frequency Domain sampling and reconstruction of Discrete – Time signals. The DFT as a linear Transformation. Relationship of the DFT to other Transforms. Properties of the DFT: Periodicity, Linearity, and Symmetry Properties, Multiplication of two DFTs and Circular Convolution, Additional DFT Properties. 11 Hrs

UNIT - II

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 Hrs

UNIT - IV

UNIT - V
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. 11 Hrs

TEXT BOOK:

REFERENCE BOOKS:
DIGITAL COMMUNICATION

Subject Code : 12EC502
Credits : 04
Hrs/Week : 4
Total Hours : 52

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 Hrs

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 Hrs

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 Hrs

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 Hrs
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 Hrs

TEXT BOOKS:

REFERENCE BOOK:
TRANSMISSION LINES & WAVEGUIDES

Subject Code : 12EC503  Credits : 04
Hrs/Week : 4  Total Hours : 52

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 Hrs

UNIT - II
The 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 Hrs

UNIT - III
Stub 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 Hrs

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 Hrs

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 Hrs

TEXT BOOKS:
T2. Liao S., “Microwave Devices and Circuits”, PHI.

REFERENCE BOOKS:
SYSTEM DESIGN USING
MICROPROCESSOR / MICROCONTROLLER

Subject Code : 12EC504  Credits : 04
Hrs/Week : 4  Total Hours : 52

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 Hrs

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 Hrs

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.

10 Hrs

UNIT – IV

14 Hrs

UNIT - V

8 Hrs
TEXT BOOKS:


TELECOMMUNICATION AND SWITCHING NETWORKS

Subject Code : 12EC505  
Credits : 04  
Hrs/Week : 4  
Total Hours : 52

UNIT - I


UNIT - II


Switching Networks: Single stage networks, Link systems: General, Two-stage networks, Three-stage networks, four stage networks. Grade of Service of link systems, two stage, three stage networks, four stage networks. Application of graph theory to link systems, Use of expansion, Call packing, Rearrangeable networks.  

UNIT - III


Signalling: Customer line signalling, Audio frequency junctions and trunk circuits, FDM carrier systems: Out-band signalling, In-band(VF) signaling, PCM signalling, Inter-register signalling, Common channel signalling principles

UNIT - IV

Telephone Services- MODEMS and FAX Machines: MODEM, Asynchronous Character Format, 5-bit and 7-bit codes, Asynchronous Operation, Synchronous Operation, Isochronous Operation,

**12 Hrs**

**UNIT - V**


**8 Hrs**

**TEXTBOOK:**


**REFERENCE BOOKS:**


**MICROPROCESSOR / MICROCONTROLLER**

**APPLICATION LAB**

Subject Code :  12EC506  
Credits:  02  
Hrs/Week :  3

**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:**
   I. Addition and Subtraction of Byte, Word and multiple byte data.
   II. Multiplication and Division of signed and unsigned Hexadecimal numbers.
   III. ASCII adjustment instructions
   IV. Code conversions
   V. Arithmetic programs to find square cube, LCM, GCD, factorial of numbers

3. **Bit manipulation instructions:**
   I. Whether given data is positive or negative
   II. Whether given data is odd or even
   III. Logical 1’s and 0’s in a given data
   IV. Bit wise and nibble wise palindrome

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

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

6. **Programs involving Software interrupts**
   Programs to use DOS interrupt INT 21h Function calls for Reading a Character from keyboard, Buffered Keyboard input, Display of character/ String on console

**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
BASIC COMMUNICATION LAB

Subject Code : 12EC507  Credits : 02
Hrs/Week : 3

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
   a. PPM (modulation and demodulation).
   b. PWM (modulation and demodulation).
10. Transistor mixer – up/down conversions.
IMMERSIVE GROUP WORKSHOP (IGW)

Subject Code: 12EC508  Credits: 0

Hrs/Week: 3

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 Hrs

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 Hrs

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
- Misrepresentation and misappropriation
- Intellectual property
- Whistle blowing  

7 Hrs

Module 4: Interpersonal Behaviour & relationship skills
- Establishing trust based relationships in team & organizational environment
- Trust equation – credibility, responsiveness, integrity, self-interest  

3.5 Hrs

Module 5: Dealing with Conflicts
Orientation towards conflicts in team and organizational environment
• Understanding sources of conflicts
• Conflict resolution styles and techniques 3.5 Hrs

Pedagogical tools & techniques used in the workshop
• Organizational templates for simulating a organizational context- structures, units, roles and activities
• Metaphoric scenarios for simulating real –life tasks and dynamics in a team/project context
• LEGO™ building blocks for simulating last-mile technical activity in teams
• 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

Subject Code : 12EC511
Credits : 03
Hrs/Week : 3
Total Hours : 39

UNIT - I


UNIT - II

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.

TEXT BOOKS:
REFERENCE BOOKS:

DSP PROCESSORS AND ARCHITECTURE
Subject Code : 12EC512 Credits : 03
Hrs/Week : 3 Total Hours : 39

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 Hrs

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 Hrs

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

TEXT BOOK:

REFERENCE BOOKS:
R1. Ifeachor E. C., Jervis B. W., “Digital Signal Processing : A
   Practical Approach”, Pearson- Education, 2002
R2. B. Venkataramani, M. Bhaskar, “Digital Signal Processors”,
   TMH, 2002
   Architectures, Implementations and Applications”,
   Prentice Hall, 2005
## PROGRAMMING IN C++

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>12EC513</th>
<th>Credits</th>
<th>03</th>
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<td>Hrs/Week</td>
<td>3</td>
<td>Total Hours</td>
<td>39</td>
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### UNIT - I

**Getting started:** General format, data types, variable declaration, operators, and miscellaneous topics, keyboard input and screen output.

- Control statement and loops: relational and logical operators, if and switch statements, loops in general, for, while and do while loops.
- **Pointers, addresses & indirection operator:** Importance of pointers, data variables and memory, address operators, pointers.
- **Functions basics:** Functions in C++, basic format, requirement for writing functions, local, static and global variables, pointers and functions.

16 Hrs

### UNIT - II

**Arrays:** Using single data variables, array fundamentals, one dimensional arrays and functions, character strings.

- **User defined data types:** Customized data types, data structures, accessing structure elements, structure arrays, structure within structures, structures and functions, structure arrays and functions, enumerated data types.
- **Classes and objects:** Object oriented principles and definitions, classes and objects, writing member functions, class constructors and destructors, examples, array of objects, pointer and classes.

16 Hrs

### UNIT - III

**Class relationships:** Using C++ language classes, user defined classes, Inheritance. Importance of Inheritance and basics.

7 Hrs

### TEXT BOOK:


### REFERENCE BOOK:

PROJECT MANAGEMENT

Subject Code : 12EC514
Credits : 03
Hrs/Week : 3
Total Hours : 39

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. 15 Hrs

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. 15 Hrs

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. 9 Hrs

TEXT BOOK:

REFERENCE BOOKS:
INFORMATION THEORY AND CODING

Subject Code : 12EC601
Credits : 04
Hrs/Week : 4
Total Hours : 52

UNIT - I
Information Theory: Introduction, Measure of information, Average information content of symbols in long independent and dependent sequences, Markov statistical model for information source, Entropy and information rate of Markov source. 10 Hrs

UNIT - II
Source Coding: Properties of codes, Kraft’s inequality, Shannon’s encoding algorithm, Shannon-Fano encoding algorithm, Huffman minimum redundancy code (binary, ternary and quaternary), code efficiency and redundancy. 10 Hrs

UNIT - III
Channels and Mutual Information: Introduction, Discrete communication channels, Representation of a channel, Probability relations- priori, posteriori entropy, equivocation, mutual information, Special channels- symmetric, binary symmetric, binary erasure, noiseless, deterministic and cascaded channels, Estimation of channel capacity by Muroga’s method. 10 Hrs

UNIT - IV
Error Control Coding-I: Introduction, Types of errors, Examples, Types of codes, Linear Block Codes- matrix description, error detection and correction, table look up decoding using standard array, Binary cyclic codes, Encoding using (n-k) bit shift register, syndrome calculation. 12 Hrs

UNIT - V
Error Controlling Coding-II: BCH codes, RS codes, Golay codes, Shortened cyclic codes ,Burst error correcting codes, Burst and Random error correcting codes, Convolutional codes-Time domain approach, Transform domain approach , code tree, state diagram, Viterbi decoding. 10 Hrs
TEXT BOOK:


REFERENCE BOOKS:


MICROWAVE DEVICES & COMMUNICATION

<table>
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<tr>
<th>Subject Code</th>
<th>Credits</th>
<th>Hrs/Week</th>
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<tr>
<td>12EC602</td>
<td>04</td>
<td>4</td>
<td>52</td>
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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.  

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.  

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 Hrs

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 Hrs

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 Hrs

TEXT BOOKS:
T2. Annapurna Das & Sisir K. Das, “Microwave Engineering”

REFERENCE BOOK:
VLSI CIRCUITS

Subject Code : 12EC603  
Credits : 04
Hrs/Week : 4  
Total Hours : 52

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 Hrs

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. Latch-up in CMOS and prevention.  
12 Hrs

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 Hrs

UNIT - IV
Designing with high speed CMOS logic networks: Gate delays, driving large capacitive loads, logic efforts, Timing Analysis(T2)  
10 Hrs

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 Hrs
TEXT BOOKS:

REFERENCE BOOKS:

ANTENNAS & WAVE PROPAGATION

Subject Code : 12EC604 Credits : 04
Hrs/Week : 4 Total Hours : 52

UNIT - I
Antenna Basics: Basic antenna parameters, patterns, beam area, Radiation Intensity, Beam efficiency, Directivity and Gain, Antenna aperture, Effective height, Radio communication link, Fields from oscillating dipole, Antenna field zones, Shape- impedance consideration.
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, Non- isotropic dissimilar point sources, array of n- isotropic sources of equal amplitude and spacing, null directions, Array of two driven $\lambda/2$ elements (broad side case, end-fire case and general case with equal currents of any phase) 10 Hrs

UNIT - II
Electric Dipole and Thin Linear Antennas: The short electric dipole, the fields of short dipole, radiation resistance, thin linear
antenna, radiation resistance of $\lambda/2$ antenna, fields of thin linear antenna.

**Loop Antenna:** Loop antenna (general case), field comparison of short dipole and small loop, field pattern, radiation resistance, directivity, radiation efficiency, Q, Band width and SNR.  

10 Hrs

**UNIT - III**

**Helical Antenna And Yagi-Uda Array:** Helical antenna, Helical geometry, 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, axial-Mode patterns, Axial ratio and conditions for circular polarization of Monopolar axial- mode Helical antenna and wide band characteristics of Monopolar axial- mode helical antenna.

**Antenna Types:** Slot antenna, Babinet’s principle and Complementary antenna, 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, the plasma antennas.  

12 Hrs

**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  

10 Hrs

**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 earths magnetic field, wave propagation in Ionosphere, Faraday rotation and measurement of total electron content.  

10 Hrs

**TEXT BOOKS:**


REFERENCE BOOKS:

RADAR AND NAVIGATIONAL AIDS

Subject Code : 12EC611          Credits : 03
Hrs/Week     : 3                  Total Hours : 39

UNIT - I
Basic radars: simple form of radar, radar equation, range performance, minimum detectable signal, Receiver S/N, range ambiguities; Doppler effect, CW radar, FMCW radar; Radar displays
MTI: pulse Doppler radar, delay line cancellers, range-gated Doppler filters, signal processing, limitations to MTI, Tracking with radars, sequential “lobing”, conical scan, mono-pulse tracking, range acquisition

   15 Hrs

UNIT - II
Navigation: radio direction finding, “Gonio”-meters, errors in direction finding, Adcock direction finder, LF-MF four course radio range, VOR, Hyperbolic systems of navigation-LORAN, DECCA; DME , TACAN.Aids to approach and landing: ILS, glide slope systems, surveillance radar, precision approach radar; Components of Doppler navigation, Gyros and Inertial navigation, stabilized platforms, GPS.

   16 Hrs

UNIT - III
Radar Receiver concepts: Electronically steered phased array antenna, array elements, feeds for arrays, phase shifters; Noise figure and noise temperature; matched filter receiver, correlation detection, and detector characteristics.

   8 Hrs
TEXT BOOKS:

REFERENCE BOOKS:

ARM PROCESSOR

Subject Code : 12EC612
Credits : 03
Hrs/Week : 2+0+2
Total Hours : 39

NOTE: 1. CIE Evaluation: MSE-1 + MSE-2 + Mini project : 15Marks + 15 Marks +20 Marks

1. No. of Hours allotted for Lab: 11 Hrs

UNIT - I
ARM Processor: Introduction to ARM 7, ARM – THUMB Mode, Programming Model, Instruction Set. 10 Hrs

UNIT - II

UNIT - III
Programming In Embedded C – Assembly Language, Source File To Hex File Translation, Embedded Firmware Development Languages/Options – Assembly Language – Source File To Hex File Translation, Embedded Firmware Development Languages/Options – High Level Language – Source File To Hex File Translation, Mixing Of Assembly Language With High Level Language, ‘C’ Verses Embedded C, Keywords, Data Type, Storage Class, Arithmetic
Operators, Logic Operator, Branching And Loop Control Instructions, Arrays, Pointers, Characters and Strings, Input Output Operations, String operations, Functions, Structures, Union, Preprocessor and Macros, Delay, Bit Manipulation Operation, Coding Interrupt Service Routine, Reentrant Versus Recursive Function, Dynamic Memory Allocation, Memory Management Functions.  

TEXT BOOKS:


COMPUTER OPERATING SYSTEMS

Subject Code : 12EC613  
Credits : 03  
Hrs/Week : 3  
Total Hours : 39

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.

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 Hrs

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 Hrs

TEXT BOOK:

REFERENCE BOOK:

R2.

COMPUTER ORGANIZATION & ARCHITECTURE

Subject Code : 12EC614  
Credits : 03  
Hrs/Week : 3  
Total Hours : 39

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.


15 Hrs
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 Hrs

UNIT - III

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

TEXT BOOK:


REFERENCE BOOK:


FUZZY LOGIC

Subject Code : 12EC621  Credits : 03
Hrs/Week : 3  Total Hours : 39

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 Hrs
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 Hrs

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 Hrs

TEXT BOOK:

REFERENCE BOOK:

ADVANCED SIGNAL PROCESSING

Subject Code : 12EC622  Credits : 03
Hrs/Week : 3  Total Hours : 39

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 Hrs
UNIT - II


Multi-rate Signal Processing: Multi-rate Systems, Decimation and Interpolation (integer and fractional), Decimation Filters, Interpolation Filters. 15 Hrs

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. 8 Hrs

TEXT BOOKS:


T4. DSP Handbook.


REFERENCE BOOKS:


DATA BASE MANAGEMENT SYSTEM

Subject Code : 12EC623  
Credits : 03  
Hrs/Week : 3  
Total Hours : 39

UNIT - I
Introduction: DBMS Administrators, designers, Users, Developers & maintenance users of DBMS.
Relational data model & Relational algebra: Queries in relational algebra.  
16 Hrs

UNIT - II
SQL-a Relational Database language, Different clauses & example queries.
14 Hrs

UNIT - III
Query processing & Optimization, Transactions, Recovery & Concurrency control. Security & Integrity constraints..  
9 Hrs

TEXT BOOK:
CONTROL SYSTEMS

Subject Code : 12EC624    Credits : 03
Hrs/Week : 3    Total Hours : 39

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. 16 Hrs

UNIT - II
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). 15 Hrs

UNIT - III
Frequency domain analysis: Introduction, Correlation between time and frequency response, Bode plots (construction and analysis of Bode plots for simple systems). 8 Hrs

TEXT BOOK:

REFERENCE BOOKS:
DIGITAL SIGNAL PROCESSING LAB

Subject Code : 12EC605  
Credits : 02  
Hrs/Week : 3

LIST OF EXPERIMENTS USING MATLAB
1. Verification of sampling theorem.
2. Impulse response of a given system.
3. Linear convolution of two given sequences.
5. Autocorrelation of a given sequence and verification of its properties.
6. Cross correlation of given sequences and verification of its properties.
7. Solving a given difference equation.
8. Computation of N point DFT of a given sequence and to plot magnitude and phase spectrum.
9. Linear convolution of two sequences using DFT and IDFT.
10. Circular convolution of two given sequences using DFT and IDFT.
11. Design and implementation of FIR filter to meet given specifications.
12. Design and implementation of IIR filter to meet given specifications.

LIST OF EXPERIMENTS USING DSP PROCESSOR
1. Linear convolution of two given sequences.
2. Circular convolution of two given sequences.
3. Computation of N-Point DFT of a given sequence.
4. Realization of an FIR filter (any type) to meet given specifications. The input can be a Signal from function generator / speech signal.
5. Noise removal & Interference suppression.
6. Impulse response of first order and second order system.

REFERENCES:
ADVANCED COMMUNICATION LAB

Subject Code : 12EC606  
Credits : 02
Hrs/Week : 3

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 microstripline 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.

REFERENCE BOOKS: