SEMESTER V

CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 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, nominal 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:

I. Irvrin Miller & Freind: Probability And Statistics For Engineers, Prentice Hall Of India

2. S.S.Sastry: Numerical Methods, PHI Publishers.

REFERENCES:

.I. P.Kandaswamy K. Thilagavathy, K.Gunavathy: Numerical Mehtods, S.Challd & Co.

2. A.Papoulis: Probabiljty,Random Variables And Stochastic Processes,MGH Publishers

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 502 INDUSTRIAL INSTRUMENTATION I

MODULE I

Measurement of Forcr, Torque, Velocity : Electric balance – different types of load cells – magnets – elastics load cell-strain gauge load cell-different methods of torque measurement, strain gauge, relative regular twist-speed measurement-revaluation counter- capacitive tacho-drag up type tacho D.C and A.C tacho generators – stroboscope.

MODULE II

Pressure Measurement :Units of pressure – manometers – different types – elastic type pressure gauges – Bourde type bellows – diaphragms – Electrical methods – elastic elements with LVDT and strain gauges – capacitive type pressure gauge – piezo resistive pressure sensor – resonator pressure sensor – measurement of vacuum – McLeod gauge – thermal conductivity gauges – Ionization gauge cold cathode and hot cathode types – testing and calibration of pressure gauges – dead weight tester.

MODULE III

Temperature Measurement : Definitions and standards – primary and secondary fixed points – calibration of thermometers different types of filled in system thermometer – sources of errors in filled in systems and their compensation – Bimetallic thermometers – Electrical methods of temperature measurement – signal conditioning of industrial RTDs and their characteristics –3 lead and 4 lead RTDs.

MODULE IV

Thermocouples and pyrometers : Thermocouples – law of thermocouple – fabrication of industrial thermocouples – signal conditioning of thermocouple output – thermal block references functions – commercial circuits for cold junction compensation – response of thermocouple – special techniques for measuring high temperature using thermocouples – Radiation methods of temperature measurement – radiation fundamentals – total radiation and selective radiation pyrometers – optical pyrometer – two colour radiation pyrometer.

TEXT BOOKS

1. Ernest O.Doebelin, Measurement systems Application and Design, . International Student Edition, IV Edition, McGraw Hill Book Company, 1998
2. R.K.Jain, Mechanical and Industrial Measurements, Khanna Publishers, New Delhi, 1999.

REFERENCES

3. D.Patranabis, Principles of Industrial Instrumentation, Tata McGraw Hill Publishing Ltd., New Delhi, 1999.
4. A.K.Sawhney, A course in Electrical and Electronic Measurement and Instrumentation – Dhanpat Raj and Sons, New Delhi, 1999.
5. P.Holman, Experimental Methods for Engineers International Student Edition, McGraw Hill Book Company, 1971.
6. B.C.Nakra and K.K.Chaudary, Instrumentation Measurement and Analysis, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1985.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 5O3 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, multiplexes. 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. Miios D Ercegovac, Tomas Lang, Digital systems and hardware I firmware algorithm, John Wiley, 1985

REFERENCES :

1. Charles H. Roth. Fundalnentals of Logic Design, Thomson Publishers, 5th ed.
2. J. M. Yarbrough, Digital Logic, Application, & Design, Thomson Publishers. 1997
3. Zvi Kohavi, Switching and Finite automata Theor, Tata McGraw Hill, 2nd ed.
4. Comer, Digital Logic State Machine Design, Oxford University Press, 3rd ed.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 504 ADVANCED MICROPROCESSORS

MODULE I

Architecture 16 bit microprocesors: Intel 8086 Architecture Memory address space and data organization Segment registers and memory segmentation l/O address space-Addressing modes comparison of 8086 and SO88. Basic 8086/8088 configurations, 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. Super scalar Architecture, Branch Prediction. Pentium II, Pentium Ill, Pentium lV 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 micro controllers

TEXTS:

I. Barry B. Brey, The INTEL Microprocessors -8086/8088.80186/80188. 80286.80386. 80486 Pentium and Pentium pro processor. Pentium 1/. Pentium III. Pentium 4 –Architecture. Programming and interfacing, Prentice Ha11 of India , 7th ed.
2. Kenneth Ayala, The 8051 Microcontroller , West Publishing Company.
3. Mazidi, The 8051 Microcontroller~. & Embedded Systems, Pearson Education' PHI Ltd 2nd ed.

REFERENCES:

I. K. Ray & K. M. Bhurchandi, Advanced Microprocessors and peripherals, Tata McGraw Hill, 2000.
2 YU-Cheng Liu & Glenn A Gibson, Microcomputer Systems. Architecture, Programming & Design. PHI Ltd, 2nd ed.
3. James L. Antonakos, The Intel Microprocessor Family Hardware and Software, Principles and Applications, Thomson Learning, 2007

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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 (UI-YC -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 (.MRR. 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

Opamp 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- 1 order and II order filters. Quality factor -Design- Gyrator-Negative Impendence Converter-Filter using Simulated Inductance -Universal Active Filters -AIl Pass filters. Switched Capacitive Filters

MODULE III

Specialized IC's 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 range. 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 -perfomance 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:

I, R F Coughlin .Op (amps and linear Integrated circuit,Pearson Education! PHl Ltd, 6th ed. 2, Sargio Franko .Design with operational ,4mplifiers Analog ICs .McGraw Hill. 2nd Ed. 3.

3. Millman & Grabel Microelectrol1ics. Tata McGraw Hill, 2nd ed,

REFERENCES:

I. Gaykwad .Op-llmps and Linear integrated Circuits. Pearson Education/ Prentice-Hall India Ltd. 4th ed.

2. K R Botkar .Intf!,t':ra(ed circuits, K hanna Publishers, 9th ed.

3. Gray. Analog integrated circuis, John Wiley 2nd end

4. Horstian .Micro Electronics. Prentice-Hall India. 3r" ed.

5 Sedra & Smith. Microelectronic circuit, Oxtord University Press.3rd ed.
6, D A Bell. Microelectronic Circuit.", Prentic~-Hall India .2"d Ed.
7 David L.Terrell Op Amps-Design,Application and Troubleshooting.Elsevier India Pvt. L.td..2nd ed.
8. Joseph J. Carr.Linear Integrated Circuits elsevier 2006

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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.

Introduction to digital 1ilter design -specifications- FIR Digital Filters -Realizations - direct -cascade -lattice forms -hardware implementation -FIR filter design using Fourier series -window functions -frequency sampling technique- Finite word length effects in FIR filter design- Applications of FIR filters,

MODULE III.

IIR Digital Filters -Realizations -Direct -Cascade -Parallel forms -hardware implementation -Analog filter, approximations -Butterworth and chebychev approximations -Transformation techniques- The method of mapping of differentials - impulse invariant transformation -Bilinear transformation -Matched Z transform ; technique -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-ADSP2lXXX sharc processor .

REFERENCE :

1. John G Proakis & Dimitris G Manolakis, Digital Signal Processing, Pearson education/ PHI Ltd,3rd ed.
2. Oppenheim & Ronald W Schafer,Digital Signal Processing,Pearson education PHI Ltd, 2nd ed,
3. B, Venkataramani, M,Bhaskar, Digital Signal Processors: Architecture, Programming . and Applications, Tata McGraw- Hill, 2002
4. Ashok Ambardar, Digital Signal Processing, Thomson Learning, 2007 ,
5. Steven W, Smith, Digital Signal Processsing-A Practical Guidefor Engineer and Scientists, Elsevier India ,Pvt Ltd. 2006
6. Andrea; Antoniou , Digital Filters Analysis & Design, Pearson education ,2nd ed,
7. Avtar Singh & Srinivas, Digital Signal Processing, Thomson Learning, 2004
8. Sanjit K, Mithra .Digital Signal Procesing, Tata McGraw Hill, 3rd ed,
9. Emmanuel C, Ifeachor & Barni W. Jerris, Digital Signal Processing, A practical approach, Pearson education,2'1d ed
10. Charles S. Williams, Designing digital filters, Prentice-Hall India Ltd, 1986
11. JAE S. Lim, Alan V, Oppenheim, Advanced topics in signal procesing, Pearson education, 1988

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

CS/EB/EC/EI 507 MICROPROCESSOR LABORATORY

PART 1- 3 Lab sessions

Pal1 I A (Compulsory)

I. Study of a t}'Pical microprocessor trainer kit and its operation
2. Interfacing and programming of 8255.(eg: trafic light control. burglar alarm. stop watch)
3. Interfacing and programming of 8253/ 8254.
4. Interfacing and programming of 8279.

Part I B*

I. 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 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 programs 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.

El 508 INSTRUMENTATION LABORATORY I

PART --A *
Measurement of Inductance by Maxwell's Bridge and Hay's Bridge
Measurement of Capacitance by Schering Bridge
Measurement of low resistance by Kelvin Double Bridge
Measurement of resistance by Wheat stone's Bridge
Study of Inductance Pick up Module
Study of Capacitance Pick up Module

* Atleast three topics from part A have to be covered.

PART -B *

1. Circuits using OP-AMPs
Instrumentation Amplifier.
Measurement of Off-set Voltage and its compensation.
Precision rectifiers
Second order active RC filters-Low pass, High pass, Band pass and Band elimination
Filters using simulation inductance
Universal active filter
Double integration Osci11ator

* Atleast four topics from part B have to be covered.

PART -C

II. Voltage regulator using 723 with short circuit protection
III. Voltage contro11ed osci11ator -Use as frequency modulator .

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.