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

Module I

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 fractional transformations, mapping by elementary functions like Z^2, e^z, sin z, cos z, sin hz, and Cos hz, Z+1/Z.

Module 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)=0, F(y, p, q)=0, F(z, p, q)=0, F1(x, p) = F2(y, q), Lagrange's form Pp + Qq = R. Linear homogeneous partial differential equations with constant coefficients.

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 Laplace'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*, Mc Graw Hill,6th ed.

References:

1. Ervin Kreyszig, *Advanced Engineering Mathematics*, Wiley Eastern,9th ed.
2. Churchill R.V, *Complex Variables & Applications*, Mc Graw Hill Publishers,5th ed.
3. M.C.Potter, J. L. Goldberg, *Advanced Engineering Mathematics*, Oxford University Press,3rd ed.

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EE 402 LOGIC DESIGN

Module I

Number System and binary codes: Binary, Octal and Hexadecimal number systems – binary arithmetic, binary codes, excess-3 code, Gray code error detection and correction – Boolean algebra – minimisation of Boolean functions using Karnaugh map and Quine-Mclusky methods – formation of switching functions from word statements, realisation using NAND, NOR & XOR gates – combinational circuits – multiplexer – demultiplexer, decoder, encoder.

.

Module II

Arithmetic circuits: Half adder, full adder, subtractor, serial and parallel addition – carry look ahead adder – binary multiplication – multivibrators – monostable and astable multivibrators using discrete gates.

Module III

Sequential circuits: flip-flops – RS, JK, T & D flip-flops, shift registers – counters – design -asynchronous and synchronous counters, up-down counters, Modulo counter, ring counter, Johnson counter – sequence generators – analysis of sequential circuits – state table and diagrams
Memories – ROM, RAM, EPROM, EEPROM Programmable logic array, devices – basic ideas – PLD architecture – PAL and PLA – programmable examples with software tools.

Module IV

Logic families: RTL, DTL, TTL, ECL, and CMOS – tristate logic – specification and transfer characteristics of basic TTL interfaces, - standard logic levels – current and voltage parameters – fan in and fan out – propagation delay, integrated circuits modules, noise consideration – interfacing of CMOS to TTL and interfacing of TTL to CMOS.

TextBook:-
1) Taub & Schilling - *Digital Integrated Electronics*

Reference:
1) Samuel C Lee - *Digital Circuits and Logic Design*
2) A P Malvino - *Digital Computer Electronics*
3) Morris & Miller - *Design with TTL Integrated Circuits*

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EE 403 ELECTRICAL MACHINES I

Module I

DC generators: Principle of DC generators, constructional details, field, armature and commutator or magnetic circuits, field flux distribution. Armature windings – pole pitch, coil span, winding pitch and commutator pitch. Simplex lap and wave windings, parallel paths, equalizer ring connections, dummy coils – methods of setting brushes in d.c machines. Methods of excitation – separately excited, shunt, series and compound machines. Induced e.m.f – e.m.f. equations. Armature m.m.f. – Magnitude and direction, armature reaction – air gap flux distribution under load conditions, effect of saturation, demagnetizing and cross-magnetizing armature m.m.f. – variation with brush position – compensating winding connections.

Module II

Commutator: Time of commutation, e.m.f. In the coil undergoing commutation, reactance e.m.f. – effect of brush shift, interpoles – polarity and winding connections. Type of d.c. generators – characteristics – open circuit characteristics, condition for self-excitation, critical resistance, critical speed. Load characteristics, effect of compounding. Parallel operation – parallel operation of shunt series and compound generations, equalizer connections.

Module III

DC Motors: Principles of operation, back e.m.f, production of torque, torque equation, developed and shaft torque, performance characteristics of shunt, series and compound motors, applications of various types of DC motors. Starting – need of the starter, face plate starters – three point and four point starters, calculation of resistance elements for shunt meter starter, Speed control – field control, armature control – Ward Leonard speed control. Testing of d.c. machines – losses and efficiency, separation of losses – Swinburne's test, Hopkinson's test, Fields Test, retardation test.

Module IV

Transformers: Single-phase transformer - constructional details – core, winding, insulation and brushing. Principles of operation, turns ratio, emf equation. Operation on load - magnetizing and core loss components – phasor diagram – equivalent circuit. Regulation – losses and efficiency.

Testing of transformers: DC test, SC test, Sumpner's back to back test, separation of losses, three phase connections – star and delta connections using single phase transformers. Three phase transformers – oscillating, neutral, tertiary winding, Scott connection –open delta connection – six phase connections. Parallel operation, load sharing, distribution transformers – all day efficiency.

References:

Clayton A.E. & Hancock N.N.- *Performance and Design of DC machines*, ELBS/CBS Publishers, Delhi, 1990

Theraja B.L.- *A text book of Electrical Technology Vol II*, S. Chand & Co.,

Bhimbra P.S. - *Electrical Machinery*, Khanna Publishers, New Delhi

M.G. Say- *Performance and Design of AC machines*, ELBS & Pitman, Third Edition, 1980.

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EE 404 LINEAR SYSTEMS ANALYSIS

Module I

Systems Concepts and Modelling of electrical systems: Classification of systems, static dynamic, linear, non-linear, time varying, time invariant, distributed, lumped etc. Superposition principle, Modelling of electrical systems, dynamic equations using Krichhoff's laws. Transfer functions-block diagrams and signal flow graphs.

Module II

Modelling of non-electrical systems: Translational and rotational systems, force voltage and force-current analogy- friction spring inertia-pneumatic hydraulic and thermal systems. Dynamic equations and transfer functions-comparison of different systems.

Module III

Time domain analysis for linear systems: Response to standard inputs, impulse response-step ramp and acceleration inputs-time domain performance measures-under damped and over damped systems, error constants.

Module IV

State space models for linear systems: Concepts, state space, linear systems in state space, state models from transfer functions state transition matrix time response from state model zero state and zero input response concept of stability. BIBO stability, Routh's Hurwitz criterion. Lyapunov's stability-asymptotic. Stability theorems applied to linear systems only.

Reference:

1. David.K.Cheng - *Analysis of Linear Systems*, Addison Wesley, 1977
2. Burton.T.D - *Introduction to Dynamic Systems*, McGraw Hill, 1994.
3. C.T Chen - *Linear Systems Theory and Design*, 1999.

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EC/EE 405 ANALOG COMMUNICATION

Module I.

Introduction–communication process, source of information, communication channels; Modulation – need, band width requirements – electromagnetic spectrum. Amplitude modulation – principles – visual concepts, modulation factor and percentage of modulation, mathematical relationship, component phasors, frequency spectrum, band selection. Amplitude modulators – ISB modulators – VSB modulation. AM transmitters – low level, high level – SSB systems – comparisons, mathematical analysis, SSB generation –SSB transmitters – filter method, phase shift method, third method. AM receivers – TRF receivers, Super heterodyne receiver, Double Super heterodyne receiver – SSB receiver – BFO, envelope detection, multi-channel Pilot carrier.

Module II.

Angle Modulation – mathematical analysis, principles, waveforms, frequency deviation, frequency analysis, bandwidth requirement, phasor representation–pre-emphasis, de-emphasis. FM modulators – direct, indirect, Phase modulators – direct. FM transmitters – direct FM, indirect FM; FM receivers-block diagram– demodulators – Tuned circuit frequency discriminators, slope detector, balanced slope detector, Foster-Seeley discriminators, ratio detectors – FM noise suppression; FM stereo broadcasting-stereo transmitter, stereo receiver (block level treatment only).

Module III.

Noise – external, internal – noise calculations, multiple noise sources, equivalent noise band width – Noise figure – Effective noise temperature, noise figure in terms of available gain – Noise in AM, angle modulation, pulse modulation – Performance of Communication systems – noise representation- Comparison of coded and uncoded systems - Characteristics of receivers – sensitivity, selectivity, double spotting, SNR – AGC circuitry – Performance of communication receivers – Comparison study of AM, FM and PM.

Module IV.

Telephony –Simple telephone communication, classification of switching systems, Basics of a switching system; Switches & Multiplexers, DTMF & Pulse signaling, Electronic switching – stored program control, centralized and distributed SPC, enhanced services, Time division, space division & combination switching, Signaling techniques; Traffic Engineering – Network traffic, load and parameters, grade of service, blocking probability, traffic congestion.

Text Books:

George Kennedy, *Electronic communication systems*, McGraw Hill ,4th ed.
Thiagarajan-Viswanathan, *Telecommunication Switching Systems and Networks*, PHI Ltd, 2001

References:

Simon Haykin, *Communication Systems*, John Wiley & Sons, 2004.
Robert J Schoenbeck, *Electronic Communications Modulation & Transmission*, PHI Ltd, 2nd Ed.
Wayne Tomasi, *Electronic Communications Systems (Fundamentals through Advanced)*, Pearson Education 5th Ed.
B. P. Lathi, *Communication Systems*, B.S Publication, 2001
Taub & Schilling, *Principles of Communication Systems*, Tata McGraw Hill, 1991
Roddy & Coolen, *Electronic Communications*, Pearson Education/ Ltd, 4th Ed.
D. N. Krishnakumar, *Telecommunication & Switching*, Sanguine Publishers, 2006

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EC/EB/EI/EE/ 406 INDUSTRIAL & POWER ELETRONICS

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 V - I 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 waveforms with R, RL, RL 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, waveforms. DC motor speed control - various schemes – multi quardrant 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-1φ and 3φ 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. Muhammed H. Rashid, *Power Electronics – Circuits, Devices and Applications*, PHI Ltd, 3rd ed.

References:-

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

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

CS/EB/EI/EC/EE 407 DIGITAL ELECTRONICS LAB

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) 1'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 realization 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% Mark is earmarked for continuous evaluation and 50% mark for end semester examination, to be assessed by two examiners. A candidate shall secure a minimum of 50% marks for two components to be eligible for pass in that subject.

EE 408 ELECTRICAL MEASUREMENTS LAB

Measurement of resistance using Wheatston's bridge
Measurement of resistance using Kelvin's double bridge
Measurement of self and mutual inductance of coupled coils
Measurement of KVAR in 3-phase circuits by single and two wattmeter method.
Calibration of ammeter using slide wire potentiometer
Calibration of Voltmeter using slide wire potentiometer
Measurement of internal resistance of battery using vernier potentiometer
Measurement of resistance of earth electrode using earth megger.
Calibration of wattmeter using vernier potentiometer
Determination of B-H curve
Determination of Hysterisis loop-tracing the loop using CRO
Calibration of single phase energy meter by direct and phantom loading
Calibration of single-phase energy meter at 0.5 & 0.866 p.f. without using phase shifting transformer.
Calibration of 3-phase energy meter.
Adjustments in energy meter using rotating sub- standard.

Student shall present his/her fair record, notebook duly certified by the Head of the Department, to the examiners at the time of University Practical examination.

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