EX- 402 ELECTRICAL AND ELECTRONICS MATERIAL

Unit I

Classes of Engineering Materials – Metals & alloys, ceramics, organic polymers and composite material. Classification of solids from electrical Engineering point of view. Conducting material – properties of conductors, characteristics of good conductor material, commonly used conducting materials, conductor materials for overhead lines, types of conductors, conductor for underground cables, conductor materials used for electrical machines winding, resistor materials,types of resistors, materials for bus bar. Thermal conductivity of matter, super conductivity. Materials of MHD generator, Fuel cells, Thermoelectric generators, Thermonic conductors

Unit II

Dielectric Materials: Dielectric strength, factors affecting dielectric strength, dielectric loss, dissipation factor, factors affecting dielectric loss, permittivity & polarization, charging and discharging of dielectric, conduction through dielectric. Application of dielectric, different types of capacitors and materials used for them.Insulating materials, their properties – thermal, chemical, mechanical & electrical. Insulating materials like ceramic, mica, glass, rubber, resins, wax varnishes, Class of Insulation. Transformer oils & their testing. Piezoelectricity & Ferro electricity.

Unit III

Applications of semi conductor materials: type of semi conductors, working and applications of semiconductors, Temperature sensitive elements, photoconductive cells, photo voltaic cells; Varistor, Hall effect generator, LCD, Light dependent registors, LEDs, piezo electric materials, semiconductor laser and its characteristics, photo conductors photo diodes, avalanche photo diode, photo transistors.

Unit IV

Classification of magnetic materials: Dia-magnetism, Para magnetism, Ferro- magnetism, magnetisation curve, hysterisis loop, Magnetostriction, Factors affecting permeability and hysterisis, Anti – ferromagnetism, Ferrimagnetism, Magnetic resonance, B-H curve for different magnetic materials, loss of magnetism, impurities in ferromagnetic materials, soft and hard magnetic materials, ferrites. Fiber optic materials, lasers Special Purpose materials – Thermo couple, soldering, fuse, contact, refractory, fluorescent & phosphorescent, galvanizing and impregnation.

Unit V

IC Fabrication: planar process – Fabrication of BJT, FET, & CMOS devices, Monolithic diodes Contacts – IC resistor & Capacitors - IC packaging – characteristic of IC components.

References:

1. TTI Madras; Electrical Engineering Materials; TMH.

2. C. S. Indulkar and S. Thruvengadem; Electrical Engineering Materials; S. Chand.

3. A.J. Dekkor; Electrical Engineering Materials; PHI.

4. John Allison; Electrical Engineering Material s & Devices; TMH.

5. Kasap; Electronic Materials and devices; TMH

6. V. Raghvan; Material Science & Engineering; PHI.

7. Milman & Grabe; Micro Electronics; TMH

8.S.P. Seth & P.V. Gupta; Electrical Engineering Materials; Dhanpat Rai.

EX- 403 – DIGITAL ELECTRONICS LOGIC DESIGN –I

Unit I

Number Systems and Codes : Digital number systems, base conversion, Binary, Decimal, octal, Hexadecimal, number system with radix r, Gray codes.Alphanumeric codes – ASCII code and EBCDIC codes, Hollerith code, concept of parity, complement r's & (r-1)'s, subtraction with complements, signed Binary numbers, Error Detecting & Correcting codes. Basic Theorems & Properties of Boolean Algebra: AND, OR, NOT operators, laws of Boolean Algebra, Demorgon's theorem, Boolean expression & logic diagram. Negative logic, Alternate logic gate representation (concept of bubbled gates) canonical and standard Forms (Minterms & Maxterms), sum of minterms & product of maxterms, conversion between canonical forms. Truth table & maps, 2,3,4,5 and 6 variable maps, Solving digital problems using Maps, Don't care conditions, Tabular minimization. Sum of product & product of sum reduction, Exclusive OR & Exclusive NOR circuits, Parity generator & checkers.

Unit II

Combinational Circuits : Design procedure, Adders (half and Full), subtractor (half and full) code convertors, Analysis of design, Universal building blocks, Implementation of any logic circuit with only NAND gates or with only NOR gates, Binary serial adder, parallel adder, serial/parallel adder, look ahead carry generator, BCD adder, Binary multiplier, Magnitude comparator, Decoder, Demultiplexer, Encoders, priority encoder, Multiplexers & implementation of combinational logic diagram, HDL for combinational circuit.

Unit III

Sequential Logic Circuit : Latches, SR latch with NAND & NOR gates, D latch, edge triggered flip flop, J-K flip flop, T flip flop, Master slave flip flop, Analysis of clocked sequential circuit, state table, state diagram, state reduction state equations, state assignments, flip flop excitation table & characteristic equations, Design procedure for sequential circuits, Design with state reduction, Applications of flip flop.

Unit IV

Registers and Counters : Asynchronous and Synchronous counter, counters with MOD numbers, Down counter, UP/DOWN counter, propagation delay in ripple counter, programmable counter, Pre-settable counter, BCD counter, cascading, counter applications, Decoding in counter, Decoding glitches, Ring Counter, Johnson counter, Rotate left & Rotate right counter, Registers – Buffer, Shift left, shift right, shift left/Right registers, parallel in parallel out, serial in serial out, parallel in serial out, serial in parallel out registers.

Unit V

Random Access Memory, Timing waveform, Memory Decoding, Internal Construction, Coincident decoding, Address multiplexing, Read only memory – Combinational circuit implementation, Type of ROMs, combinational PLDs, Programmable Logic Array (PLA), Programmable Array Logic (PAL), sequential programmable device. Analog to digital conversion – Ramp type, dual slope, integration, successive approximation, parallel conversion, parallel/ serial conversion, convertor specifications, Digital to Analog convertors – Binary weighted & R/2R D to A convertors.

References:

1. Mano; Digital design; Pearson Education Asia
2. Thomas Blakeslee; Digital Design with standard MSI and LSI; Wiley Interscience
3. Jain RP; Modern digital electronics; TMH
4. -M.Mano; Digital logic & Computer Design; PHI
5. Tocci ; Digital Systems Principle & applications; Pearson Education Asia
6. Gothmann; Digital Electronics; PHI
7. R.H.Gour; Digital Electronics and Micro Computer - (Dhanpat Rai)
8. –Malvino, Leech; Digital Principles and applications –(TMH)
9. Floyad; Digital Fundamentals (UBS)
10. Nripendra N. Biswas; Logic Design Theory (PHI)
11. D.C. Green; Digital Electronics (Pearson Education Asia)

List of Experiments (Expandable):

1. Verification of all the logic gates.
2. Design of BCD to Excess-3 code converter.
3. Implementation of NAND & NOR as Universal gate.
4. Design of RS, JK, T& D Flip flop.
5. Multiplexer /Demultipexer based boolean function
6. Design of combinational circuit for the
    (i) Half adder
    (ii) Full adder
    (iii) Half subtractor
    (iv) Full subtractor
7. Design various A-D & D-A convertors.

NOTE- - All experiments (wherever applicable) should be performed through the following steps.

Step1: Circuit should be designed/ drafted on paper.

Step 2: Where ever applicable the designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER etc.).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: Where ever required the bread board circuit should be fabricated on PCB.

EX- 404 – ELECTRICAL MACHINE - I

Unit-I Transformer-I

Working principle, e.mf. equation, construction, phasor diagrams, equivalent circuit, voltage regulation, losses, separation of hysteresis and eddy current losses, efficiency, tests: open circuit and short circuit, load, Sumpner's test, Condition for maximum efficiency and regulation, Power and distribution transformer, allday efficiency, Excitation phenomenon, Autotransformer: working, advantages , its equivalent circuit and phasor diagram.

Unit II Transformer-II

Three phase transformer: its construction, groups and connections, their working and applications; Scottconnection; Parallel operation of Transformers: application, advantages, requirement and load sharing; Tap changers, cooling, conservator and breather. Pulse and high frequency transformers.

Unit III Three phase Induction Motor- I

Working principle, construction, comparison of slip ring and squirrel cage motors, steady state analysis, phasor diagram and equivalent circuit, power flow diagram, torque-speed and power-speed characteristics, Losses and efficiency, No load and block rotor test, circle diagram

Unit IV Three phase Induction Motor-II

Starting of squirrel cage and slip ring motors, power factor control, Cogging & Crawling, Double cage & Deep bar Indication Motor, impact of unbalanced supply and harmonics on performance, speed control, braking, Induction Generator. Applications

Unit V Single Phase Motors:

Single Phase Induction motor; double revolving field theory, equivalent circuit and its determination, performance calculation, starting methods and types of single phase Induction motors: their working principle and applications, comparison with three phases Induction Motor. Single phase A.C. series motor, Servo motors, Linear Induction Motor

Reference Books:

1. M. G. Say, Alternating Current Machines', (5th Ed.) ELBS, 1986.
2. V.Del Toro, "Electrical Machines & Power Systems", 1985, Prentice-Hall, Inc., Englewood Cliffs.
3. V.Del Toro, "Electromechanical Devices for Energy Conversion & Control Systems", PHI ,1975.

Text Books:

1. Electrical Machines by Nagrath and Kothari (TMH).
2. A.C. Machines by Langs dorf (McGraw-Hill)
3. Electrical Machines by Dr.P.S.Bimbhra (Khanna).
4. Electrical Machines by Ashfaq Hussain. (Dhanpat Rai).

List of Experiments (expandable)

Experiments can cover any of the above topics, following is a suggestive list:

1. Perform turn ratio and polarity test on 1-phase transformer
2. Perform load test on a 1-phase transformer and plot its load characteristic
3. Perform OC and SC tests on a 1-phase transformer and determine its equivalent circuit. Also find its efficiency and regulation at different load and power factor.
4. Perform OC and SC tests on a 3-phase transformer and determine its equivalent circuit. Also find its efficiency and regulation at different load and power factor.
5. Perform Sumpner's test on two 1-phase transformer and determine its efficiency at various load.
6. Perform No-load and block rotor test on a 3- phase IM and determine its equivalent circuit.
7. Perform load test on a 3- phase IM and plot its performance characteristics.
8. Study various types of starters used for 3- IMs.
9. Perform No-load and block rotor test on a 1- phase IM and determine its equivalent circuit.

EX-405 ELECTRONIC DEVICES AND CIRCUITS-II

Unit I Operational Amplifiers:

Design aspects of Monolithic OpAmps, ideal characteristics,specifications, offset voltages and currents, frequency compensation techniques, measurement of opamp parameters, applications of op-amp inverting, non inverting amplifiers, integrators, function generator, logarithmic amplifier, instrumentation amplifiers, signal conditioning circuits, multi- vibrators, square wave generator, rectifiers, peak detectors & voltage regulator.

Unit II

Filters: Active filters, LPF, HPF, BPF, BEF, All pass filter, higher order filters & their design, switched capacitor filters, 555 timer and its applications, 556 function generator IC and its applications, phase locked ICs (PLL) 565 and their applications. IC 1496 (Balanced modulator applications).

Unit III

Acoustics: Microphones – Carbon, moving coil, ribbon, crystals condenser, their working principle and characteristic, Noise Figure and sensitivity and shielding. Loud Speakers – Moving

Coil, electrodynamics horn type, multi-way speaker system, cross over network and their frequency characteristic. Various types of sound recording, magnetic recording, disk and crystal recording, Reverberations, building and studio acoustics, high fidelity.

Unit IV

Microwave: Generation of microwave by tubes, limitation of conventional tubes, Klystron amplifiers, reflex Klystron oscillator, magnetrons, traveling wave tube (TWT), backward wave oscillator (BWO), high frequency limitation of transistor, microwave transistor, Manley Rowe relations, parametric amplifiers and frequency multipliers, Gun effect, Gun diode oscillator, Avalanche effect, IMPATT & TRAPATT, BARRITT, TUNNETT, MITATT, microwave field effect transistors, MASER, LASER, Microwave Integrated Circuits (MICs) diode, Schottky barrier and backward diodes, PIN diode and their applications.

Unit V

Logic Families: DTL, ITL, ECL, TTL, MOS Logic Families, parameters and their comparison, transistor logic, interfacing of logic families, Integrated transistor, FET and MOS as switches, switching speed of integrated diode, transistor, FET devices, comparison between TTL and DTL, multi emitter transistor, Characteristics of TTL with Shottkey devices, transfer characteristics of ECL, Fan in and Fan out speed of operation, logic versatility of ECL gates, temperature compensated bias MOS, CMOS and their transfer characteristics, MOS invertors, CMOS inverter, rise and fall time in CMOS gates, interfacing BIT and CMOS gates.

References:

1. Tobbey; OP- Amps their design and Application
2. Gaikward RA; OP- Amp and linear Integreted circuits; PHI
3. Salivahanan; Linear Integrated Circuits; TMH
4. Kennedy J; Principles of communications; TMH
5. R.G.Gupta; Audio and Video System; TMH
6. Linear Integrated Circuits :D. Raychowdhary and Shail Jain
7. Introduction to System Design using Integrated ckt: B.S. Sonde (New Age Pub.).
8. Micro Electronics :Jacob Millman (ISE)
9. Integrated Circuits :Botkar (Khanna)
10. Applications of linear Integrated circuits :Clayton
11. Microwave Design and Circuits :S.L. Liao (PHI)
12. Microwaves and Radar :A.K. Maini (Khanna)

List of Experiments (Expandable):

1. Char. of Op-Amp (input offset voltage, slew rate CMRR, BW, Input bias current)
2. Linear application of OP-Amp (voltage follower, inviting and non-inverting amplifier and their frequency response adder subtractor differential amplifier, integrator and differential frequency response)
3. Study of Op-Amp as a comparator
4. Design of Schmitt trigger
5. Design of monoastable & astable multivibrator
6. To construct and plot frequency response of low & high pass filter.

NOTE- - All experiments (wherever applicable) should be performed through the following steps.
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Step 2: Where ever applicable the designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER etc.).
Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.
Step 4: Where ever required the bread board circuit should be fabricated on PCB.

EX- 406 – ELECTRICAL ENGINEERING SIMULATION LAB-I

Unit- 1 MATLAB Basics

Simulation Mechanism and Simulation Tools, Starting and Ending MATLAB, MATLAB Desktop, Help Browser, Types of Files, Command Input Assistance,

Operators and Special Characters, Variables and Arrays, Handling Arrays, Useful Built-in Functions, Control Structures, Input/Output Commands, File Handling

Unit- 2 Introduction to Plotting

The plot command, Formatting and Labeling a Plot, Multiple Plots, Adding Legend, Sub Plots, Plotting Complex Data, 2-D and 3-D Plots, Plotting a Function, Plot Editor, Interactive Plotting using Plotting Tool

Unit- 3 Programming in MATLAB

MATLAB Editor, MATLAB Programming, Debugging MATLAB Programs, MATLAB Debugger, Functions and Function Files, Differential Equation Solver, Symbolic Mathematics, Programming Examples

Unit- 4 Basic Electrical and Networks Applications

Analysis of Electrical Networks – Experiments based on Solution of Series-Parallel Circuits, Solution of system with linear equations - Experiments based on mesh and nodal analysis, Experiments for Validation of Network Theorems, Solution of Network Problems, Solution of First Order Differential Equation – Experiments for the study of Transients, Experiments for AC Signal Waveform Analysis, Study of Resonance in AC Circuit, Study of Frequency Response

Waveform Analysis, Study of Resonance in AC Circuit, Study of Frequency Response

Unit- 5 System Modeling using SIMULINK

Simulation Steps, Getting Simulink, Creating and Simulating a Simulink Model, Simulink Solution of Differential Equation, Assigning Variables, Observing Variables During Simulation, Storing/Saving Data, Linking M-file with Model file, Creating and Masking Sub-systems, Solution using Laplace Transform Approach, Solution using Laplace Transform Approach, Study of dynamic response, Simulation of Non-Linear System, Examples such as Simulink model to generate sine, cosine waveform and ramp signal

BOOKS

1. “MODELLING AND SIMULATION USING MATLAB-SIMULINK”,2011 DR SHAILENDRA JAIN, WILLEY INDIA.

2. “MATLAB PROGRAMMING”, RUDRAPRASAD.