CE/CS / EB/ EC /EE/ EI/IT/ ME/SE 501 ENGINEERING MATHEMATICS- IV

Module I

Probability distributions: random variables (discrete & continuous), probability density, mathematical expectation, mean and variance of a probability distribution, binomial distribution, Poisson approximation to the binomial distribution, uniform distribution , normal distribution.
Curve fitting: method of least squares, correlation and regression, lines of regression.

Module II

Sampling distributions: population and samples, the sampling distribution of the mean unknown),σ known), the sampling distribution of the mean (σ(the sampling distribution of the variance, point estimation, interval estimation, tests of hypotheses, null hypotheses and significance tests, hypothesis concerning one mean, type I and type II errors, hypotheses concerning two means. The estimation of variances: Hypotheses concerning one variance - Hypotheses concerning two variances.

Module III

Finite difference Operators:∇, Δ, E, δ, μ , $x^{(n)}$
Newton's Forward and Backward differences interpolation polynomials, central differences, Stirlings central differences interpolation polynomial. Lagrange interpolation polynomial, divided differences, Newton's divided differences interpolation polynomial
Numerical differentiation: Formulae for derivatives in the case of equally spaced points.
Numerical integration: Trapezoidal and Simpson's rules, compounded rules, errors of interpolation and integration formulae. Gauss quadrature formulae (No derivation for 2 point and 3 point formulae)

Module IV

Numerical solution of ordinary differential equations: Taylor series method, Euler's method, modified Euler's method, Runge-Kutta formulae 4th order formula,
Numerical solution of boundary value problems: Methods of finite differences, finite differences methods for solving Laplace's equation in a rectangular region, finite differences methods for solving the wave equation and heat equation.

Text Books:

1. Irvrin Miller & Freind , *Probability And Statistics For Engineers,* Prentice Hall of India
2. S.S.Sastry, *Numerical Methods*, Phi Publishers.

References:

1. P.Kandaswamy K.Thilagavathy, K.Gunavathy , *Numerical Mehtods*, S.Chand & Co.
2. A.Papoulis, *Probability,RandomVariables And Stochastic Processes,*,Mc Graw Hill Publishers

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 502 ELECTROMAGNETIC THEORY

Module 1

Vector Analysis : Vector Algebra, Coordinate Systems and Transformation – Cartesian, Cylindrical and spherical coordinates, constant-coordinate surfaces, Vector Calculus – Differential length, area and volume, Line, surface and volume integrals, Del operator, Gradient of a scalar, Divergence of a vector, Divergence Theorem, Curl of a vector, Stoke's Theorem, Laplacian of a scalar, Classification of vector fields.

Module 2

Electrostatics: Electrostatic Fields – Coulomb's Law and field intensity, Electric fields due to continuous charge distributions, Electric flux density, Gauss's Law, Applications of Gauss's Law, Electric Potential, Relationship between E and V, Electric dipole, Energy density in Electrostatic fields.
Electric fields in material space – Properties of materials, Convection and conduction currents, Conductors, Polarization in Dielectrics, Dielectric constant and strength, Linear, isotropic and homogeneous dielectrics, Continuity equation, relaxation time, Boundary conditions.
Electrostatic Boundary value problems–Poisson's and Laplace's Equations, Uniqueness Theorem, Resistance and capacitance [Parallel-plate, coaxial, spherical capacitors].

Module 3

Magnetostatics and Maxwell's equations: Magnetostatic fields – Biot-Savart's Law, Ampere's circuital law, Applications of Ampere's circuital law, Magnetic flux density, Magnetic scalar and vector potentials. Magnetic forces, Materials and devices – Forces due to magnetic fields, Magnetic torque and moment, Magnetic dipole, Magnetization in materials, Classification of Magnetic Materials, Magnetic boundary conditions, Inductors and inductances, Magnetic energy, Magnetic circuits. Faraday's Law, Displacement current, Time-harmonic fields, Maxwell's equations for static fields and time varying fields, Word statement.

Module 4

Electromagnetic wave propagation : Electromagnetic waves-Wave propagation in lossy dielectrics- Wave equations from Maxwell's equations, propagation constant, intrinsic impedance of the medium, complex permittivity, loss tangent, Plane waves in lossless dielectrics, Plane waves in free space – uniform plane wave, TEM wave, Plane waves in good conductors – skin effect, Poynting vector, Poynting's Theorem, Reflection of a plane wave at normal incidence – standing waves, Reflection of a plane wave at oblique incidence – parallel and perpendicular polarization, Brewster angle. Numerical Methods in Electromagnetics – Finite Difference, Finite Element and Moment method [Only the concept need be introduced – detailed study not required]

Text Books:

1. Matthew N. O. Sadiku, *Elements of Electromagnetics*, Oxford University press, 2004.
2. Jordan and Balmain, *Electromagnetic waves and radiating systems*, Pearson Education ,2nd Ed., 2006.

Reference:

1. Kraus Fleisch, *Electromagnetics with Applications* ,McGraw Hill ,1999.
2. Cheng, *Field and Wave Electromagnetics,* Pearson Education ,2005.
3. N.Narayana Rao, *Elements of Engineering Electromagnetics* ,Pearson Education, 2006.
4. William.H.Hayt, Jr and John A.Buck, *Engineering Electromagnetics*, Tata McGraw Hill, 2004.
5. Joseph A. Edminister, *Electromagnetics*, Schaum series - McGraw Hill ,1993.
6. D.GaneshRao and C.Narayanappa, *Engineering Electromagnetics*, Sanguine Technical Publishers, 2004.
7. Guru Hiziroglu, *Electromagnetic Field Theory Fundamentals* , Thomson ,2003.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 503 DIGITAL SYSTEM DESIGN

Module I

Introduction to combinational modules and modular networks. Standard combinational modules, design of arithmetic modules. Programmable Logic Array, Devices- Basic ideas, PLD architecture- PAL & PLA, Implementation of combinational systems with decoder, multiplexers, ROMs and PLAs. Implementation of multimodule combinational systems- decoder networks, Mux trees, demux network, encoder network. Shifter network and barrel shifters

Module II

Introduction to digital systems, Synchronous and asynchronous- state diagram, state names, Mealy and Moore machines binary description. Time behavior of synchronous sequential systems, Minimization of no. of states, Specification of various types of sequential system

Module III

Canonical implementation - analysis and synthesis of networks in the canonical implementation, Flip flop modules and networks. Standard sequential modules-Registers - shift register - counters - RAM - content addressable memories and programmable sequential arrays (PSA).

Module IV

Design of sequential systems with small number of standard modules, State register and combinational networks - use of ROMs in sequential networks - Counter and combinational networks - RAM and combinational networks - SR and combinational networks. Multimodule implementation of sequential systems - Multimodule registers - Shift registers and RAMs - Multimodule counters.

Text Book:

1. Milos D Ercegovac, Tomas Lang, *Digital systems and hardware / firmware algorithm*, John Wiley

References :

1. Charles H.Roth , *Fundamentals of Logic Design*, Thomson Publishers, 5th ed.
2. J.M.Yarbrough, *Digital Logic, Applications & Design*,Thomson Publishers,I edition
3. Zvi Kohavi, *Switching and Finite automata Theory*, Tata Mc Graw Hill
4. Comer, *Digital Logic State Machine Design* , Oxford University Press, 3rd edition

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC /EI 504 ADVANCED MICROPROCESSORS

Module I

Architecture 16 bit microprocessors: Intel 8086 Architecture Memory address space and data organization Segment registers and memory segmentation I/O address space- Addressing modes Comparison of 8086 and 8088. Basic 8086/8088 configuration, Minimum mode-Maximum mode

Module II

Intel 8086 programming: 8086 Instruction set. Instruction Classifications, Program development tools: editor, assembler, linker, locator, debugger and emulator. Use of DEBUG and MASM

Module III

Architecture of 32 bit Microprocessors: Intel 80386 Architecture, Block Diagram, Segmentation, Paging, Real, Protected and Virtual modes, 80486 microprocessor Architecture, Block Diagram, Pentium Architecture Block Diagram, Superscalar Architecture, Branch Prediction. PentiumII, Pentium III, PentiumIV Processors (Block Diagram only).

Module IV

Introduction to micro controllers - comparison with microprocessors Study of micro controller (MCS 51 family- 8051) - Architecture, instruction set, addressing modes and programming - Comparison of various families of 8bit micro controllers. Interfacing of ADC, sensors, keyboard and DAC using microcontrollers

Texts :

1. Barry B.Brey, *The INTEL Microprocessors - 8086/8088, 80186/80188, 80286, 80386, 80486 Pentium and Pentium pro processor, Pentium II, Pentium III, Pentium 4 - Architecture, Programming and interfacing*, Prentice Hall of India , 6 Ed, 2003.
2. Kenneth Ayala, *The 8051 Microcontroller* ,West Publishing Company.
3. Mazidi ,*The 8051 Microcontrollers & Embedded Systems*, Pearson Education.

References:

1. A.K.Ray &K.M.Bhurchandi, *Advanced Microprocessors and peripherals* , Tata Mc Graw Hill, 2000.
2. YU-Cheng Liu & Glenn A Gibson, *Microprocessor System , Architecture Programming & Design*, Prentice Hall, Inc., 1986.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC /EI 505 MICROELECTRONICS& INTEGRATED CIRCUITS

Module I

Introduction to operational amplifiers –Internal block schematic of op amp - Op-amp parameters - ideal op amp - transfer curve - equivalent circuit –Open loop gain –input and output impedance – Frequency response, frequency compensation. Slew rate and its effect; Input bias current –offset - drift - compensating networks CMRR, SVRR, finite gain bandwidth and its effect in opamp circuits' performance. Open loop configurations Op amp in closed loop configuration: Different feed back configurations- Voltage series feedback and voltage shunt feedback - concept of virtual ground- linear circuits: Summer- Subtractor Integrator and differentiator voltage follower - V/I converters, I/V converters and its applications - Differential amplifiers with one op amp and 3 op amps- Use of offset minimizing resistor (R_{OM}) and its design. Instrumentation amplifier IC and its application

Module II

Op amp applications- Log amplifier- Antilog amplifier- Comparators: zero crossing- using voltage reference- regenerative (Schmitt trigger) comparators, window detector application – OPAMP as comparators - Astable and monostable multivibrators- Triangular and saw tooth wave generators- - RC phase shift and Wien bridge oscillators-Sample and hold circuit- Peak detector circuit. Precision rectifiers.
Filters : Transfer functions – LPF ,HPF,BPF, BRF Approximation methods –Butter worth – Chebyshev -Active Filters - I order and II order filters, Quality factor –Design- Gyrator- Negative Impendence Converter-Filter using Simulated Inductance –Universal Active Filters –All Pass filters. Switched Capacitive Filters

Module III

Specialized ICs and applications: Voltage regulator IC 723, current limiting, short circuit protection, Thermal protection -555 timers – Functional block diagram- Astable multivibrator, monostable multivibrator and its applications.- 566 VCO chip- Phase locked loop(PLL) - block diagram ,Mathematical Derivation of capture rage , lock range and pull in time capture and lock range- 565 PLL - PLL applications: Frequency multiplication and division- AM demodulation- FM detection- FSK demodulation Analog multiplier circuits and applications. ADC and DAC –performance specification –weighted, R-2R ; successive approximation , flash, integrating.

Module IV

Introduction to Microelectronics: Monolithic and hybrid Ics- Bipolar & MOS Technology- Fabrication of active and passive components, bonding, packaging, - Concepts of SSI, LSI, VLSI. Introduction to thick film and thin film Technology – resistors- capacitors- comparison

Text Books:

1. R F Coughlin , *Op amps and Linear Integrated circuits* , Pearson Education/PHI
2. Sargio Franko , *Design with operational Amplifiers Analog IC*s , McGraw Hill, 2nd Edition
3. Millman & Grabel ,*Microelectronics* , Tata McGraw Hill ,2nd edition

References:

1. Gaykwad ,*Op-amps and Linear integrated Circuits*, Pearson Education, 4th edition
2. K R Botkar , *Integrated circuits,* Khanna Publishers
3. Gray, *Analog Integrated Circuits,* John Wiley, 2nd edition
4. Horstian , *Micro Electronics*, Prentice-Hall India, 3rd edition
5. Sedra & Smith,*Microelectronic circuit* , Oxford University Press,3rd edition
6. D A Bell, *Opamps and Linear integrated Circuits* ,Prentice-Hall India ,2nd Edition .

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 506 DIGITAL SIGNAL PROCESSING

Module I.

Discrete Fourier Transform and properties - Fast Fourier Transform Decimation in time FFT algorithms - decimation in frequency FFT algorithms - FFT algorithms for N a composite number, Block convolution, Discrete Hilbert transform– Other discrete transforms -.Discrete Cosine transform- Wavelet transforms.

Module II.

FIR filter design using Fourier series - window functions - frequency sampling technique-Introduction to digital filter design – specifications- FIR Digital Filters - Realizations - direct - cascade - lattice forms - hardware implementation - Finite word length effects in FIR filter design- Applications of FIR filters.

Module III.

Analog filter approximations - Butterworth and Chebychev approximations – - IIR Digital Filters - Transformation techniques-The method of mapping of differentials - impulse invariant transformation - Bilinear transformation - Matched Z transform technique – IIR Filter Realizations - Direct - Cascade - Parallel forms - hardware implementation - - Finite word length effects in IIR filter design-effects due to truncation and rounding-limit cycles- Applications of IIR filters

Module IV.

General DSP architecture- features _ on chip subsystems- memory organization-Addressing modes- Instruction types - TMS320C54X fixed point processor- TMS320C4X floating point processor-ADSP21XXX sharc processor.

Reference :-

1. John G Proakis & Dimitris G Manolakis , *Digital Signal Processing*,Pearson education,3rd edition
2. Oppenheim & Ronald W Schafer, *Digital Signal Processing*, Pearson education, 2nd edition
3. Ashok Ambardar, *Digital Signal Processing* , Thomson Learning, 2007.
4. Andreas Antoniou , *Digital Filters Analysis & Design*, Prentice Hall India , 2nd edition
5. Avtar Singh & Srinivas, *Digital Signal Processing*, Thomson Learning, 2004
6. Sanjit K.Mithra ,*Digital Signal Processing*, Tata Mc Graw Hill, 3rd edition.
7. Emmanuel C. Ifeachor & Barni W.Jerris,*Digital Signal Processing ,a practical approach*, Pearson education
8. Charles S.Williams,*Designing digital filters*, Prentice Hall
9. JAE S.Lim, Alan V.Oppenheim, *Advanced topics in signal processing*, Prentice Hall

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EB/EC/EI 507 MICROPROCESSOR LABORATORY

PART I – 3 Lab sessions

Part I A (Compulsory)

1. Study of a typical microprocessor trainer kit and its operation
2. Interfacing and programming of 8255.(eg: traffic light control, burglar alarm, stop watch)
3. Interfacing and programming of 8253/ 8254.
4. Interfacing and programming of 8279.

Part I B*

1. A/D and D/A converter interface
2. Stepper motor interface
3. Display interface
4. Programming of different types of EPROM 2716, 2732 etc

(* At least two topics from part B has to be covered.)

PART II – 7 Lab sessions

(Compulsory)

1. Introduction to IBM/PC and its DEBUG program commands
   - Examining and modifying the contents of the memory
   - Assembling 8086 instructions with the ASSEMBLER commands
   - Executing 8086 instructions and programmes with the Trace and GO Command.
   - Debugging a program
2. Assembly language program development using IBM/PC Macro assembler
   - Creating an Assembler source file
   - Assembling source program with MASM
   - The link program - creating a RUN module
   - Typical programming examples.
3. Interfacing Experiments with micro controllers

Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.

EC 508 ELECTRONIC CIRCUITS LABORATORY II

PART A (Compulsory)

I Linear circuits
Circuits using OP- Amps - Inverting & non inverting amplifiers , Summing Amplifier, Differential Amplifier, Instrumentation Amplifier, Integrators & Differentiators , Measurements of offset voltage and its compensation .Precision rectifiers

II Circuits using op-amps for waveform generation.
i) Astable, monostable multivibrators .
ii) Wein bridge oscillator
iii) Triangular, square wave form generators.

III Second order Active RC filters
High pass, low pass

IV Astable and monostable multi-vibrators circuit using 555

V PLL 565, voltage regulator 723

VI Filters using simulated inductance

PART B (*)

1. Characteristics of SCR, TRIAC, MOSFET
2. Trigger circuits for full wave/halfwave fully controlled / half controlled thyristor circuits.
3. Study of phase control rectifier - Resistive load, inductive load, free wheeling diode.
4. Study of motor speed control.
5. Study of UPS / SMPS

* Atleast two topics from part B has to be covered.

Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.