# SEMESTER IV

## CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 401 ENGINEERING MATHEMATICS III

**MODULE 1**

Complex Analytic functions and conformal mapping: curves and regions in the complex plane, complex functions, limit, derivative, analytic function, Cauchy -Riemann :equations, Elementary complex functions such as powers, exponential function, logarithmic, trigonometric and. hyperbolic functions.. Conformal mapping: Linear fractlonal transfonnatlons, mapping by elementary functions like $Z^2$ , e , sin z, COS z, sin hz and COS hz, Z+ 1/Z

**MODUL II**

Complex integration: Line integral, Cauchy's integral theorem, Cauchy's integral formula, Taylor's series, Laurent's series, residue theorem, evaluation of real integrals using integration around unit circle, around the semi circle, integrating contours having poles, on the real axis.

**MODULE III** .

Partial differential equations: Formation of partial differential equations. Solutions of equations of the form F(p, q) = 0, F(x,p,q)=O, F(y,p,q)=O, F(z,p,q)=O, Fl(x,p) = F2 (Y,q), Lagrange's form Pp+Qq = R. Linear homogeneous partial differential equations with constant co-efficients.

**MODULE IV**

Vibrating string: one-dimensional wave equation, D ' Alembert ' s solution, solution by the method of separation of variables. One dimensional heat equation, solution of the equation by the method of separation of variables, Solutions of Lap lace’s equation over a rectangular region and a circular region by the method of separation of variables.

**TEXT BOOKS:**


1 R.K.Jain, S.R.K.Iyengar: Advanced Engineering Mathematics, Narosa Publishers. 2nd ed

2 C.R. Wilie & L.C.Barrett: Advanced Engineering Mathematics, MGH Co, 6th ed :


**REFERENCES:**


Advanced Engineering Mathematics: Ervin Kreyszig, Wiley Eastern,9th ed

Complex Variables & Applications: Churchill R. V, Mgh Publishers,5th ed.

Advanced Engineering Mathematics, M.C.Potter, J.L.Goldberg 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**.

# CS/EB/EC/EI 402 MICROPROCESSORS

## MODULE I

Introduction to 8 bit microprocessor: Microcomputers and microprocessors, 8/ 16/32/ 64-bit microprocessor families; Internal architecture of Intel 8085 microprocessor: Block diagram, Registers, Internal Bus Organization, Functional details ofpins, Control signals, External Address / Data bus multiplexing, Demultip1exing, 1/ 0 mapped 1/ 0, and memory mapped 1/ 0
techniques. Interrupts, Serial communication and DMA features

## MODULE II

Assembly Language Programming: 8085 instruction set: Instructions, Classifications, Addressing modes, Stack and Subroutines, Delay routines, Counters etc. Programming examples.

## MODULE III

Instruction Timing and Interrupts: Timing Diagrams (of various instructions): T-state, Machine cycle (Opcode fetch, Read / Write, Interrupt Acknowledge, Bus Idle, etc), Interrupts: -types (h/ w and s/ w), Maskable / Non maskable, their organization.

## MODULE IV

Interfacing concepts and devices:
Memory interface: Concept of memory chip/ chips interface to 8085 with appropriate examples Programmable interfacing devices: -Programmable peripheral interface (Intel 8255), Programmable timer interface (Intel 8253/54), Programable display / Keyboard interface (Intel 8279), Programmable serial communication interface (Intel 8251 )-(their architecture, register 1 organization, initialization, hard ware and software interface to 8085.

## TEXT BOOKS:

1 . Ghosh and Sridhar: 0000 to 8085 Microprocessors for Engineers and Scientists
2. Gaonkar: Microprocesors, Architecture, Programming and Applications.

## REFERENCES :


1. A.Nagoor Kani, Microprocessors, Architecture & Programming, RBA Publications, 2004
2. Douglas V Hall, Microprocessors, Interfacing & Peripherals, Tata McGraw Hill 2nd ed
3. S.P.Chowdhuray, Sunetra Chowdhuray, Mcroprocessors & Peripherals, SCITECH, 2004


**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 403 ELECTRONIC CIRCUITS II

**MODULE I**

**Feedback amplifiers**: Negative and positive feedback -Different types of negative feedback amplifier -voltage shunt-voltage series -current shunt -current series .Oscillators -Principle of sinusoidal oscillators -BarkHausen criteria -RC oscillators -phase shift-Wienbridge -LC oscillators -Hartley , Colpitts -clapp oscillator, crystal oscillator .

**Module II**

Power amplifiers -classification -class A , class B; Class AB, Cla3s C and class D -Transformer coupled class AB Power amplifier -Transformer less class AB push pull Power amplifier -complementary symmetry power: amplifier- Harmonic distortion in Power amplifiers -Transistor rating -Heat sinks -Switching amplifiers

**Module III**

High frequency amplifier -Filter Design and Tuned amplifier -coupled circuit, unilateralisation of transistor,\ Q-factor. single tuned, double tuned and stagger tuned amplifier (analysis not required) -Wide band amplifier:: Gain-bandwidth trade off. Wide band transistor configuration cascade emitter coupled -broad banding, bandwidth trade-off, wide band transistor configuration with negative feed back, frequency compensation -low frequency RC compensation High frequency compensation (analysis not required)

**Module IV.**

Differential amplifier:-Basic differential amplifier-dual input balanced output and unbalanced output -internal block schematic of op amp-Biasing used in IC-Constant current source - current mirror circuits-active load-level shifters-power amplifier stages. Power supply requirements.

**TEXT BOOK: -**

1. Sedra & Smith, Microelectronic circuits, Oxford University Press, 5th ed.

**REFERENCE: -**

1. Millrnan & Halkias , Electronic Devices & Circuits, Tata MeGraw Hill. 2004
2. Bapat K N , Electronic Devices & Circuits. Mc Graw Hill,1992
3. Millman & Taub, Pulse Digital and Switching WaveJorIm. Tata McGraw Hill. 2002
4. Millman & Halkias , Integrated Electronics, Tata McGraw Hill. 2003
5. Boylestead & Neshelsky .Electronic Devices & Circuit Pearson Education/ PHI Ltd,9th ed.
6. Schilling & Belove, Electronic Circuits ,Discrete & Integrated. Tata McGraw Hill, 3rd ed.
7. R.S. Moni. Amplifiers, Wiley Eastern
8. Ramakant A. Gaykwad. Op-amp. and Linear integrated Circuit., Pearson Education/ PHI Ltd.4th 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 404 SIGNALS AND SYSTEMS

## MODULE I

Continuous Time signals: Energy and Power signals, Exponential and sinusoidal Signals, periodicity, Impulse and step signals. Continuous Time systems: Properties- Linearity, stability, causality, memory, invariability. time invariance. Analysis of LTI System -impulse response- convolution-graphical analysis-properties of convolution, differential equation representation. : Frequency analysis of CT systems -Fourier series Fourier Transfom1 -Properties Convolution, multiplication, Correlation, ParseVal's relationship, Examples. Inverse relationship between time and frequency, Time-Bandwidth product. Signal Spectrum,

## MODULE II

Discrete Time signals: Energy and Power signals, Exponential and sinusoidal signals. Periodicity, Impulse and step signals. Discrete Time systems: Properties: Linearity, stability, causality, memory, invertibility, time invariance.

Representation of systems -impulse response- convolution -Difference equation representation Frequency analysis of DT systems: Discrete Time Fourier Series, Discrete Time Fourier Transforms, Z transforms: Properties Analysis of L TI systems using Z transforms the inverse Z transform -System function. : sampling of CT and DT signals. Sampling Theorem Nyqust rate. Reconstruction --ideal. Zero order hold.

## MODULE III

Random Signals and systems: Review of random variables and probability density function. Random processes, statistical averages. Stationary processes, Ergodic processes. Random processes and L TI systems. Random processes in frequency domain, Power spectrum of stochastic processes, variance, Auto correlation and spectral densities -Properties, Power spectral density. Gaussian, Rayleigh, Rice probability density and White processes, and limited and band pass processes.

## MODULE IV

Noise: White noise, Narrow band noise, effective noise temperature and noise figure representation Sine wave ontAminated with narrow band noise. Effect of noise in SysteJns; eg: Linear and angle modulation systems, m-eshold effect and threshold extension, pre-emphasis and de-emphasis filtering. Introduction to Detection and stimation, Matched filters

## TEXT BOOKS


I. Openheim & WilskY, Signa/s & systems, Prentice-HallIndia Ltd /Pearson Education, 2nd ed.

2. Simon Haykin, Communication .S:vstems, John Wiely, 4th ed.

3 Proakis & Salehi .Conlmunication Systems, Pearson Education/ Prentice-HallIndia Ltd, 2nd ed.


## REFERENCES :


I. Steven W. SmIth, Digital Signal Processsing- A Practical Guide for Engineers and Scientists. Elsevier , India Pvt Ltd., 2006

2. Ambardar, Ana/og & Digita/ Signa/ Processing, Thomson Learning, 2nd Ed.

3. B P Lathi .Linear signal & ~vstems ,Oxford University Press,2nd ed.

4. C L Phillips, J M. Parr, EA Riskin, Signals,Systems. and Tralzsforms, Pearson Education 3rd ed.

5 RE Ziemer, W H Tranter,D. R Fannin, Signals and~vstems, Prentice-HallIndia Ltd.4th ed.
6. S S Soliman. M D Srinath, Continuoll.'i and discrete signa/s and systems, Prentice- HallIndia Ltd, 2nd ed. ..
7. Stark/Wood, Probability' and Random proces.with application to Signal Processing. Pearson Edu., 3rd ed.
8, Hwei-Hsu, analog & Digital Communication, Schaums series, McGrawHill, 2nd 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.**
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## EI 405 PRINCIPLES OF MEASUREMENT AND INSTRUMENTATION .

### MODULE I

Generalized Measurement system -Block diagram. Functional Description of Measuring System. Desired, Modifying, Interfering Inputs, Methods of eliminating Modifying and interfering Inputs. - Generalized performance characteristics -Static characteristics error and error analysis. Dynamic characteristics, ramp and impulse, step response of Zero order, 1 SI order, 2nd I order Measurement systems.

### MODULE II

Variable Resistance Transducers -Types, Potentiometric Transducers -Loading Error, Sensitivity and Linearity.

Strain Gauges -types, Gauge Factor- Strain gauge bridge circuits, Tempcompensation. ISemi-conductor Strain gauge, Calibration of Strain gauge, Thermister, R. T .D.

Variable capacitance Transducers: Principles, types, Sensitivity and Linearity for variable air gap & Variable Permitivity Types. Capacitance Transducers bridge circuits.

Variable Inductive Transducers: Various types, L.V.D.T. -Principle and characteristics, Block diagram approach for a typical L. V .D. T .set up used for displacement Measurement.

Magneto striction -Materials -Magneto striction Transducers.

### MODULE III

Piezo Electric Transducers: Piezo Electric, Element and their properties. Piezo Electric coefficients. Equivalent circuit and frequency response of P .E. Transducers.

Hall Effect transducers inductive transducers, digital transducers. Photo electric transducers, pyroelectric transducers and fibre optic sensors.

Elastic Transducers: Springs, Bellows, Diaphram, Bourdon Tubes -Their important features.

Ionization Transducers: Geiger Muller and Scintillation counters.

### MODULE IV

TEMPERATURE: Temperature Scales, Mechanical temperature sensors, Resistance type temperature sensors, Platinum resistance thermometers, Thermisters, Thermocouples, Solid state sensors, Quartz thermometer, Radiation methods, Optical Pyrometer, Calibration of thermometers.

PRESSURE: Diaphragms, other elastic elements, Transduction methods, Force balance transducers, Solid state devices, Piezo-Electric transducers, Vibrating element pressure sensors, Pressure calibration using dead weight tester.

### TEXT BOOKS :

Instrumentation transducers - Newbert
Measurement systems, application & design - Doeblin
Engineering measurements - Collet & Hope

**REFERENCES:**


| | |
|---|---|
| lnstrumentation in scientific research | Lion |
| Electrical and electronic measurements | A K Sawlmey |
| Instrumentation for process measurement and control | Norman & Anderson |
| Engg. Measurement & inst'n | Adams. IF |
| Principles of industrial instrumentation | D Patranabid |
| Industrial process measuring instruments | G C Carrol |


**Type of Questions for University Exam.**

**Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.**
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## EB/EC/EE/EI 406 INDUSTRIAL AND POWER ELECTRONICS

**MODULE I**

Power transistors -Design of high power amplifier -switching transistors -Parallel operation of transistor - Power MOSFET Operating principles -Structure and characteristics. Thyristors -Classification & constructional Details. SCR -Working principle -turn on, turn off and characteristics -gate characteristics, and rating: Series and parallel operation of SCR -TRIAC -characteristics. modes of operation, Trigger circuits - magnetic & solid state, half- wave and full-wave operation .

**MODULE II.**

Single phase controlled rectifiers -half-wave. full-wave, half-controlled and fully controlled typical wave forms, with R. RL, RI- with diode and RL with voltage source - voltage and current equation for half-wave controlled rectifier. Three phase half-wave and full-wave controlled rectifier with R load, wave forms. DC motor speed ~ control - various schemes -multi quadrant operation -simple circuits for speed control of series, PM and separately excited motors.

**MODULE III.**

Commutation schemes -(different classes) waveforms -single-phase invertors -series, parallel and bridge -PWM invertor -square wave and sin wave output. Chopper circuits using SCR transistor (detailed analysis not required) -Jones Chopper. A.C Motor speed control -various schemes –electronic control of speed of induction motors and synchronous motors.

**MODULE IV**.

Static switches: dc & ac switches- 1 and 3 switches-design of static switches-Solid state relays.

Switching regulators -Basic concepts, analysis and design of Buck, Boost, Buck-Boost and derived converters .

UPS -Characteristics -Configuration -Application. Batteries: Characteristics and selection-charging circuits.

Thyristor protection -over current, over voltage, di/dt, dv/dt, gate protection.

Industrial applications: Timer circuits -Flasher circuits-Electronic ballast, dielectric heating, induction heating.

**TEXT BOOK:**

1. Mohammed H. Rashid, Power Electronics -Circuits. Devices and Applications, PHI Lid, 3rd ed.

**REFERENCES:-**

2. Power Electronics, IMPACT Learning Material Series, Indian Society for Technical Education.
3. J. Michael Jacob, Power Electronics: Principles & Applications, Thomson Learning, New Delhi, 2006
4. B. K. Bose, Modern Power Electronic." And AC Drives, Pearson Education/ Prentice-Hall India Ltd. 2003.
5. Biswanath Paul, Industrial Electronic.5 and Control. Prentice Hall of India. New Delhi. 2002 ,
6. D W Hart. Introduction to Power Electronic.'i. Pearson Education. 1997 ,
7. PC Sen, Power Electronics, Tata Mc Graw Hill. 2007
8. Singh & Khanchandani , Power Electronics, Tata Mc Graw Hill, 2nd ed.
9. Asgnar M syed , Power ElecJronics, Prentice Hall of India, 2003
10. Hays, The art of Electronic.5, Cambridge University Press. 1989 ,

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## CS/EB/EC/EE/EI 407 DIGIT AL ELECTRONICS LABORATORY

1. Half adder and full adder using NAND gates
2. Code converters -Binary to Gray and gray to Binary using mode control
3. Binary addition and subtraction (a) l's complement (b) 2's complement{using 7483)
4. BCD adder using 7483.
5. Study of MUX. DeMUX &Decoder Circuits and ICs
6. Set up R-S & JK flip flops using NAND Gates
7. Asynchronous UP / DOWN counter using JK Flip flops
8. Design and rea1ization of sequence generators.
9. Study of shift registers and Implementation of Johnson and Ring counter using it.
10. Study of IC counters 7490, 7492.7493 and 74192 or the CMOS equivalent.
11. Astable and monostable multi- vibrators using TTL gates.
12. Transfer characteristics and specifications of TTL gates

**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 408 ELECTRONIC CIRCUITS LABORATORY

I Study of RC and RLC circuits - Frequency responses, pulse response, characteristics,
II Differentiating circuit and integrating circuit Biasing of Active devices
    i) Voltage biasing, current biasing and Feedback biasing ofBJT
    ii) Biasing of JFET
III Amplifying circuits
    (i) Simple common emitter amplifier configuration -gain and bandwidth.
    (ii) Common source amplifier

Functions of each component, gain measurement, frequency responses

IV Feedback amplifier circuits -Current series and voltage shunt- gain and bandwidth.. ,
V Oscillators -RC phase shift. Wein Bridge
VI Multivibrators -Astable ,Bistatle,monostable.
VII Sweep circuits -Simple transistor sweep,bootstrap sweep. vm Series Voltage Regulator using transistors.

**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**.