M. TECH. ELECTRONICS & COMMUNICATION ENGINEERING

(EMBEDDED SYSTEM)

(1st Year)

Total Contact Hours = 24 **Total Marks = 600** **Total Credits = 22**

SEMESTER 1st		Contact Hrs			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MECE2-101	Embedded System Design	4	0	0	40	60	100	4
MECE2-102	Microcontrollers and Embedded Systems	4	0	0	40	60	100	4
MECE2-103	Electronics System Design	4	0	0	40	60	100	4
MECE2-104	Research Lab-I	0	0	4	60	40	100	2
Departmental Elective – I (Select any one)		4	0	0	50	100	150	4
MECE2-156	Hardware Description Languages and VLSI Design							
MECE2-157	Embedded Computing							
MECE2-158	Modern Control Systems Design							
MECE2-159	Sensors and Transducers							
Departmental Elective – II (Select any one)		4	0	0	50	100	150	4
MECE2-160	Soft Computing							
MECE2-161	Virtual Instrumentation							
MECE2-162	Material Science & Engineering.							
MECE2-163	Advanced Computer Architecture							
Total	**Theory = 5 Lab = 1**	**20**	**0**	**4**	**260**	**340**	**600**	**22**

M. TECH. ELECTRONICS & COMMUNICATION ENGINEERING

(EMBEDDED SYSTEM)

(1st Year)

Total Contact Hours = 24 **Total Marks = 600** **Total Credits = 22**

SEMESTER 2nd		Contact Hrs			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MECE2-205	Advanced Microcontroller Systems	4	0	0	40	60	100	4
MECE2-206	CPLD and FPGA Architectures and Applications	4	0	0	40	60	100	4
MECE2-207	Research Lab-II	0	0	4	60	40	100	1
Departmental Elective – III (Select any one)		4	0	0	50	100	150	4
MECE2-264	Robotics and Machine Vision							
MECE2-265	Signal Processing for Embedded Systems							
MECE2-266	High Speed Digital Design							
MECE2-267	Parallel Processing							
Department Elective – IV (Select any one)		4	0	0	50	100	150	4
MECE2-268	Nano electronics							
MECE2-269	Signal Acquisition and Conditioning							
MECE2-270	MEMS and NEMS							
MECE2-271	Multimedia and Signal Coding							
Open Elective – I (Select any One)		4	0	0	50	100	150	4
Total	Theory = 5 Lab = 1	**20**	**0**	**4**	**260**	**340**	**600**	**22**

MRSPTU

M. TECH. ELECTRONICS & COMMUNICATION ENGINEERING
(EMBEDDED SYSTEM)
(2nd Year)

Total Contact Hours = 26 **Total Marks = 500** **Total Credits = 26**

SEMESTER 3rd		Contact Hrs			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MECE2-308	Research Methodology	4	0	0	40	60	100	4
MECE2-309	Professional Writing	4	0	0	40	60	100	4
MECE2-310	Project	0	0	10	100	50	150	10
MECE2-311	Seminar on Advanced Topics from Referred Journals	0	0	4	50	0	50	4
Departmental Elective – V (Select any one)		4	0	0	50	100	150	4
MECE2-372	Advanced Computer Networks							
MECE2-373	Digital Signal Processing							
MECE2-374	System on Chip Architecture							
MECE2-375	Error Control and Coding							
Total	**Theory = 3 Lab = 2**	**12**	**0**	**14**	**270**	**230**	**500**	**26**

MRSPTU

M. TECH. ELECTRONICS & COMMUNICATION ENGINEERING
(EMBEDDED SYSTEM)
(2nd Year)

Total Credits = 20

SEMESTER 4th		Contact Hrs			Evaluation Criteria	Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Satisfactory/ Unsatisfactory**	
MECE3 - 412	Thesis	0	0	20		20

Overall

Semester	Marks	Credits
1st	600	22
2nd	600	22
3rd	600	26
4th	--	20
Total	**1700**	**90**

EMBEDDED SYSTEM DESIGN

Subject Code: MECE2-101 **L T P C** **Duration: 45 Hrs.**

4 0 0 4

UNIT-I (10 Hrs.)

Embedded systems design: Introduction to Embedded system, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES

UNIT-II (12 Hrs.)

8051 Microcontroller: Microprocessor V/s Micro-controller, 8051 Microcontroller: General architecture; Memory organization; I/O pins, ports & circuits; Counters and Timers; Serial data input/output; Interrupts. 8051 Instructions: Addressing Modes, Instruction set: Data Move Operations, Logical Operations, Arithmetic Operations, Jump and Call Subroutine, Advanced Instructions.

UNIT-III (12 Hrs.)

PIC Microcontroller: ARCHITECTURE:CPU, ALU , Data Movement, The Program Counter and Stack, Reset , Interrupts, Architecture Differences, Mid-Range instruction Set, PIC HARDWARE FEATURES :Power Input and Decoupling , Reset, Watchdog Timer, System Clock/Oscillators, Configuration Registers, Sleep, Hardware and File Registers, Parallel Input Output, Interrupts, Prescaler, The OPTION Register , Mid-Range Built-In EEPROM Flash Access,TMR1 and TMR2 Serial I/0, Analog I/0, Parallel Slave Port (PSP), External Memory Connections ,In-Circuit Serial Programming (ISCP).PROGRAMMING WITH PIC :Assembly Language Programming, Hex File Format, Code-Protect Features, Programming, PIC Emulators

UNIT-IV (11 Hrs.)

ARM Processor Fundamentals: Registers, State and Instruction Sets, Pipeline, Memory Management, Introduction to the ARM Instruction Set

Text Books:-

1.James k. Peckol, "Embedded system Design", John Willey & Sons, 2010(2nd Edition).
2.Muhammad Ali Mazidi, Janice G. Mazidi and D. McKinley, „The 8051 Microcontroller and Embedded Systems" Prentice Hall, 2005(1st Edition).

Reference Books:-

1. Embedded Systems by Raj Kamal, TMH, 2006(6th Edition).
2. The 8051 Microcontroller by K Ayala, 3rdEd., Thomson Delmar Learning, 2007.
3. 8051 Microcontroller by S. Ghoshal, Pearson Education, 2010 (2nd Edition).

MICROCONTROLLERS FOR EMBEDDED SYSTEM DESIGN

Subject Code: MECE2-102 **L T P C** **Duration: 45 Hrs.**

4 0 0 4

UNIT-I (12 Hrs.)

Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System Components. Characteristics and Quality Attributes of Embedded Systems: Hardware Software Co-Design and Program Modelling: Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Introduction to Unified Modelling Language, Hardware Software Trade-offs.

UNIT-II (10 Hrs.)

Embedded Hardware Design and Development :EDA Tools, How to Use EDA Tool, Schematic Design – Place wire, Bus , port, junction, creating part numbers, Design Rules check, Bill of materials, Netlist creation , PCB Layout Design – Building blocks, Component placement, PCB track routing.

UNIT-III (11 Hrs.)

ARM Architecture: ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families. ARM Programming Model – I: Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions. ARM Programming Model – II: Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

UNIT-IV (12 Hrs.)

ARM Programming: Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops. UNIT –V: Memory Management: Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Context Switch.

TEXT BOOKS:-

1. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss, Dominic Symes, Chris Wright, 2008, Elsevier (1st Edition).
2. Shibu K.V., "Introduction to Embedded Systems", Tata McGraw Hill Education Private Limited, 2009(1st Edition)

REFERENCE BOOKS:-

1. Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes / Cole, 1999, Thomas Learning (1st Edition).
2. James K Peckol, "Embedded Systems – A contemporary Design Tool", John Weily, 2008 (2nd Edition).

ELECTRONICS SYSTEM DESIGN

Subject Code: MECE2-103 **L T P C** **Duration: 45 Hrs.**

4 0 0 4

UNIT-I (10 Hrs.)

MSI and LSI Circuits and Their Applications: Review of Digital electronics concept, Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR and AND OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.

UNIT-II (12 Hrs.)

Sequential Machines: The Concept of Memory, The Binary Cell, The Cell and The Bouncing Switch, Set/Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock F/F, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters, Shift Registers and Memory.

UNIT-III (11 Hrs.)

Multi Input System Controller Design: System Controllers, Design Phases And System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position And Detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, State Assignment, Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations, Programmable System Controllers, ROM, PLA And PAL Based Design.

UNIT-IV (12 Hrs.)

Asynchronous Finite State Machines: Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, Plotting And Reading The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method, Electromagnetic Interference And Electromagnetic Compatibility Grounding And Shielding of Digital Circuits. Interfacing digital system with different media like fiber cable, co-axial cable etc.

TEXT/REFERENCE BOOKS:

1. An Engineering Approach to Digital Design by Fletcher, PHI, **1990.**
2. Designing With TTL Circuits by Texas Instruments.
3. Related IEEE/IEE publications

RESEARCH LAB-I

Subject Code: MECE2-104 **L T P C**
4 0 0 4

Every subject In-Charge will define at least one practical project to each student (preferably different) of his/her concerned subject to be performed in Research Lab.

MRSPTU

HARDWARE DESCRIPTION LANGUAGE AND VLSI DESIGN

Subject Code: MECE2-156 **L T P C** **Duration: 45 Hrs.**

4 0 0 4

UNIT-I (11 Hrs.)

MOS TRANSISTOR THEORY: Introduction, Ideal I-V Characteristics, Second Order Effects, CMOS Logic, CMOS Fabrication and Layout, VLSI Design Flow.

CIRCUIT CHARACTRIZATION AND PERFORMANCE ESTIMATION: CMOS Inverter, DC Transfer Characteristics, Delay Estimation, Logical Effort, Power Dissipation, Scaling and Latch-up.

UNIT-II (11 Hrs.)

COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN: Static CMOS, Ratioed Circuits, Differential Cascode Voltage Switch Logic, Dynamic Circuits, Domino Logic-Pass Transistor Circuits, CMOS D Latch and Edge Triggered Flip-flop and Schmitt trigger.

UNIT-III (12 Hrs.)

HDL PROGRAMMING USING BEHAVIORAL AND DATA FLOW MODELS: Verilog, Introduction, Typical Design Flow, Modules and Ports, Instances, Components, Lexical Conventions, Number Specification, Strings, Identifiers and Keywords, Data Types, System Tasks and Compiler Directives, Behavioural Modelling, Dataflow Modelling, RTL, Gate Level Modelling, Programs For Combinational and Sequential.

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UNIT-IV (11 Hrs.)

HDL PROGRAMMING WITH STRUCTURAL AND SWITCH LEVEL MODELS: Tasks and Functions, Difference between Tasks and Functions, Switch Level, MOS Switches, CMOS Switches, Examples: CMOS NAND and NOR, MUX using Transmission Gate, CMOS Flip-Flop.

TEXT/REFERENCE BOOKS:

1. CMOS VLSI Design (3rd Edition) by Neil H.E Weste, David Harris and Ayan Banenjee, Pearson,2004
2. CMOS Digital Integrated Circuits (3rd Edition) by Sung Mu Kang and Yusuf Leblebici, Tata Mc-Graw Hill, 2002
3. Verilog HDL (2nd Edition) by Samir Palnitkar, Pearson, 2004

EMBEDDED COMPUTING

Subject Code: MECE2-157 **L T P C** **Duration: 45 Hrs.**

4 0 0 4

UNIT–I (12 Hrs.)

Programming on Linux Platform: System Calls, Scheduling, Memory Allocation, Timers, Embedded Linux, Root File System, Busy Box. Operating System Overview: Processes, Tasks, Threads, Multi-Threading, Semaphore, Message Queue.

UNIT-II (13 Hrs.)

Introduction to Software Development Tools: GNU GCC, make, gdb, static and dynamic linking, C libraries, compiler options, code optimization switches, lint, code profiling tools.

UNIT –III (10 Hrs.)

Interfacing Modules: Sensor and actuator interface, data transfer and control, GPS, GSM module interfacing with data processing and display, Open CV for machine vision, Audio signal processing.

UNIT–IV (10 Hrs.)

Networking Basics: Sockets, ports, UDP, TCP/IP, client server model, socket programming, 802.11, Bluetooth, ZigBee, SSH, firewalls, network security. IA32 Instruction Set: application binary interface, exception and interrupt handling, interrupt latency, assemblers, assembler directives, macros, simulation and debugging tools.

TEXT BOOKS

1.Modern Embedded Computing - Peter Barry and Patrick Crowley, 1st Ed., Elsevier/Morgan Kaufmann, 2012
2. Linux Application Development - Michael K. Johnson, Erik W. Troan, 1st Ed, Adission Wesley, 1998.
3. Assembly Language for x86 Processors by Kip R. Irvine (3rd Edition)

REFERENCE BOOKS

1. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin and Greg Gagne, 7th Edition.
2. The Design of the UNIX Operating System by Maurice J. Bach Prentice-Hall,1986,1st edition
3. UNIX Network Programming by W. Richard Stevens, Second Edition: Networking APIs: Sockets and XTI, Prentice Hall, 1998

MODERN CONTROL SYSTEMS DESIGN

Subject Code: MECE2-158 **L T P C** **Duration: 45 Hrs.**
4 0 0 4

UNIT-1 (10 Hrs)

Review of continuous and discrete time system analysis by Laplace and 'z' transforms; Review of system modelling by transfer function methods; feedback, stability and sensitivity; State space description of systems; Sampling of Systems ; Stability, robustness; Controllability and Observability, State Space Design; Pole Placement; Implementation issues ; CAD tool for control design.

UNIT-2 (11 Hrs)

Linear Quadratic (LQ) Control via Dynamic Programming; Review of Probability Theory; Sample Space, Random Variable, Probability Distribution and Density Functions; Correlation Function, Spectral Density; Principle of Least Squares estimation; Stochastic State Estimation (Kalman Filter); CAD tools for control design.

UNIT-3 (12 Hrs)

Linear Stochastic Control (Linear Quadratic Gaussian (LQG) Problem); Linear Multivariable Control; Tracking Control; Feedforward Control; Robust control design for multivariable systems, with uncertainties. CAD tools for control design.

UNIT-4 (12 Hrs)

Principles of intelligent control including adaptive, learning, and self-organizing systems. Neural networks and fuzzy logic systems for feedback control. Introduction to discrete event systems and decision-making supervisory control systems.

TEXT BOOKS:

1. Franklin, Powell, Workman ,"Digital Control of Dynamic Systems" Addison Wesley, Ellis-Kagle Press since, **2006.**
2. Ashish Tewari ,"Modern Control Design with MATLAB and SIMULINK" , John Wiley & Sons, February, **2002**.
3. John Yen, Reza Langari, "Fuzzy Logic: Intelligence, Control, and Information" , Prentice Hall, **1999.**

SENSORS AND TRANSDUCERS

Subject Code: MECE2-159 **L T P C** **Duration: 45 Hrs.**

4 0 0 4

UNIT-I (12 Hrs)

Sensors/Transducers: Principles, Classification, Parameters, Characteristics (Static and Dynamic), Environmental Parameters (EP), Characterization.

Mechanical and Electromechanical Sensors: Introduction, Resistive Potentiometer, Strain Gauge (Resistance and Semiconductor), Inductive Sensors: Sensitivity and Linearity of the Sensor, Types-Capacitive Sensors, Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors.

UNIT –II (14 Hrs)

Thermal Sensors: Introduction, Gas Thermometric Sensors, Thermal Expansion Type Thermometric Sensors, Acoustic Temperature Sensor, Dielectric Constant and Refractive Index Thermosensors, Helium Low Temperature Thermometer, Nuclear Thermometer, Magnetic Thermometer, Resistance Change Type Thermometric Sensors, Thermoemf Sensors, Junction Semiconductor Types, Thermal Radiation Sensors, Quartz Crystal Thermoelectric Sensors, NQR Thermometry, Spectroscopic Thermometry, Noise Thermometry and Heat Flux Sensors.

Magnetic sensors: Introduction, Sensors and the Principles Behind, Magnetoresistive Sensors (Anisotropic and Semiconductor), Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers (Synchros and Synchro-resolvers), Eddy Current Sensors, Electromagnetic Flowmeter, Switching Magnetic Sensors and SQUID Sensors.

UNIT-III (10 Hrs)

Radiation Sensors: Introduction, Basic Characteristics, Types of Photosensistors/Photo Detectors, X-ray and Nuclear Radiation Sensors and Fiber Optic Sensors.

Electroanalytical Sensors: Introduction, The Electrochemical Cell, The Cell Potential, Standard Hydrogen Electrode (SHE), Liquid Junction and Other Potentials, Polarization (Concentration, Reactive, Adsorption and Charge Transfer), Reference Electrodes, Sensor Electrodes and Electroceramics in Gas Media.

UNIT-IV (9 Hrs)

Smart Sensors: Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing, Data Communication (Standards for Smart Sensor Interface) and The Automation

Sensor's Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing and Sensors for Environmental Monitoring.

TEXT/ REFERENCE BOOKS:

1. Sensors and Transducers (2nd Edition) by D. Patranabis, PHI, 2003
2. Mechatronics (4th Edition) by W. Bolton, Pearson, 2011

SOFT COMPUTING

Subject Code: MECE2-160 **L T P C** **Duration: 45 Hrs.**

4 0 0 4

UNIT – I (12 Hrs)

Soft Computing: Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Fuzzy Logic: Fuzzy set versus crisp set, basic concepts of fuzzy sets, membership functions, basic operations on fuzzy sets and its properties. Fuzzy relations versus Crisp relation,

Fuzzy rule base system: Fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, Fuzzy Inference Systems (FIS) – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models, Fuzzification and Defuzzification, fuzzy decision making & Applications of fuzzy logic.

UNIT – II (13 Hrs)

Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN and its applications. Neural Network architecture: Single layer and multilayer feed forward networks and recurrent networks. Learning rules and equations: Perceptron, Hebb's, Delta, winner take all and out-star learning rules. Supervised Learning Network: Perceptron Networks, Adaptive Linear Neuron, Multiple Adaptive Linear Neuron, Back Propagation Network, Associative memory networks, Unsupervised Learning Networks: Competitive networks, Adaptive Resonance Theory, Kohnen Self Organizing Map

UNIT – III (12 Hrs)

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modelling: selection operator, cross over, mutation operator, Stopping Condition and GA flow, Constraints in GA, Applications of GA, Classification of GA.

UNIT – IV (08 Hrs)

Hybrid Soft Computing Techniques: An Introduction, Neuro-Fuzzy Hybrid Systems, Genetic Neuro-Hybrid systems, Genetic fuzzy Hybrid and fuzzy genetic hybrid systems

TEXT BOOKS

1. S, Rajasekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications", PHI Publication, 2011
2. S.N. Sivanandam & S.N. Deepa, "Principles of Soft Computing", Wiley Publications, 2007

REFERENCE BOOKS

1. Michael Negnevitsky, "Artificial Intelligence", Pearson Education, New Delhi, **2008**.
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Wiley, **2010**
3. Bose, Neural Network fundamental with Graph, Algo & Appl, TMH
4. Kosko: Neural Network & Fuzzy System, PHI Publication
5. Klir &Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli., PHI Pub.
6. Hagen, Neural Network Design, Cengage Learning

VIRTUAL INSTRUMENTATION

Subject Code: MECE2-161 **L T P C** **Duration: 45 Hrs.**

4 0 0 4

UNIT-I (12 Hrs)

Introduction: Definition, comparison with hard wired instruments, VI architecture, block diagram representation, VI application softwares, salient features and application areas.

LabVIEW basics: Introduction, building front panel and block diagram, tools and palettes, creating sub VI, controlling program flow-Loops, structures, shift registers, local and global variables, data types- Numeric, digital, strings, arrays, clusters, waveform, data presentation elements, graphs and charts.

UNIT-II (10 Hrs)

LabVIEW advance: File input – output, timing and synchronization, mathematical analysis function. Data communication functions, programmatically controlling VIs

UNIT-III (14 Hrs)

Data acquisition basics: Classification of signals, analog I/O and digital I/O signal acquisition, study different types of data acquisition system (USB, PCI, RS-485 network based).

LabVIEW data acquisition and instrument control: Study of various functions, Interfacing DAQ system with LabVIEW, Building VIs for analog I/O and digital I/O, study of VIs, control of instruments and DAQ system using serial, RS-485 and GPIB interface.

UNIT-IV (09 Hrs)

Software signal processing and manipulation: Sampling theorem, anti-aliasing filters, time and frequency domain analysis, Windowing, signal generation, spectrum analysis, digital filtering.

Case study: Development of VIs for specific application (simulation, real time).

TEXT/ REFERENCE BOOKS:

1. LabVIEW for Everyone: Graphical Programming Made Easy and Fun, and Jeffrey Travis and Jim Kring, Pearson, **2007.**
2. LabVIEW For Everyone: Graphical Programming Made Even Easier by Lisa K. Wells and Jeffrey Travis, Prentice Hall, **1997.**
3. Virtual Instrumentation using LabVIEW by Gupta S. and Joseph J., Tata McGraw Hill, **2005.**
4. LabVIEW Graphical Programming: Practical Application in Instrumentation and Control by Johnson GW, Tata McGraw-Hill, **2001.**
5. LabVIEW GUI: Essential Techniques by Ritter DJ, Tata McGraw-Hill, **2002.**
6. LabVIEW-User Manual by National Instruments, National Instruments Corporation, 1996

MATERIAL SCIENCE & ENGINEERING

Subject Code: MECE2-162 **L T P C** **Duration: 45 Hrs.**
4 0 0 4

UNIT-I (12 Hrs)

Atomic Structure, Bonding Classifications, Seven Systems and Fourteen Lattices, Metal, Ceramic, Polymeric and Semiconductor Structures, X-ray Diffraction, and Defects (Point, Linear and Planar), Diffusion, Mechanical Behavior: Stress versusStrain, Elastic and Plastic Deformation, Hardness, Creep and Stress Relaxation, Viscoelastic Deformation. Thermal Behavior: Heat capacity, Thermal expansion, conductivity and shock, Failure Analysis & Prevention.

UNIT-II (13 Hrs)

Phase Diagrams-Equilibrium Microstructural Development: Phase Rule and Diagram, Lever Rule, Heat Treatment, Metals, Ceramics and Glasses, Polymerization, Structural Features of Polymers, Thermoplastic and Thermosetting Polymers, Composites (Fiber Reinforced and Aggregate), Mechanical Properties and Processing of Composites, Electrical Behavior, Optical Behavior, Corrosion & Oxidation Semiconductor Materials, Magnetic Materials, Environmental Degradation.

UNIT-III (14 Hrs)

Superconductivity, Band Structure, Carrier Concentration, Electrical, Mechanical and Optical properties of Gallium Nitride (GaN), Aluminum Nitride (AlN), Indium Nitride (InN), Boron Nitrade (BN), Silicon Carbide (SiC), Silicon-Germanium(Si1-xGex).

UNIT-IV (06 Hrs)

Materials of Special Applications viz. Cryogenic, High Temperature, High Frequency Application.

TEXT AND REFERENCE BOOKS:

1. Properties of Advanced Semiconductor Materials: GaN, AlN, InN, BN, SiC and SiGe by Michael E. Levinshtein, Sergey L. Rumyantsev and Michael S. Shur, John Wiley & Sons, 2001
2. Introduction to Materials Science for Engineers (6^{th} Edition) by James F. Shackelford, Prentice Hall, 2001
3. Fundaments of Semiconductors: Physics and Materials Properties by Yu and M Cardona, Springer, 1996
4. Materials Science & Engineering (5^{th} Edition) by K.M. Gupta, Umesh Publications, 2012

ADVANCED COMPUTER ARCHITECTURE

Subject Code: MECE2-163 **L T P C** **Duration: 45 Hrs.**
4 0 0 4

UNIT-I (12 Hrs)

The concept of Computer Architecture, Introduction to Parallel Processing, Trends in parallel processing, Basic Uniprocessor Architecture, ILP Processors, Parallel Processing Mechanism, Architectural Classification Schemes: Multiplicity of Instruction-Data Streams, Serial versus Parallel Processing, Parallelism versus Pipelining.

UNIT-II (14 Hrs)

Pipelining: Pipelined Processors, An overlapped Parallelism, Principles of Linear Pipelining, Classification of Pipeline Processors, Principles of Designing Pipelined Processors: Instruction Prefetch and Branch Handling, Data Buffering and Busing Structures, Internal Forwarding and Register Tagging, Hazard Detection and Resolution, Superscalar and Superpipeline Design.

UNIT-III (13 Hrs)

Structures and Algorithms for Array Processors: SIMD Array Processors, SIMD Computer Organizations, Inter-PE Communications, SIMD Interconnection Networks.

Multiprocessor Architecture and Interconnection Networks, Multi threaded Architecture.

UNIT IV (06 Hrs)

Advanced Memories: non-blocking cache memories; memory protection, translation and virtualization; memory synchronization, consistency and coherence.

TEXT BOOKS:

1. Faye A. Briggs," Computer Architecture and Parallel Processing", McGraw-Hill International Editions, IOS Press, **1999.**
2. John D. Carpinelli, "Computer Systems Organization & Architecture", Addison Wesley., **2001.**

REFERENCE BOOKS:

1. J.L Hennessy and D.A Patterson," Computer Architecture: A Quantitative Approach", Maurgan Kaufman, Edition 3, **2003.**
2. D.M. Harris and S.L. Harris," Digital Design and Computer Architecture", ARM Edition, **2015**.