# A Profile of the Syllabi for M.Sc. in Electronics

## Choice Based Credit System for PG Students in Electronics

### I Semester:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Course code</th>
<th>Title of the paper</th>
<th>HC/SC/OE</th>
<th>Credit pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E1.1</td>
<td>Network Analysis</td>
<td>HC</td>
<td>Lecture 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>2</td>
<td>E1.2</td>
<td>Microprocessor and ARM</td>
<td>HC</td>
<td>Lecture 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>3</td>
<td>E1.3</td>
<td>Digital Communication</td>
<td>HC</td>
<td>Lecture 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>4</td>
<td>E1.4</td>
<td>Semiconductor devices and Nano technology</td>
<td>SC</td>
<td>Lecture 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>5</td>
<td>L1.1</td>
<td>Lab in MASM and ARM interfacing</td>
<td>HC</td>
<td>Lecture -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>6</td>
<td>L1.2</td>
<td>Lab in Communications</td>
<td>HC</td>
<td>Lecture -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
</tbody>
</table>

Hard core subjects 4 hrs per week
Total 20 credits + 4 credits
Total 24

### II Semester:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Course code</th>
<th>Title of the paper</th>
<th>HC/SC/OE</th>
<th>Credit pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E2.1</td>
<td>Control System</td>
<td>HC</td>
<td>Lecture 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>2</td>
<td>E2.2</td>
<td>Java Programming</td>
<td>HC</td>
<td>Lecture 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>3</td>
<td>E2.3</td>
<td>Microwave Engineering</td>
<td>HC</td>
<td>Lecture 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>4</td>
<td>E2.4</td>
<td>Instrumentation Technology</td>
<td>SC</td>
<td>Lecture 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>5</td>
<td>L2.1</td>
<td>Java Programming Lab</td>
<td>HC</td>
<td>Lecture -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
<tr>
<td>6</td>
<td>L2.2</td>
<td>Lab in Microwave and Instrumentation using LABVIEW</td>
<td>HC</td>
<td>Lecture -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tutorial -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Practical 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4</td>
</tr>
</tbody>
</table>

Hard core subjects 4 hrs per week
Total 20 credits + 4 credits
Total 24
### III Semester:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Course code</th>
<th>Title of the paper</th>
<th>HC/SC/OE</th>
<th>Credit pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lecture</td>
<td>Tutorial</td>
</tr>
<tr>
<td>1</td>
<td>E3.1</td>
<td>Digital Signal Processing</td>
<td>HC</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>E3.2</td>
<td>COMMUNICATION NETWORKS</td>
<td>HC</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>E3.3</td>
<td>VLSI and Digital design using VHDL</td>
<td>HC</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>E3.4</td>
<td>Thin films and MEMS technology</td>
<td>SC</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>L3.1</td>
<td>Lab in MATLAB</td>
<td>HC</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>L3.2</td>
<td>Lab in VHDL</td>
<td>HC</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>E3.OE 1</td>
<td>Open to other streams 1. Microcontroller 8051 with embedded C  Or 2. Basic Electronics</td>
<td>OE</td>
<td>2</td>
</tr>
</tbody>
</table>

Hard core subjects 4 hrs per week  
Total 20 credits + 4 credits OE = 4 credits  
**Total:** 28

### IV Semester:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Course code</th>
<th>Title of the paper</th>
<th>HC/SC/OE</th>
<th>Credit pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lecture</td>
<td>Tutorial</td>
</tr>
<tr>
<td>1</td>
<td>E4.1</td>
<td>Embedded system</td>
<td>HC</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>L4</td>
<td>Project</td>
<td>HC</td>
<td>-</td>
</tr>
</tbody>
</table>

Hard core subjects 4 hrs per week  
Total 20 credits + 4 credits  
**Total:** 24

Total Credits (All four semesters)  
100
## I Semester
### E1.1 – Network Analysis

<table>
<thead>
<tr>
<th>Module</th>
<th>Total Hrs: 52 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 1:</strong></td>
<td>12 Hrs</td>
</tr>
<tr>
<td><strong>Basic Concepts:</strong></td>
<td>Practical sources, Source transformations, Network reduction using Star – Delta transformation, Loop and node analysis With linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh.</td>
</tr>
<tr>
<td><strong>Network Topology:</strong></td>
<td>Graph of a network, Concept of tree and co-tree, incidence matrix, tie-set, tie-set and cut-set schedules, Formulation of equilibrium equations in matrix form, Solution of resistive networks, Principle of duality.</td>
</tr>
</tbody>
</table>

| Module 2: | 10 hrs |
| **Network Theorems – 1:** | Superposition, Reciprocity and Millman’s Theorems, Thevinin’s and Norton’s theorems; Maximum Power transfer theorem |
| **Resonant Circuits:** | Series and parallel resonance, frequency response of series and Parallel circuits, Q – factor, Bandwidth. |

| Module 3: | 10 hrs |
| **Transient behavior and initial conditions:** | Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations. |

| Module 4: | 10 hrs |
| **Laplace Transformation & Applications:** | Solution of networks, step, ramp and impulse responses, waveform Synthesis. |

| Module 5: | 10 hrs |
| **Two port network parameters:** | Definition of Z, Y, H and transmission parameters, modeling with these parameters, relationship between parameters sets. |

### TEXT BOOKS:

### REFERENCE BOOKS:
### E1.2 – Microprocessor and ARM7 microcontroller

**Total number of Hours: 52**

<table>
<thead>
<tr>
<th>Module</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 1</strong></td>
<td>10 hrs</td>
</tr>
<tr>
<td><strong>Architecture &amp; Instruction set for 8086:</strong></td>
<td></td>
</tr>
<tr>
<td>Architecture and pin configuration of 8086, Basic 8086/8088 system bus architecture, Minimum mode Configuration, Maximum mode configuration; memory interfacing with 8086/8088 in minimum and maximum mode; System Bus Timings, Bus Standards.</td>
<td></td>
</tr>
</tbody>
</table>

| Module 2 | 12 hrs |
| **Instruction Format; Addressing modes, Data Transfer Instruction; Arithmetic Instructions; Branching and Looping Instructions, NOP and Halt, Flag Manipulation Instructions; Logical, Shift and Rotate Instruction. Byte and String Manipulation: String Instructions; REP Prefix, Table Translation, Number Format conversions. Assembler, Directives and Operators; Assembly Process; Assembly language programming, subroutines, macros. Interrupts of 8086.** | |

| Module 3: | 10 hrs |
| **ARM Embedded Systems:** | |

| Module 4: | 10 hrs |
| **Introduction to the ARM7 Instruction Set:** | |
| Data processing Instructions, Branch, Instructions, Load, store instructions, Software Interrupt Instruction, Program Status, Register Instructions, Loading Constants, ARM V5E Extensions, Conditional Executions. | |

| Module 5: | 10 hrs |
| **Introduction to the THUMB Instruction Set:** | |
| Thumb Register usage, ARM Thumb, Interworking, Data Processing Instructions, Single – Register Load – Store Instructions, Multiple Register Load - Store Instructions, Stack Instructions, Software Interrupt Instructions. | |

| Module 5: | 10 hrs |
| **Exception and Interrupt Handling:** | |
| Interrupts, Interrupt Handling Schemes, Nonnested, Interrupt Handler, Nested Interrupt Handler, Reentrant Interrupt Handler, Prioritized Simple Interrupt Handler, Prioritized Standard Interrupt Handler, Firm Ware for ARM based Embedded systems. | |

**Text Books:**

Software”, Andrew N. Sloss, Dominic Symes & Chris Wright, Morgan – Kaufmann Publishers

### E1.3 Digital Communications
Total number of Hours: 52

**Module 1:** 10 hrs
Communication: Introduction, Differences between digital and analog communication systems, Block diagram of a digital communication system. Classification of signals, Information channel capacity. Digital Transmission of Analog Wave forms: Introduction, Sampling Theory and Practice, Sampling Theorem, Ideal Sampling and Reconstruction low pass signals, the uniform Sampling Theorem for Band pass signals, Practical sampling.

**Module 2:** 10 hrs

**Module 3:** 12 hrs
Baseband transmission of binary data: The inter symbol interface problem, Ideal solution, Raised Cosine Spectrum, Correlative-level coding, Base band transmission of M-ray Data, Eye Pattern, Adaptive Equalization.

**Module 4:** 10 hrs
Multiplexing and Multiple accessing Techniques:
Frequency-Division Multiplexing/Multiple Access, Time-Division Multiplexing/Multiple Access, Communications Resource Channelization, Performance Comparison of FDMA and TDMA, Code-Division Multiple Access, Space-Division and Polarization-Division Multiple Access.
Source coding theorem, Prefix Coding, Huffman Coding, Channel coding.
Error Control Coding: Introduction, Linear Block Codes, Hamming Codes, Binary cyclic codes, Convolution Codes.

**Module 5:** 10 hrs
Analog and digital links in an optical fiber communication system:
Analog links – Introduction, overview of analog links, CNR, multichannel transmission techniques, RF over fiber, key link parameters, Radio over fiber links, microwave photonics.
Digital links – Introduction, point-to-point links, System considerations, link power budget, resistive budget, short wave length band, and transmission distance for single mode fibers, Power penalties, nodal noise and chirping.

TEXT BOOK:

REFERENCE BOOKS:
1. Digital and Analog communication systems, Simon Haykin, John Wildy India Lts, 2008

E1.4 – Semiconductor Devices and Nano Technology
Total number of Hours: 52

Module 1:
Introduction to semiconductor: 10 hrs
Bonding forces and Energy Bands in solids, Charge carriers in semiconductors, carrier concentrations, drift of carrier in Electric and magnetic fields

Module 2: 12 hrs
p-n junctions: equilibrium conditions, steady state conditions, reverse bias breakdown, transient and A-C conditions, metal semiconductor junctions, heterojunctions.
FET: The junction FET, Metal-Semiconductor FET, Metal - Insulator - Semiconductor FET, MOS FET.
Module 3: 10 hrs
Introduction to Synthesis of nanomaterials: 3D, 2D, 1D, 0D Nanostructures, Nanostructure assembly: Introduction, different strategies for synthesis of 3D, 2D, 1D (nanorods and nanowires) and 0D (Semiconductor nano dots: quantum dots, Metals nano particle/dots: plasmonics) nanomaterials. Special Nanomaterials synthesis carbon nanotube, micro and mesoporous, zeolites, core shell structures, hybrid nanomaterials.
Preparation methods: Bottom-up synthesis – Top-downm Approach: molecular self assemblies precipitation, mechanical milling, colloidal routes, self assembly, vapour phase deposition, MOCVD, sputtering, evaporation, PVD, Molecular beam epitaxy, atomic layer epitaxy, MOMBE.
Patterning and lithography for nanoscale devices: introduction to optical/ UV electron beam and x-ray lithography systems and processes, wet etching, dry (Plasma/reactive ion) etching, etch resists – dip pen lithography.

Module 4: 10 hrs
Characterization and characterization techniques of nanomaterials:
Introduction, structural characterization: X-ray diffraction (XRD – Powder/single crystal), small angle X-ray scattering (SAXS), scanning electron microscopy (SEM), transmission electron microscopy including high resolution imaging (TEM), energy dispersive X-ray analysis(EDAX), Low Energy Electron Diffraction(LEED), small angle X-ray and neutron scattering, scanning probe microscopy (SPM) – principle of operation, instrumentation and probes, Atomic force microscopy (AFM), Optical spectroscopy, luminescence spectroscopy, UV- spectroscopy (liquid and solid state), UV Photo electron microscopy (UPS), Infrared spectroscopy, Raman Spectroscopy.

Module 5: 10 hrs
Applications:
Applications of zero dimensional nanoparticles: Quantum dots for solar cells, Quantum dots for LED, molecular electronics, nanoparticle as catalysts.
Applications of one dimensional nanotubes and nanowires: Nanotube/nanowire based FET for biosensing, gas sensing, piezoelectric nanowires as nanogenerator, thermoelectric nanowires.
Application of carbon nano structures, Application of nano semiconductors: nanoscale electronic devices including CMOS, potentiometric sensors etc., magnetoresistive random access memory (MRAM) devices.

Text Books:

Reference Books:
1. Silicon VLSI Technology, Plummer, Deal, Griffin, Pearson Education India.
3. Introduction to nano electronics – Vladimir V. Mitin

L1.1 - 8086 Programming Lab

Part - A

8086 Programs

1. Addition, subtraction, multiplication and division of 8-bit, 16-bit binary and decimal numbers.
2. Addition and subtraction of two 24-bit binary and decimal numbers.
3. Average of N-8-bit/16-bit binary and decimal numbers.
4. a) To generate the Fibonacci series up to the given limit N and also print number of elements
   in the series (both binary and decimal)
   b) Minimum and maximum out of N numbers
   c) To sort given N numbers in ascending order
   d) Find the GCD of 2 integer numbers (both binary and decimal)
   e) To calculate factorial of a given number using recursion technique.
5. To generate and print prime numbers and perfect dividing numbers up to a limit N (both
   binary and decimal). Print also the number of prime and perfect dividing numbers in the
   series.
6. a) Conversion of array of Binary code to Gray code.
   b) Conversion of array of Gray code to Binary code.
7. To generate resultant byte for a given Boolean expression.
8. a) To find the Sum and difference of two matrices of order MxN and PxQ (both binary and
   decimal)
   b) To find the transpose of given MxN matrix
9. Search for an element using binary search in an array of an 8-bit signed numbers. Array is
   sorted in ascending order.
10. Reverse of an array of numbers, byte and word.
11. Check for authentic password, and display suitable message.
12. Program to perform print screen operation.
14. Display system date using DOS service.

**Part - B**

**Arm Microcontroller Interfacing Programs**

1. DAC interfacing.
2. Stepper motor interfacing.
4. Seven segment display interfacing.
5. Temperature interfacing.
6. LCD interfacing.
7. Elevator interfacing.
8. Traffic control interfacing.

**L1.2 - Communication Lab**

1. PAM, PWM and PPM.
2. To study sampling of a signal and it’s reconstruction.
3. To study amplitude shift keyed (ASK) generation and detection.
4. To study Frequency shift keyed (FSK) generation and detection.
5. To study phase shift keyed (PSK) generation and detection.
7. To study delta modulation.
8. To study (TDM) and recovery of two band limited signals of PAM signals.
9. To study DPSK generation and detection.
10. To study QPSK generation.
11. Voltage controlled oscillator (VCO-IC 566) and phase locked loop (PLL-IC 565)
12. Measurement of losses in a given optical fiber (propagation loss, bending loss) and numerical aperture
13. Analog and Digital (with TDM) communication link using optical fiber.
II Semester

E2.1- Control System

Total number of Hours: 52

Module 1: 10 hrs


Block diagrams and signal flow graphs: Transfer functions, Block diagram algebra, Signal Flow graphs (State variable formulation excluded).

Module 2: 10 hrs

Time Response of feedback control systems: Standard test signals, 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. Introduction to PI, PD and PID controllers and their applications (excluding design)


Module 3: 10 hrs


Frequency domain analysis: Correlation between time and frequency response, Bode plots, Experimental determination of transfer functions, Assessment of relative stability using Bode Plots. Introduction to lead, lag and lead-lag compensating networks (excluding design).

Module 4: 10 hrs


Introduction to State variable analysis: Concepts of state, state variable and state models for electrical systems, Solution of state equations.

Module 5: 12 hrs

Programmable logic controller and processors:
PLC operation, input and output status files, fixed PLCs. Sixteen-point I/O modules with decimal addressing, I/O interaction with input and output status files, PLC memory (system and application), data formats. Putting together a modular PLC. Conventional ladder Vs PLC ladder logic. Examples of ladder diagram development. Programming a PLC. Programming Terminals, Open PLC systems. Soft PLC or Open Architecture control.

PLC Processors:
Processor’s function, Operating system. Scanning 4 general Electric series 90-30 PLC, Omron Sysmach CQMI Programmable controller, WDT, Processor Ports. Serial communication between a PC and PLC. Interfacing to non- RS232 PLC Processors, Processor Operating Modes.
Choosing the correct Processor for a particular Application. Program and data organization inside PLC processor, Understanding relay instructions and PLC in out modules. Timing and counter
Instructions. Comparison and data handling instructions. Sequencer instructions. Documenting the system.

TEXT BOOK:
2.
REFERENCE BOOKS:

E2.2 – Programming in Java

Total number of Hours: 52

Module 1 – Introduction
Language Fundamentals:
Basic Language Elements: Lexical Tokens, Identifiers, Keywords, Literals, Comments, Primitive Data types, Operators., Assignments.
Module 2 - Object Oriented Programming

Module 3 - Extending Classes and Inheritance

Module 4 - Array & String:

Module 5 - GUI Programming
The Collection Framework: Collections of Objects, Collection Types, Sets, Sequence, Map, Understanding Hashing, Use of ArrayList & Vector


DataBase Programming using JDBC: Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases

REFERENCE BOOKS:

E2.3 – Microwave Engineering

Total number of Hours: 52

Module 1: 12 hrs
Motion of an electron in an electric and magnetic field. Review of Gauss law, Farady law, Ampere’s law, Maxwells equations (differential and integral forms), boundary conditions, Poynting energy theorem
MICROWAVE TRANSMISSION LINES: Introduction, transmission lines equations and solutions, reflection and transmission coefficients, standing waves and SWR, line impedance and line admittance. Smith chart, impedance matching using single stubs, Microwave coaxial connectors.

Module 2: 10 hrs
MICROWAVE WAVEGUIDES AND COMPONENTS:
Introduction, rectangular waveguides, circular waveguides, microwave cavities, microwave hybrid circuits, directional couplers, circulators and isolators.

Module 3: 10 hrs
Microwave Tubes: H.F limitations of conventional tubes at microwave frequency, Klystron, multi cavity klystron, helix, coupled cavity TWT, magnetron - construction, operation performance characteristics and applications.
MICROWAVE DIODES: Transfer electron devices: Introduction, Gunn Effect diodes – GaAs diode, RWH theory, Modes of operation, Avalanche transit time devices: READ diode, IMPATT diode, BARITT diode, parametric amplifiers Other diodes: PIN diodes, Schottky barrier diodes.
S matrix representation of multi port networks.

Module 4: 10 hrs
Microwave passive devices, Coaxial connectors and adapters, Phase shifters, Attenuators, Waveguide Tees, Magic tees.
STRIP LINES: Introduction, Microstrip lines, Parallèle strip lines, Coplanar strip lines, Shielded strip Lines and strip antennas ( in brief ).
Module 5: 10 hrs
AN INTRODUCTION TO RADAR: Basic Radar, The simple form of the Radar equation, Radar block diagram, Radar frequencies, application of Radar, the origins of Radar.
MTI AND PULSE DOPPLER RADAR: Introduction to Doppler and MTI Radar, delay line Cancellers, digital MTI processing, Moving target detector, pulse Doppler Radar.

TEXT BOOKS:
1. Microwave Devices and circuits- Liao / Pearson Education.

REFERENCE BOOK:

E2.4 - Instrumentation Technology

Total number of Hours: 52

Module 1: 10 hrs
Measurement Errors: Gross errors and systematic errors, Absolute and relative errors, Accuracy, Precision, Resolution and Significant figures.

Measurement of resistance, inductance and capacitance:
Whetstone’s bridge, Kelvin Bridge; AC bridges, Capacitance Comparison Bridge, Maxwell’s bridge, Wien’s bridge, Wagner’s earth connection

Module 2: 10 hrs
Transducers and Data Acquisition:


Module 3: 10 hrs
Sensors:

Fundamentals of biomedical instruments:
Sources of biomedical signals, Basic instrumentation system, General constraints in design of biomedical instrumentation systems

**Bioelectric Signals and Electrodes:**
Origin of bioelectric signals, Types of bioelectric signals, recording electrodes, Electrode-Tissue interface, Polarization, Skin contact impedance, Silver-silver chloride electrodes, Electrodes for ECG, EEG, EMG, Microelectrodes.

**Module 4: Biopotential recorders:**  
**Electrocardiograph:** Electrical activity of the heart, Genesis & characteristics of Electrocardiogram (ECG), Block diagram description of an Electrocardiograph, ECG lead system, Multi-channel ECG machine  
**Electroencephalograph:** Genesis of Electroencephalogram (EEG), Block diagram description of an Electroencephalograph, 10-20 electrode systems, and computerized analysis of EEG.  
**Electromyography (EMG)** and Electroretinigraphy.

**Patient Monitoring System:** Bedside patient monitoring systems, Central monitors, Measurement of heart rate – Average heart rate meter, Instantaneous heart rate meter (cardio tachometer), Measurement of pulse rate.

**Module 5:**  
**Blood pressure measurement:** Direct & Indirect method, Automatic blood pressure measuring apparatus using Korotkoff’s method, Rheographic method, Oscillometric method, Ultrasonic Doppler shift method, Measurement of Respiration rate – Thermistor method, Impedance pneumography, CO2 method, Apnea detectors  
**Blood Flow Meters:** Electromagnetic blood flow meters, Ultrasonic blood flow meters, NMR blood flow meters, and Laser Doppler blood flow meters.  
**Cardiac Output Measurement:** Fick’s method, and Impedance technique.  
**Cardiac Pacemakers and Defibrillators:** Need for cardiac pacemaker, External pacemaker, Implantable pacemaker, Types of Implantable pacemakers, Programmable pacemaker, Rate-responsive pacemakers, and AC & DC defibrillators.

**TEXT BOOKS:**
1. “Modern Electronic Instrumentation and Measurement Techniques”, A.D. Helfric and W.D. Cooper, PHI of India ltd.,
2. Biomedical Instrumentation – Khandpur

**Reference Books:**
1. Bio-Medical instrumentation- Rangan Mani Sharma  
2. Bio-Medical Instrumentation- Dr. M Arumugam.
L2.1 - Java Programming Lab

List of programs (Any 20 programs)
1. WAP to display the List of even numbers
2. Factorial of a number
3. Compare Two Numbers using else-if
4. Determine If Year Is Leap Year
5. Fibonacci Series
6. Palindrome Number
7. Generate prime numbers between 1 & given number
8. Pyramid of stars using nested for loops
10. Calculate Circle Area using radius
11. Factorial of a number using recursion
12. Pyramid of numbers using for loops
13. To Find Maximum of Two Numbers.
14. To Find Minimum of Two Numbers using conditional operator
15. Write a program that will read a float type value from the keyboard and print the following output.
   i.  -> Small Integer not less than the number.
   ii.  -> Given Number.
   iii.  -> Largest Integer not greater than the number.
16. Write a program to generate 5 Random nos. between 1 to 100, and it should not follow with decimal point.
17. Write a program to display a greet message according to Marks obtained by student.
18. Write a program to find SUM AND PRODUCT of a given Digit.
19. Write a program to find sum of all integers greater than 100 and less than 200 that are divisible by 7.
20. Write a program to concatenate string using for Loop.
21. Program to Display Multiplication Table.
22. Write a program to Swap the values.
23. Write a program to convert given no. of days into months and days. (Assume that each month is of 30 days)
24. Write a program to Display Invert Triangle using while loop.
25. Write a program to find whether given no. is Armstrong or not.
26. Write a program to generate Harmonic Series.
27. Write a program to find average of consecutive N Odd numbers and even numbers.
28. Display Triangle as follow: (using for loops)
   i.  1
   ii.  2 3
   iii. 4 5 6
   iv.  7 8 9 10 ... N */
29. WAP to display a color name depending on color value using switch.
30. Accepting single character, int, float, string and double value from the keyboard.
31. To grade the students using switch and if-else.
32. To compute the power of 2 using for loop
33. To find the sum of the digits of a given integer number.
34. Given the month, identify the season using switch.
35. To find perfect number.
36. Method overloading.
L2.2 – Lab in Microwave and Instrumentation using Labview

Part - A

List of experiments using microwave:
1. Study of microwave components and set up a microwave bench
2. Find frequency and wavelength from a given microwave source (waveguide law verification)
3. Find low and high vswr (using standing wave and double minima method)
4. Study and plot characteristics of reflex klystron (mode curves)
5. Study properties of directional coupler (coupling factor, directivity, insertion loss)
6. Study properties of magic tee (power division)
7. Plot e and h pattern of waveguide horn antenna
8. Study characteristics of gunn diode (v-i characteristics)
9. Measurement of phase shift of phase shifter
10. Measurement of insertion loss, isolation, vswr of circulator
11. Measurement of dielectric constant of homogeneous material

Part - B

INSRUMENTATION LAB USING LABVIEW

1. Wheatstone Bridge
2. Kelvin Bridge
3. Maxwells Bridge
4. Wien Bridge
5. Instrumentation amplifier.
6. Second order active LPF and HPF
7. Second order active BPF and BE
8. Schmitt Trigger Design and test a Schmitt trigger circuit for the given values of UTP and LTP
9. Frequency synthesis using PLL.
10. Test R-2R DAC using op-amp
11. IF amplifier design
12. Amplitude modulation using transistor/FET (Generation and detection)
13. Frequency modulation using 8038/2206
14. Precision rectifiers – both Full Wave and Half Wave.

III Semester

E3.1 – Digital Signal Processing

Total number of Hours: 52
Introduction: Definitions of a signal and a system, classification of signals, basic Operations on signals, elementary signals, Systems viewed as Interconnections of operations, properties of systems.


**Module 2**: 10 hrs
Discrete Fourier Transforms (DFT): Frequency domain sampling and reconstruction of discrete time signals. DFT as a linear transformation, its relationship with other transforms.

Properties of DFT, multiplication of two DFTs- the circular convolution, additional DFT properties.

**Module 3**: 10 hrs

Goertzel algorithm, and chirp-z transform.

**Module 4**: 10 hrs
IIR filter design: Characteristics of commonly used analog filters –Butterworth and Chebysheve filters, analog to analog frequency transformations. Implementation of discrete-time systems:

**Module 5**: 10 hrs
Structures for IIR and FIR systems direct form I and direct form II systems, cascade, lattice and parallel realization.

FIR filter design: Introduction to FIR filters, design of FIR filters using -Rectangular, Hamming, Bartlet and Kaiser windows, FIR filter design using frequency sampling technique.

**TEXT BOOK:**

**REFERENCE BOOKS:**

**E3.2 - COMMUNICATION NETWORKS**

Total number of Hours: 52

**Module 1**: 10 Hrs

**Module 2**: 10 hrs
DATA LINK CONTROL: Framing, Flow and error control, Protocols, Noiseless channels and noisy channels, HDLC.

MULTIPLE ACCESSES: Random access, Controlled access, Channelisation.

**Module 3:** 12 hrs
Connecting LANs, Backbone and Virtual LANs, Connecting devices, Back bone Networks, Virtual LANs

**Module 4:** 10 hrs
Network Layer, Logical addressing, Ipv4 addresses, Ipv6 addresses, Ipv4 and Ipv6 Transition from Ipv4 to Ipv6.
Delivery, Forwarding, Unicast Routing Protocols, Multicast Routing protocols.

**Module 5:** 10 hrs
Transport layer Process to process Delivery, UDP, TCP, Domain name system, Resolution.

**TEXT BOOK:**

**REFERENCE BOOKS:**

**E3.3 – VLSI and Digital design using VHDL**

Total number of Hours: 52

**Module 1:** 12 Hrs

**Module 2:** 10 Hrs
CMOS LOGIC STRUCTURES: CMOS Complementary Logic, Bi CMOS Logic, Pseudo-nMOS Logic, Dynamic CMOS Logic, Clocked CMOS Logic, Pass Transistor Logic, CMOS Domino Logic Cascaded Voltage Switch Logic (CVSL).
**SCALING OF MOS CIRCUITS:** Scaling models and factors. Limits on scaling. Limits due to current density and noise.

**Module 3:**


**Module 4:**

Subprograms and Packages: Subprograms, subprogram overloading, operator overloading, Packages and libraries: Package Declaration, package body, Design File, Design Libraries, Order of Analysis, Implicit, Explicit Visibility. DESIGNING WITH PROGRAMMABLE LOGIC DEVICES: Read-only memories, Programmable logic arrays (PLAs), Programmable array logic (PALs), Other sequential programmable logic devices (PLDs), Design of a keypad scanner.

**Module 5:**


**TEXT BOOKS:**


**REFERENCE BOOKS:**

5. VHDL Primer, J. Bhaskar , PHI, 2009.
## E3.4 – Thin films and MEMS technology

**Total number of Hours: 52**

<table>
<thead>
<tr>
<th><strong>Module 1:</strong></th>
<th><strong>10 hrs</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics of Thin Films - Introduction and overview - Basic Physics, Chemistry and Materials Science - Solid State Physics: Ideal solids and crystal structure, Defects in solids Bonds and Electrons, Thermodynamics and Phase Diagrams - Kinetics and Diffusion - Nucleation and Growth - Film Formation - Growth modes and Zone models</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Module 2:</strong></th>
<th><strong>10 hrs</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Module 3:</strong></th>
<th><strong>12 hrs</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Module 4:</strong></th>
<th><strong>10 hrs</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Module 5:</strong></th>
<th><strong>10 hrs</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Study 1: MEMS Switch: Example of RF MEMS switches and applications, Mechanical design (Analytical and FEM), Case Study 2: MEMS Resonators: Example of RF MEMS resonators and their applications, Comparison of electrostatic and piezoelectric resonators, Mechanical design of resonators, Application in oscillators: pierce oscillator overview, Application in filters. Case Study 3: Tunable Capacitors and Inductors: Example of tunable capacitors and inductors and their applications in circuits. Mechanical Design (Analytical and FEM).</td>
<td></td>
</tr>
</tbody>
</table>

**TEXT BOOKS:**

REFERENCE BOOKS:


L3.1 – DSP LAB USING MATLAB

A LIST OF EXPERIMENTS USING MATLAB (Any TEN Experiments)

1. Verification of Sampling theorem.
2. Impulse response of a given system
3. Linear convolution of two given sequences.
4. Circular 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.
13. Impulse response of first order and second order system
L3.2 - PROGRAMMING (using VHDL)

1. Write HDL code to realize all the logic gates

2. Write a HDL program for the following combinational designs
   a. 2 to 4 decoder
   b. 8 to 3 (encoder without priority & with priority)
   c. 8 to 1 multiplexer
   d. 4 bit binary to gray converter
   e. Multiplexer, de-multiplexer, comparator.

3. Write a HDL code to describe the functions of a Full Adder Using three modeling styles.

4. Write a model for 32 bit ALU using the schematic diagram shown below
   A (31:0)  B (31:0)

<table>
<thead>
<tr>
<th>Opcode(3:0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable</td>
</tr>
</tbody>
</table>

   - ALU should use combinational logic to calculate an output based on the four bit op-code input.
   - ALU should pass the result to the out bus when enable line in high, and tri-state the out bus when the enable line is low.
   - ALU should decode the 4 bit op-code according to the given in example below.

<table>
<thead>
<tr>
<th>OPCODE</th>
<th>ALU OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A + B</td>
</tr>
<tr>
<td>2.</td>
<td>A – B</td>
</tr>
<tr>
<td>3.</td>
<td>A Complement</td>
</tr>
<tr>
<td>4.</td>
<td>A * B</td>
</tr>
<tr>
<td>5.</td>
<td>A AND B</td>
</tr>
<tr>
<td>6.</td>
<td>A OR B</td>
</tr>
<tr>
<td>7.</td>
<td>A NAND B</td>
</tr>
<tr>
<td>8.</td>
<td>A XOR B</td>
</tr>
</tbody>
</table>

5. Modulo synchronous up-down counter
6. Priority encoder

7. Parity generator

8. Develop the HDL code for the following flip-flops, SR, D, JK, T.

9. Design 4 bit binary, BCD counters (Synchronous reset and Asynchronous reset) and “any sequence” counters

**INTERFACING** (at least four of the following must be covered using VHDL/Verilog)

1. Write HDL code to display messages on the given seven segment display and LCD and accepting Hex key pad input data.

2. Write HDL code to control speed, direction of DC and Stepper motor.

3. Write HDL code to accept 8 channel Analog signal, Temperature sensors and display the data on LCD panel or Seven segment display.

4. Write HDL code to generate different waveforms (Sine, Square, Triangle, Ramp etc.,) using DAC change the frequency and amplitude.

5. Write HDL code to simulate Elevator operations

6. Write HDL code to control external lights using relays.

**IV Semester**

**E4.1 – Embedded System (Compulsory Paper)**

**Total number of Hours: 52**

**Unit 1:** 10 hrs

**Hardware Considerations:**

Introduction: Overview - optimizing design metrics, processor technology - design technology, custom single-purpose processors, Optimizing program, FSMD, data path & FSM. General purpose processors and ASIC's: Software and operation of general purpose processors, programmer's view - development environment - ASIP's – microcontrollers, DSP and less general ASIP environments.

**Unit 2:** 12 hrs

Standard processor peripherals: timers, counters and watchdog timers, applications, UART, PWM application, LCD controller, keypad controllers, stepper motor control, ADC and DAC. Memory: Different types of ROM & RAM, cache system design. Interfacing: introduction to interfacing, communication basics, basic protocol concepts, interrupts and DMA, arbitration, multilevel bus architectures, communication - serial parallel and wireless protocols.

**Unit 3:** 10 hrs
Interrupts: Microprocessor architecture, interrupt basics, the shared data problem, interrupt Latency.
Survey of software architecture: round robin, round robin with interrupts, function queues scheduling, RTOS architecture, selecting an architecture.
Introduction to RTOS: tasks and task states, tasks and data, Semaphores and Shared data.
More operating system services: Message Queues, mail boxes and pipes, timer functions, events, memory management, interrupt routines in an RTOs environment.

Unit 4: 10 hrs
Basic design using RTOS: overview, principles, an example, encapsulating Semaphores and Ques, Hard Real time scheduling considerations, saving memory space, saving power.
Embedded software development tools: Host and target machines, linkers/locators for embedded software, getting embedded software into the target system.

Unit 5: 10 hrs
Debugging techniques: testing on your host machine, instruction set simulators, the assert macro.

Text Books:
1. Embedded system Design - Frank Vahid and Tony Givargis, John Wiley, 2002

References:

Electives:

AVIONICS SYSTEMS (Elective)

Module 1: 10 Hrs
Introduction to Electronics and Computer Technology applicable to Aircraft Systems:
Microprocessors, Digital Computers, Avionics Systems used in Civil and Military Aircraft.
Computer Architecture for Aircraft System and Interfaces, Software of Avionics System. Hardware Software Integration (HSI), Hardware & Software Reliability, System level redundancies, Failure Mode Effects and criticality analysis and Design Margin.

Module 2: 18 Hrs
Air Data Systems, Sensors used in Aircraft:
Electro-Mechanical Sensors: Gyroscope, Synchro, Flux Valve/Gate, Magnetic Compass, Gyromagnetic Compass, Directional Gyro, Global Positioning System.
Data Communication in Aircraft:
Fiber Optic Communication: Glass Fiber, Time Domain Reflectometry, ARINC 573/ 615/708 and other data bus protocols.

**Module 3:** Aircraft Displays and Controls

**Module 4:** Avionics Support Systems

**Text Books**

**WIRELESS COMMUNICATION (Electives)**

**Module 1:**
*10 hrs*

**Module 2:**
*10 hrs*
Multiplexing and multiple accesses: Allocation of the Communications Resource: Frequency-Division Multiplexing/Multiple Access, Time-Division Multiplexing/Multiple Access, Communications Resource Channelization, Performance Comparison of FDMA and TDMA, Code-Division Multiple Access, Space-Division and Polarization-Division Multiple Access, Multiple Access Communications System and Architecture: Multiple Access Information Flow, Demand Assignment Multiple Access, Access Algorithms, OFDM. Duplex Techniques: FDD(introduction) and TDD in detail. Random Access Methods: ALOHA, Slotted ALOHA, Reservation-ALOHA, Performance Comparison of S-ALOHA and R-ALOHA, Polling Techniques. Carrier-Sense Multiple
Access Networks, Token-Ring Networks, Performance Comparison of CSMA/CD and Token-Ring Networks,

Module 3: 15 hrs
GSM and TDMA techniques, GSM system overview, GSM Network and system Architecture, GSM channel concepts, GSM identifiers, GPRS. GSM system operation, Traffic cases, Call handoff, Roaming, GSM protocol architecture. TDMA systems, CDMA technology, CDMA overview, CDMA channel concept CDMA operations. Wireless Modulation techniques and Hardware, Characteristics of air interface, Path loss models, UWB radio techniques, Diversity techniques.

Module 4: 15 hrs
Introduction to wireless LAN 802.11X technologies, Evolution of Wireless LAN Introduction to 802.15X technologies in PAN Application and architecture Bluetooth Introduction to Broadband wireless MAN, 802.16X technologies and LTE.

TEXT BOOK:

REFERENCE BOOKS:

Android(Elective)

Module 1: JAVA and SQL Concepts 10 hrs
JAVA Concepts: OOPs Concepts, Inheritance in detail, Exception handling, Packages & interfaces, JVM & .jar file extension, Multi threading (Thread class & Runnable Interface)
SQL Concepts: DML & DDL Queries in brief

Module 2: 10 hrs
Introduction to Android: What is Android? Setting up development environment, Dalvik Virtual Machine & .apk file extension
Fundamentals: Basic Building blocks – Activities, Services, Broadcast Receivers & Content providers, UI Components - Views & notifications, Components for communication -Intents & Intent Filters, Android API levels (versions & version names), Application Structure (in detail), Android Manifest.xml, uses-permission & uses-sdk, Resources & R.java, Assets, Layouts & Drawable Resources, Activities and Activity lifecycle, First sample Application

Module 3: 10 hrs
Emulator-Android Virtual Device, Launching emulator, Editing emulator settings, Emulator shortcuts, Logcat usage, Introduction to DDMS Second App:- (switching between activities) - Develop an app for demonstrating the communication between Intents.
Basic UI design: Form widgets o Text Fields o Layouts o [dip, dp, sip, sp] versus px o Examples
Preferences: Shared Preferences, Preferences from xml o Examples
Menu: Option menu, Context menu, Sub menu, menu from xml, menu via code, Examples

Module 4: 10 hrs
UI design: Time and Date, Images and media, Composite, Alert Dialogs & Toast, Popup Examples.
Tabs and Tab Activity: Examples.
Styles & Themes of styles.xml: drawable resources for shapes, gradients (selectors), style attribute in layout file, Applying themes via code and manifest file, Examples.
Content Providers: SQLite Programming, SQLite Open Helper, SQLite Database, Cursor Reading and updating Contacts, Reading bookmarks Example.

Module 5: 12 hrs
Android Debug Bridge (adb) tool,
Linkify: Web URLs, Email address, text, map address, phone numbers, MatchFilter & Transform Filter, Examples.
Adapters and Widgets: Adapters:- Array Adapters, Base Adapters, ListView and List Activity, Custom list view, Grid View using adapters, Gallery using adapters, Examples.
Notifications: Broadcast Receivers, Services and notifications, Toast, Alarms.
Custom components: Custom Tabs, Custom animated popup panels, Other components, Examples.
Threads: Threads running on UI thread (runOnUiThread), Worker thread, Handlers & Runnable, AsyncTask (in detail), and Examples.
Advanced: Live Folders, Using sdcards, XML Parsing, JSON Parsing, Maps, GPS, Location based Services, Accessing Phone services (Call, SMS, MMS), Network connectivity services, Sensors.

VIRTUAL INSTRUMENTATION

Module 1: Review of Digital Instrumentation: 8 Hrs
Representation of analog signals in the digital domain – Review of quantization in amplifier and time areas, sample and hold, sampling theorem, ADC and DAC.

Module 2: Fundamentals of Virtual Instrumentation: 12 Hrs

Module 3: Cluster of Instruments in System: 8 Hrs

Module 4: Graphical Programming Environment in VI: 12 Hrs
Concepts of graphical programming – Lab-view software – Concept of VIs and sub VIs – Display types – Digital – Analog – Chart – Oscilloscope types – Loops – Case and sequence structures – Types of data – Arrays – Formulate nodes – Local and Global variables – String and file I/O.
Module 5: Analysis Tools and Simple Application in VI:  
12 Hrs

TEXT BOOKS:

REFERENCE BOOKS:

MACHINE INTELLIGENCE

Unit 1: Introduction, Soft Computing intelligence, comparison with conventional Artificial Intelligence, soft computing characteristics, Fuzzy sets, Fuzzy rules and Fuzzy inference systems. 10 hrs

Unit 2: Different fuzzy Models: Mamdani, Sugeno, Tsu Kamoto, Fuzzy modeling, Least squares methods for system identification, Derivative based optimization. 10 hrs


Unit 4: Adaptive Neuro-Fuzzy interface systems, Advanced Neuro-Fuzzy modeling. 10 hrs

Unit 5: Data clustering algorithms, Neuro-Fuzzy control, Fuzzy filtered neural network, Genetic algorithms in game playing. 10 hrs
TEXT BOOK

Open to other stream (OE)

MICROCONTROLLERS and EMBEDDED C

Total number of Hours: 52

MODULE 1
INTRODUCTION TO EMBEDDED SYSTEMS:
An embedded system, processor, hardware unit, software embedded into a system, example of an embedded system, OS services, I/O, N/W, O/S, real time and embedded operating system, processor selection for an embedded system, memory devices, memory selection for an embedded systems, allocation of memory to program segments and blocks and memory map of a system. Direct Memory Accesses.

MODULE 2
MICROPROCESSORS AND MICROCONTROLLER:

**The 8051 Architecture:** Introduction, 8051 Microcontroller Hardware, Input/Output Pins, Ports and Circuits External Memory, Counter and Timers, Serial Data Input / Output, Interrupts.

<table>
<thead>
<tr>
<th>MODULE 3</th>
<th>10 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADDRESSING MODES AND OPERATIONS:</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Jump and Call Instructions:</th>
<th>The JUMP and CALL Program range, Jumps, calls and Subroutines, Interrupts and Returns, More Detail on Interrupts, Example Problems.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MODULE 4</th>
<th>06 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8051 PROGRAMMING IN C:</strong></td>
<td></td>
</tr>
<tr>
<td>Data types and time delays in 8051C, I/O programming, logic operations, data conversion programs, accessing code ROM space, data serialization.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODULE 5</th>
<th>10 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TIMER / COUNTER PROGRAMMING IN 8051:</strong></td>
<td></td>
</tr>
<tr>
<td>Programming 8051 Timers, Counter Programming, programming timers 0 and 1 in 8051C</td>
<td></td>
</tr>
</tbody>
</table>

**Interrupts Programming:** 8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Interrupt Priority in the 8051/52, Interrupt programming in C.

<table>
<thead>
<tr>
<th>MODULE 6</th>
<th>08 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROGRAMMABLE PERIPHERAL INTERFACE IC – 8255:</strong></td>
<td></td>
</tr>
<tr>
<td>Features, Pin diagram, Functional block diagram, Ports and their modes</td>
<td></td>
</tr>
</tbody>
</table>

**8051 Interfacing and Applications:**

Interfacing 8051 to LCD, Keyboard, ADC, DAC, Stepper motor interfacing.

**TEXT BOOKS:**

Reference Books:

1. Predko ; “Programming and Customizing the 8051 Microcontroller” –, TMH
3. Ajay V.Deshmukh; “Microcontrollers- Theory and Applications”, TMH,2005
4. Dr.Ramani Kalpathi and Ganesh Raja; “Microcontroller and its applications”, Sanguine Technical publishers,Bangalore-2005
SYLLABUS FOR M.SC. ELECTRONIC-SCIENCE

Sr. No Course Number Course Title Number of Credits
1) EL â€“ 205 Power Electronics Devices and Systems 3
2) EL â€“ 206 Industrial Applications of Optoelectronics 2
3) EL â€“ 218 Foundation of Quantum Computing 2

Semester III
Core Courses
1) EL â€“ 301 Practical V Special Lab 5
2) EL â€“ 314 Electronic Communication Systems 2
3) EL â€“ 302 Practical VI Special lab 5
4) EL â€“ 315 Embedded System Applications 2
5) EL â€“ 303 Practical VII

All the basic subjects of electrical and electronic engineering like AC, DC, DIODE, BJT, MOSFET, POWER SYSTEM, CONTROL SYSTEM, SIGNAL PROCESSING, DIGITAL LOGIC etc((personal opinion). The candidate should have the ability to solve the related math...Â

The candidate should have the ability to solve the related mathematical problems of the above mentioned topics.

Subject: Electronics
Examination Scheme for Semester 1 & 2

I. Theory Papers (Semester System of Examination)
1. Syllabus in each Theory Paper is divided in 4 units.
   i. A Student is required to attempt 5 questions in all.
   ii. Question No 1 is compulsory, consisting of short answer type questions based on all the 4 units.

II. Practical Paper (Annual Examination System)
1. The practical examination will be held at the end of 2nd semester in two sittings of three hours each with First sitting starting in the evening session of the first day and second sitting in the following morning session.
2. A candidate is required to perform minimum of 6 experiments in each section out of.