RESOLUTIONS MADE IN BOARD OF STUDIES MEETING

Resolved to adopt the following modified scheme for M.E (Electronic Instrumentation)

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
Andhra University, Visakhapatnam

M.E (Electronic Instrumentation), Two year (Four Semester)

Scheme to be valid with effect from the admitted batch of 2007 - 2008

Semester – I

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject title</th>
<th>Credits</th>
<th>Pds/week</th>
<th>Sessionals</th>
<th>Unv. Exam Marks</th>
<th>Total</th>
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<tbody>
<tr>
<td>MEI-1</td>
<td>Digital Signal Processing</td>
<td>4</td>
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<td>-</td>
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<td>MEI-2</td>
<td>Microprocessor Systems</td>
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<td>MEI-3</td>
<td>Optical fibers and applications</td>
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<td>4</td>
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<td>MEI-4</td>
<td>Transducers and Signal Conditioners</td>
<td>4</td>
<td>4</td>
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<td>MEI-5</td>
<td>VLSI</td>
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<td>MEI-6</td>
<td>Elective - I</td>
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<td>MEI-7</td>
<td>Microprocessor Lab</td>
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Total 28 24 6

Elective – I

a) EMI/EMC
b) Artificial Intelligence and Neural Networks
c) Application Specific Integrated Circuits (ASIC)
### Semester II

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<td>MEI-9</td>
<td>Electronic Instrumentation Techniques</td>
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<td>MEI-10</td>
<td>Data Acquisition System</td>
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<td>MEI-11</td>
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<td>Elective - II</td>
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<td><strong>24</strong></td>
<td><strong>6</strong></td>
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**Elective – II**

- a) Process Control Instrumentation
- b) Remote Sensing and Image Sensors
- c) GPS & Applications

**Elective III**

1. Nanotechnology and Applications
2. Microcontrollers and Embedded Systems
3. Digital Image Processing

### Semester III

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<th>Subject title</th>
<th>Credits</th>
<th>Sessionals</th>
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Project work to be submitted before the end of 3rd Semester and it will be evaluated by a committee consisting of Chairman, Board of Studies, Head of the Department and thesis guide.

### Semester IV

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<th>Credits</th>
<th>Sessionals</th>
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M.E. (Electronic Instrumentation)

Syllabus for
DIGITAL SIGNAL PROCESSING

Credits : 4

Subject Code : MEI – 1
Exam Marks : 70
I – Semester
Sessionals : 30

Common with M.Tech (Radar and Microwave Engineering), Digital Signal Processing (MTRM – 1), M.Tech (Communication Systems), Digital Signal Processing (MTCS-4)

Chapter – I : Advanced digital filter design techniques : Multiple band optimal FIR filters – design of filters with simultaneous constraints in time and frequency response, optimization methods for designing IIR filters, comparison of optimum FIR filters and delay equalized elliptic filters.

Chapter – II : Multirate DSP : The basic sample rate alteration – time – domain characterization, frequency – domain characterization : Cascade equivalences, filters in sampling rate alteration systems, digital filter banks and their analysis and applications, multi level filter banks, estimations of spectra from finite – duration observation of signals.

Chapter – III : linear prediction and optimum liner filters : forward and backward linear prediction, AR Lattice and ARMA lattice – ladder filters, Wieners filters for filtering on prediction.

Chapter – IV : DSP Algorithms : The Goertzel algorithm, the chirp – z transform algorithm the Levinson – Durbin algorithms, the Schur algorithm, and other algorithms, computations of the DFT, concept of tunable digital filters.

Chapter – V : Signal Processing Hardware : Multipliers, dividers, different forms of FIR Hardware, multiplexing, DTTR, TDM to FDM translator, realization of frequency synthesizer, FET hardware realization, different FFT architectures, special FFT processors, convolvers, Lincoln laboratory FDP and the compatible computer configurations.

Chapter – VI : Applications of DSP :
a) Speech: Model of speech production, speech analysis – synthesis system vocoder analyzers and synthesizers, linear prediction of speech.

b) DTMF System

Suggested Books:
1. Theory and applications of digital signal processing by Lawrence R. Rabiner and Bernard Gold, PHI

M.E. (Electronic Instrumentation)

Syllabus for

MICROPROCESSOR SYSTEMS

Credits: 4

Subject Code: MEI – 2
Exam Marks: 70
I – Semester
Sessionals: 30

Common with M.Tech (Radar and Microwave Engineering), Microprocessor Systems (MTRM-2)

Introduction: Historical background, Microprocessor based personal computer systems, RISC processor, Micro controllers, comparison of 8048, 8049, 8051 and 8052, Architecture of 8051.


References:


M.E. (Electronic Instrumentation)

Syllabus for

OPTICAL FIBERS AND THEIR APPLICATIONS

Credits : 4

Subject Code : MEI-3

Exam Marks : 70

Semester – I

Sessionals : 30

Common with M.Tech (Radar and Microwave Engineering), Optical Fibers And Their Applications (MTRM-3), M.Tech (Communication Systems) Optical Fibers and Applications (MTCS-5)

1. Optic Fiber Waveguides
   - Step – Index Fiber, Graded – Index Fiber, Attenuation, Modes in Step-Index Fibers, Modes in Graded – Index Fibers, Pulse Distortion and Information Rate in Optic Fibers, Construction of Optic Fibers, Optic Fibers, Optic Fiber Cables,

2. Light Sources and Detectors
   - Principles of Photodetection, Photomultiplier, Semiconductor Photodiode, PIN Photodiode, Avalanche Photodiode,

3. Couplers and Connectors
   - Principles, Fiber end Preparation, Splices, Connectors, Source Coupling, Distribution Networks and Fiber Components, Distribution Networks, Directional Couplers, Star Couplers, Switches, Fiber Optical Isolator, Wavelength-Division Multiplexing, Fiber Bragg Gratings, Other Components : Attenuator, Circulator and Polarization Controller

4. Modulation, Noise and Detection

5. System Design and Fiber Optical Applications
   - Analog System Design, Digital System Design, Applications of Fiber Optics


Reference :
M.E. (Electronic Instrumentation)

Syllabus for

TRANSDUCERS AND SIGNAL CONDITIONERS

Credits : 4

Subject Code : MEI – 4
I – Semester

Max. Marks : 70
Sessionals : 30

Unfraned theory of bilateral electromacheni cal transducers, sensitivity and linearlity analysis, static and dynamic responses, transfer function analysis of various transducers and their associated circuits, electrodynamic variable, variable inductance, variable capacitance, piezoelectric and force – balance transducers.

Design and construction of the above types of transducers :


Text Books :

M.E. (Electronic Instrumentation)

Syllabus for

VLSI

Credits : 4

Subject Code : MEI – 5

Max. Marks : 70

I – Semester

Sessionals : 30


Text books :


References :


M.E. (Electronic Instrumentation)

Syllabus for

Elective - I(a) : EMI / EMC

Credits : 4

Subject Code : MEI – 6(a)  
Max. Marks : 70

Semester – I  
Sessionals: 30

Common with M.Tech (Radar and Microwave Engineering), EMI/EMC (MTRM-5),  
M.Tech (Communication Systems) EMI / EMC (MTCS-6a)

I. Introduction, Natural and Nuclear sources of EMI / EMC :

Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations. An overview of EMI / EMC, Natural and Nuclear sources of EMI.

II. EMI from apparatus, circuits and open area test sites :

Electromagnetic emissions, noise from relays and switches, non-linearities in circuits, passive intermodulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

III. Radiated and conducted interference measurements and ESD :

Anechoic chamber, TEM cell, GH TEM Cell, characterization of conduction currents / voltages, conducted EM noise on power lines, conducted EMI from equipment, Immunity to conducted EMI detectors and measurements. ESD, Electrical fast transients / bursts, electrical surges.

IV. Grounding, shielding, bonding and EMI filters :

Principles and types of grounding, shielding and bonding, characterization of filters, power lines filter design.

V. Cables, connectors, components and EMC standards :

EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, optoisolators, National / International EMC standards.

Text Books :


References:

M.E. (Electronic Instrumentation)

Syllabus for

Elective – I(b) : ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS

Credits : 4

Subject Code : MEI – 6(b)                     Max. Marks : 70
Semester – I                  Sessionals: 30

Common with M.Tech (Radar and Microwave Engineering), Artificial Intelligence and Neural Networks (MTRM-6(b))

Artificial Intelligence as Representation and Search
Introduction to AI, Roots and Scope of AI, Definition, Turing Test, Application Areas of AI, Predicate Calculus, Structures and Strategies for State Space Search, Heuristic Search, Control and Implementation of State Space Search

Representation and Inference
Knowledge Representation, Strong Methods for Problem Solving, Reasoning in Uncertain, Situations, Machine Learning, Symbol-Based: Framework for Symbol-Based Learning, Version Space Search, ID3 Algorithm, Un-supervised learning, Reinforcement Learning, Connectionist: Perceptron Learning, Backpropagation Learning, Competitive Learning, Hebbian Coincidence Learning, Attractor Networks

Neural Networks and Fuzzy Systems
Neural and Fuzzy machine intelligence, fuzziness as multivalence, the dynamical-systems approach to machine intelligence, intelligent behaviour as adaptive model-free estimation.

Neural Dynamics
I. Activations and signals: Neurons as functions, signal monotonicity, biological activations and signals, neuron fields, neuronal dynamical systems, common signal functions, pulse-coded signal functions, Neuronal dynamics II: Activation Models: neuronal dynamical systems, additive neuronal dynamics, additive neuronal feedback, additive bivalent models, BAM Connection matrices, additive dynamic and the noise-saturation dilemma, general neuronal activations: Cohen-grossberg and multiplicative models

Synaptic Dynamics
I. Unsupervised Learning: Learning as encoding, change, and quantization, four unsupervised learning laws, probability spaces and random processes, stochastic unsupervised learning and stochastic equilibrium, signal hebbian learning, competitive learning, differential hebbian learning, differential competitive learning. Synaptic Dynamics II: Supervised learning: Supervised function estimation, supervised learning as operant conditioning, supervised learning as stochastic pattern learning with known class memberships, supervised learning as stochastic approximation, the back propagation algorithm.

Text Book:

1. “Artificial Intelligence – Structures and Strategies for Complex Problem Solving”,

Reference Books:

1. “Artificial Intelligence”, Knight, Tata McGraw Hill
3. Fundamentals of Artificial Neural Networks, Mohamad H Hassoum, PHI
M.E. (Electronic Instrumentation)

Syllabus for

Elective – I(c) : APPLICATION SPECIFIC INTEGRATED CIRCUITS (ASIC)

Credits : 4

Subject Code : MEI – 6(c)  Max. Marks : 70
Semester – I  Sessionals: 30

Common with M.Tech (Radar and Microwave Engineering), Application Specific Integrated Circuits (MTRM-6(c))

1. Introduction to ASICs – Types of ASICs, Design flow, Economics of ASICs, ASIC cell libraries, CMOS Logic, CMOS design rules, Logic cells, I/O cells, cell compilers.
2. ASIC Library Design – Transistors as resistors, Transistor parasitic capacitance, Logical effort, Cell design, Programmable ASICs, Programmable ASIC logic cells, Programmable ASIC I/O cells, Programmable ASIC interconnect, Programmable ASIC design software.
3. Low-level design entry, Schematic entry, low-level design languages, PLA tools, EDIF, An overview of VHDL and verilog, Logic synthesis, Simulation.
4. ASIC construction, Floor planning and placement.
5. CMOS System Core Studies
6. Practical Realities and Ground Rules
   Further thoughts on floor plans/layout, floor plan layout of the four bit processors, input/output (I/O) pads, “Real estate”, further thoughts on system delays, ground rules for successful design, scaling of MOS circuits.

Textbooks


Reference Books

M.E. (Electronic Instrumentation)

Syllabus for

ELECTRONIC INSTRUMENTATION TECHNIQUES

Credits : 4

Subject Code : MEI – 9

Exam Marks : 70

II – Semester

Sessionals : 30

Principles and Design of Electronic Instruments : Digital voltmeters, Electronic counters, Frequency synthesizers, Wave analysers, Spectrum analysers, Sweep waveform generators and pulse generators, Lock-in amplifiers, Q-meters, High frequency impedance bridges, Ground loops, Electromagnetic and static pick-up, Interference, Shielding and grounding, Floating voltage measurements; Common signals and their effects.

Oscilloscopes : Sweep generators, Sweep modes, Storage oscilloscopes types, Erasing methods, Sampling oscilloscopes synchronous and random sampling, Time domain reflectometry, Logic state analysers and their applications.

Display System : Liquid crystal, Solid state CRT, Displays,


Text Books :


Reference :

Manufacturer’s Literature.
Data Acquisition system: Introduction, Principles and design.

Digital to Analog converters (DACs): Parallel R-2R, Weighted resistor, inverted ladder and serial (ADCs).

Analog to Digital Converters (ADCs): Paralleled feedback, Successive approximation, Ramp comparison, Dual slope integration, Voltage to frequency, Voltage to time, Logarithmic types of ADCs, Accuracy analysis, Dynamic and static error analysis of the above, Typical study of monolithic DACs and ADCs.

Text Books

1. H. Schmid ‘ELECTRONIC ANALOG-DIGITAL CONVERSION’ McGraw Hill
2. D.G. Hoeschele ‘A to D and D to A conversion techniques’ Wiley

Reference

2. Datel / Intersil – Data acquisition systems.
M.E. (Electronic Instrumentation)

Syllabus for

LINEAR AND DIGITAL SYSTEMS DESIGN

Credits : 4

Subject Code : MEI – 11
II – Semester

Exam Marks : 70
Sessionals : 30

Principles and applications of operational amplifiers as summers, Integrators controlled current voltage sources, Function generators, Logarithmic amplifiers, Anti logarithmic amplifiers, Instrumentation amplifiers, Sample and hold circuits, Comparators, Multivibrators, Window discriminators, Analog multipliers, Modulator circuits, Four quadrant multipliers, Squaring and square rooting, phase sensitive detector circuits, analog switches, multiplexers, Phase locked loops, broad band amplifiers, Precision rectifiers, IC voltage regulators, switched mode regulators and active filter circuits, 555, 566 "8038 ICs and their applications, Line drivers, Receivers for MODEMS, Isolation amplifiers.

Text Books
1. A.B. Grebene ‘Analog IC design’ – Van Nostrand
2. G.B. Clayton ‘Applications of Linear ICs’ – Max Millan (India)

Review of combinational logic design : Logic design with MSI and LSI; Multiplexers and Demultiplexers; Arithmetic units; Carry look-ahead adders; Decimal and BCD adders / subtractors; Tabular design; Read only memory methods; programmable logic array methods. Analysis and synthesis of sequential circuits : Algorithmic state machine (ASM) methods; Map entered variable and synthesis of random logic. Fault detection and error correction in combinational and sequential circuits ; two level multi level multi level fault detection methods. Test generation; redundance techniques. Introduction to computer aided design of digital circuits.

Text Book
S.C. Lee ‘Digital system design’ – Prentice Hall, May 2003 (Prescribed)

Reference
3. ZVI Kohavi ‘Switching and Finite automata theory TMH 1976
4. Frederick J. Hill, Gerald R. Peterson ‘Computer Aided Logical Design with emphasis on VLSI – 1933 (John Wiley)
M.E. (Electronic Instrumentation)

Syllabus for

BIO-MEDICAL INSTRUMENTATION

Credits : 4

Subject Code : MEI – 12

Exam Marks : 70

II – Semester

Sessionals : 30

Chapter – I : Sources of Bioelectric potentials and Electrodes
Electrode theory, Bio Potential Electrodes, Biochemical Transducers

Chapter – II : The Cardiovascular System and Cardiovascular Measurements,
The Heart and Cardiovascular System, The Heart, Blood Pressure, Characteristics of Blood Flow, Heart Sounds
Electrocardiography, Measurement of Blood Pressure, Measurement of Blood Flow and Cardiac output, Plethysmography, Measurement of Heart Sounds,

Chapter – III : Patient Care & Monitory and Measurements in Respiratory System
The elements of Intensive Care Monitory, Diagnosis, Calibration and repairability of Patient Monitoring equipment, other instrumentation for monitoring patients, pace makers, defibrillators
The Physiology of respiratory system, tests and instrumentation for mechanics of breathing, respiratory theory equipment

Chapter – IV : Bio telemetry and Instrumentation for the clinical laboratory Introduction to biotelemetry, physiological parameters adaptable to biotelemetry, the components of biotelemetry system, implantable units, applications of telemetry in patient care
The blood, tests on blood cells, chemical test, automation of chemical tests

Chapter – V : X – ray and radioisotope instrumentation and electrical safety of medical equipment.
Generation of Ionizing radiation, instrumentation for diagnostic X – rays, special techniques, instrumentation for the medical use of radioisotopes, radiation therapy.
Physiological effects of electrical current, shock Hazards from electrical equipment, Methods of accident prevention

TEXT BOOK :

M.E. (Electronic Instrumentation)

Syllabus for

Elective II(a) : PROCESS CONTROL INSTRUMENTATION

Credits : 4

Subject Code : MEI – 13(a)  
Exam Marks : 70

II – Semester  
Sessionals : 30
M.E. (Electronic Instrumentation)

Syllabus for

Elective II(b) : REMOTE SENSING AND IMAGE SENSORS

Credits : 4

Subject Code : MEI – 13(b)  Exam Marks : 70
II – Semester  Sessionals : 30

Unit-I  Basics of Remote Sensing
   a) Principles of Remote sensing, History of Remote sensing, Remote sensing in India,
      • Electromagnetic Radiation and Electromagnetic Spectrum, EMR quantities: Nomenclature and Units
      • Thermal Emission of Radiation, Radiation Principles (Plank’s Law, Stephen Boltezman law), Interaction of EMR with the Earth Surface (Wien’s displacement law, Kirchoffs Law)
      • Spectral signature, Reflectance characteristics of Earths cover types, Remote sensing systems.

Unit - II  Platforms and sensors
   Platforms, Remote sensing sensors, resolutions Across track and along the track scanning, Optical sensors,
   • Thermal scanners
   • Microwave sensing radar
   • satellite missions
   • Landsat series, SPOT series, IRS satellite series, IKNOS,

Unit-III  Microwave Remote Sensing
   • Airborne and Space borne radar systems basic instrumentation.
   • System parameters - Wave length, Polarization, Resolutions, Radar geometry.
   • Target parameters - Back scattering, Point target, Volume scattering, Penetration, Reflection, Bragg resonance, Cross swath variation. Speckie radiometric calibration.
   • Radar - Grametry - Introduction, Mosaicing Stereoscope.
   • Application : Geology, Forestry, Land use, Soils etc. Future trends and Research

Unit-IV  Thermal Imaging system
   • IR - radiometers, Airborne and Satellite TTR scanner system
   • Characteristics of IR images
i) Scanner distortion, ii) image irregularities, iii) Film density and recorded iv)Temperature ranges

- Effects of weather on images
  i) Clouds, ii) Surface winds, iii) Penetration of smoke plumes
- Interpretation of thermal imagery
- Advantages of Thermal imagery

Unit V

- Meteorological satellites
- Meteorological satellite characteristics and their orbits, TIROS, NIMBUS, NOAA, TIROS N, SEASAT, GOES, METEOSAT, INSAT
- Measurement of Earth and Atmospheric energy and Radiation budget parameters from satellites

Textbooks

M.E. (Electronic Instrumentation)

Syllabus for

Elective II (c) : GLOBAL POSITIONING SYSTEM AND APPLICATIONS

Credits : 4

Subject Code : MEI – 13(c)          Exam Marks : 70
I – Semester                      Sessionals : 30

Common with M.Tech (Communication Systems), Global Positioning System and Applications (MTCS-11), M.Tech (R&M) Global Positioning System and Applications (MTRM-14)

Unit I
Overview of GPS :
Basic concept, system architecture, space segment, user segment, GPS aided Geo-augmented navigation (GAGAN) architecture.

Unit II
GPS Signals
Signal structure, anti spoofing (AS), selective availability, Difference between GPS and GALILEO satellite construction.

Unit III
GPS coordinate frames, Time references : Geodetic and Geocentric coordinate systems, ECEF coordinate world geodetic 1984 (WGS 84), GPS time.

Unit IV
GPS orbits and satellite position determination : GPS orbital parameters, description of receiver independent exchange format (RINEX) – Observation data and navigation message data parameters, GPS position determination.

Unit V
GPS Errors :
GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

Textbooks :

Reference Books :
M.E. (Electronic Instrumentation)

Syllabus for

Elective III(a) : NANOTECHNOLOGY AND APPLICATIONS

Credits : 4

Subject Code : MEI – 14(a)    Exam Marks : 70
II – Semester         Sessionals : 30

Unit 1 : Introduction to Nanotechnology

Essence of Nanotechnology, Nano in daily life, Brief account of nano applications, Properties of nano materials, Metal nano clusters, Semiconductor nano particles.

Unit 2 : Nano Materials

Nano composites, Nanofying electronics, Sensing the environment, Mechanising the micro world, Energy and cleaner environment with nano technology.

Unit 3 : Carbon Nano Structures

Introduction, Carbon molecules, Carbon clusters, Carbon nanotubes, Applications of carbon nanotubes.

Unit 4 : Diagnosing Personal Health and Medical Applications

Lab on a chip, Super X-ray vision, Mapping the genes, Understanding how pharmaceutical company develops drugs, Delivering a new drug the Nanotech way, Cooking cancer with nano cells, Biomimetics.

Unit 5 : Biological Materials

Introduction, Biological building blocks, Nucleic acids, Biological nanostructures.

Textbooks

M.E. (Electronic Instrumentation)

Syllabus for

Elective III(b) : MICROCONTROLLERS AND EMBEDDED SYSTEMS

Credits : 4

Subject Code : MEI – 14(b)  Exam Marks : 70
II – Semester  Sessionals : 30

1. Introduction
   Embedded systems overview, Design challenge, Processor Technology, IC Technology, Design Technology, Trade-offs.
2. Custom single-purpose processors: Hardware
   Introduction, Combinational logic, Sequential logic, Custom single-purpose processor Design, RT-level custom single-purpose processor design, Optimizing custom single-purpose processors.
3. General purpose processors : Software
   Introduction, Basic Architecture, Operation, Programmer’s view, Development environment, Application-Specific Instruction-set Processors, Selecting a Microprocessor.
4. Memory:
   Introduction, Memory types, Memory Hierarchy and cache, Advanced Memory Interfacing: Communication Basics, Memory Access, I/O addressing, Interrupts, DMA, Arbitration, Multilevel Architecture, Protocols.
5. Microcontrollers:
   Review 8051 Microcontroller Architecture & Programming. Peripherals:
   Timers, Counters and Watchdog Timers, UART, Pulse width Modulators, LCD controllers, Stepper Motor Controllers, Analog to Digital converters, Real-Time clocks.
6. An Exemplary Embedded Systems using Microcontrollers: Digital Camera
   Introduction, Specifications, Design.
7. State Machine and Concurrent process models:
   Introduction, Models Vs. Languages, Text Vs. Graphics:
   Textual Languages Vs. Graphical Languages, an Example, A Basic State Machine Model, FSM, FSM with Datapath Model: FSMD, Using State Machines, Concurrent Process Model, Communication among Processes.

Text Books:
1. Embedded System Design: A Unified Hardware/Software Introduction By Frank vahid / Tony Givargis
   John wiley & sons
2. The 8051 Microcontroller & Embedded Systems By Muhammad Ali Mazidi & Janice Gillispie Mazidi PHI

References:
1. Embedded Systems Architecture, Programming and Design By Raj Kamal TMH
2. Embedded Software Primer By Simon.
M.E. (Electronic Instrumentation)

Syllabus for
Elective III(c) : DIGITAL IMAGE PROCESSING

Credits : 4

Subject Code : MEI – 14(c)  Exam Marks : 70
II – Semester  Sessionals : 30

Common with M.Tech (R&M), Digital Image Processing (MTRM-13(c)), M.Tech (Communication Systems), Digital Image Processing (MTCS-13(c))

1. Digital Image Fundamentals
   An image model – sampling & quantization – basic relation between pixels : imaging geometry.

2. Image Transforms
   Properties of 2-D fourier transforms, FFT algorithm and other separable image transforms, Walsh transforms, Hadamard, Cosine, Haar, Slant Transforms, RL Transforms and their properties.

3. Image Enhancement & Restoration
   Spatial domain methods, Frequency domain methods, Histogram Modification technique, Neighbourhood averaging, Median filtering, Low pass filtering, Averaging of Multiple Images, Image sharpening by differenctiation, High pass Filtering, Degradation model for Continuous functions, Discrete Formulation, Diagonalization of Circulant and Block – Circulant Matrices, Effects of Diagonalization, Constrained and unconstrained Restorations Inverse filtering, Wiener Filter, Constrained least Square Restoration.

4. Image Encoding
   Objective an subjective Fidelity Criteria, the encoding process, the Mapping, the Quantizer and the Coder, Contour Encoding, Run length Encoding, Image Encoding relative to a Fidelity Criterion, Differential Pulse Code Modulation, Transform Encoding.

5. Image Compression
   Fundamentals, Image compression models, error free compression, lossy compression, image compression standards.

6. Image Segmentation
   The detection of Discontinuities, Point Line and Edge Detections, Gradient Operators, Combined Detection, Thresholding.

7. Image Representation
   Representation Schemes, Chain Codes, Polygon Approximation, Boundary Descriptors, Simple Descriptors, Shape Numbers, Fourier Descriptors.

8. Image Construction from Projections
   Radon Transforms, Convolution/filterback Projection.

Textbooks

Semester III

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<th>Sessionals</th>
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Project work to be submitted before the end of 3rd Semester and it will be evaluated by a committee consisting of Chairman, Board of Studies, Head of the Department and thesis guide in the AUCE(A) and in the Affiliated Colleges Thesis (Part I) will be evaluated by concerned Head of the Department and thesis guide of their respective colleges.

Semester IV

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Thesis work is for a period of SIX months in Industry/Department. The students are required to submit their thesis two/three phases. Thesis is evaluated by a committee consisting of an external member from reputed institution, HOD/ Chairman BOS and thesis Guide.