SEMESTER- V

HS1501 MANAGEMENT SCIENCE (2-1-0)

Principle of management: Definition and concept of management, Evolution of management thought, System approach and decision. Theory approach to management; process of decision-making;

Function of Management Planning: Types of plans, major steps in managerial planning. Categories MB; organization; nature and purpose of organization; Basic department .Co-ordination supervision, communication and direction, Leadership, Motivation; Controlling; nature and purpose control techniques and information technology. International Management; Japanese Management vs. U.S.Management Managerial functions in international business;

Organization Theory: Group Dynamics; Defining and classifying groups, Group processes, Group task.

Group Co-hesiveness: Contlict Management discovery of conflicts, processing of grievances, conflicts resolutions, stress management: Nature of stress, Potential Sources of stress, consequences strategies.

Suggested books and References:

Koontz H.andWeihrich, H., “Essential Management”.

Mathur, S.S., “principle of management”

Agarwal, R.D., “Organization and management”

Robbin, S.P., “Organizational Behavior”

Hicks and Gullet, “Organizations: Theory and Behavior”

Allen, : Management and Organization”.

EE1502 CONTROL ENGINEERING (3-1-0)

Introduction to Control Problem

Scope of control, parts of a control system, Mathematical modeling of physical systems – Mechanical, Electrical, and Hydraulic systems, Differential equation; Systems with dead-time, System response; Control hardware and their models: Potentiometers, Synchros, LVDDT,DC and AC Servomotors, Tacho-generators, Electro-hydraulic vales, Hydraulic servomotors, Electro-pneumatic valves, Pneumatic actuators; Closed-loop systems, Block diagram and Signal flow graph analysis, Transfer function.

Basic characteristics of feedback control systems

Stability, steady-state accuracy, Transient accuracy, Disturbance rejection, Sensitivity and Robustness; Basic modes of feedback control: Proportional, integral and derivative; Feed-forward and multi-loop control configurations, Stability concept, relative stability, RouthStability criterion;

Time response of second-order systems, steady-state errors and error constants; Performance in time-domain; Root locus method of design; Lead and lag compensation.

Frequency-response analysis

Relationship between time and frequency response, Polar plots, Bode's plot, stability in frequency domain, Nyquist plots, Nyqusit stability criterion; Performance specifications in frequency-domain; Frequency-domain methods of design, Compensation and their realization in time and frequency domain; Lead and lag compensation.

Op-amp based and digital implementation of compensators; tuning process controller; State variable formulation and solution.

State variable Analysis

Concepts of state, State variable, state model, state models for linear continuous time functions, Diagonalization of transfer function, Solution of state equation.; Concept of controllability and observability;

Introduction to optimal control and non-linear control

Optimal control problems, regulator problem, Output regulator, trekking problem; Non-linear system-basic concept and analysis;

Suggested Books & References:

- Gopal,M., "Control Systems: Principles and Design", Tata McGraw Hill, 1997.
- Kuo, B.C., "Automatic Control System", Prentice Hall, Sixth Edition,1993
- Ogata, K., "Modern Control Engineering", Prentice Hall, Second Edition, 1991.
- Nagrath&Gopal, "Modern Control Engineering", New Ages International.

EE 1503 ELECTRICAL MECHANICS LAB (3-1-0)

3-PHASE Induction Motor:

Review of Constructional details, Poly-phase Distributed AC Windings, production of EMF, Coupled circuit equations, Steady state analysis- Equivalent circuit, Phasor diagram, power flow diagram and torque-slip characteristics; Starting and speed control; Effect of rotor resistance, deep and double cage rotor; Speed control schemes including solid state and vector control; Braking.

Effect of space/time harmonics and analysis; Testing, looses and Efficiency; Induction generators- Grid connected and Self excited mode; Applications;

Single Phase Motors:

Induction types double field revolving theory, equivalent circuit, Characteristics, Starting of Single-phase motor, Shaded pole machines.

Synchronous type Hysteresis motor, Reluctance motor, Stepper motors, Variable reluctance and permanent magnet type, Permanent Magnet Synchronous motor, Brushless motor;

Special Electric Motors

Switched reluctance motor, linear machines-Power energy and levitation types; Permanent Magnet DC motors.

Machines for control Systems

Disc motors, Printed circuit Motors, Servo motors- AC and DC, Tachogenerators, Synchronous, Disc Machines.

EE1501 ANALOG ELECTRONICS (2-1-0)

Review of construction, operation and characteristics of diodes and BJTs:

Region of operation; Biasing, Bias stability; Current mirror biasing; Transistor as an amplifier; Load line analysis ; Design for maximum symmetrical swing, thermal stabilization;FET: JFET and MOSFET devices: Device structure, characteristics and equations; FET as an amplifier; common source, Common drain and Common Gate configuration;

Small Signal Analysis:

Mid-frequency response of BJT and FET circuits; Hybrid parameter models and analysis Low frequency response including the effects of emitter bypass and coupling capacitors; High frequency response;

Multistage Transistor Circuits:

Differential amplifier, cascade amplifier; internal details of Op-amps; some linear and non-linear applications of Op-amps; Schmitt trigger using Op-amp;

Power Amplifiers:

Class A, Class B, Class C, operation; Push Pull Amplifier; Complementary, symmetry configuration;

Feedback in Amplifiers:

Different types of feedback; stability and oscillation; Wien bridge, phase Shift; colpitts and Hartley Oscillators;

Operational Amplifier (741) – use and its applications

Introduction to and use of Circuit Simulation software (SPICE)with an Op-amp;

EE1504 POWER SYSTEM-II (3-1-0)

System Representation:

Single line representation, Per Unit System, Modeling of Transformer, Load, Synchronous Machine;

Formulation of Network Matrix:

Bus admittance and impedance matrices, Algorithm for formulation of Z-Bus and Y-Bus matrices, Modulation of bus impedance matrix, Sparsity oriented inversions for Y-Bus;

Short Circuit Studies:

Short Circuit Studies for balanced three phase network for various types of shunt faults using sequence network, short circuit studies using Z-Bus Matrix;

Load Flow Studies:

Power System equations, solutions techniques, Gauss-Seidel iteration method, Newton-Raphson method, Fast Coupled method, Comparison of Methods, Acceleration of Convergence, Voltage Control busses, Digital Computer Studies of Load Flow. Information from Load Flow;

Stability Studies:

Stability Problem, Swing Equation, Power Angle Equation, Equal area criteria of stability, Elements of steady state and Dynamic Stability studies, Methods of Simulation for transient stability, Representation of network, load and generator, System Security concepts.

Power System Monitoring and Control:

Economic operation and load dispatch, Elementary ideas of Voltage-VAR and load-frequency controls, Load-frequency control elements, voltage control elements, Block Diagram Representation of Hydro and steam turbine governors, Tie-line bias Current.

EE 1505 DIGITAL ELECTRONICS AND LOGIC DESIGN (3-1-0)

Number system and Codes:

Decimal Odometer, Binary Odometer, Number Codes Why binary Numbers are used, Binary-to-decimal Conversion, Decimal-to-binary conversion ,Hexadecimal Numbers, Hexadecimal-binary conversion , Hexadecimal-to-decimal Conversion, Decimal-to-hexadecimal Conversion, BCD Numbers, The ASCII Code.

Gates:

Inverter, OR, AND, NOT, NOR and NAND Gate, Boolean Algebra, De-Morgan's Second Theorem, Exclusive-NOR Gate, Controlled Inverter.

TTL Circuits:

Digital integrated Circuit, 7400 Devices, TTL Characteristics, TTL overview, OR-Inverter Gates, Open-Collector Gates Multiplexers.

Boolean algebra And Karnaugh Maps:

Boolean Relations, Sum-of-products Method, Algebraic Simplification, Karnaugh Maps, Pars, Wads, and Octets, Karnaugh simplifications, Don't-care Condition.

Arithmetic-Logic Units:

Binary addition, Binary Subtraction, half Adders, Full Adders, Binary Address, Singed Binary Numbers, 2's Complements, 2's Complement Adder-Subtractor.

Flip Flops:

RS Latches, Level clocking, D-latches, Edge-triggered D Flip-Flops, Edge triggered 7K Master-Slave Flip-Flop.

Registers and Counters:

Buffer Registers, Shift Registers, Controlled Shift Registers, Ripple Counter, Synchronous Counters, Ring Counters, Other Counters, Three-state Register, Bus-Organize Computers.

Memories:

RAMs ROMs, PROMs, EPROMs; TTL Memory, Hexadecimal Addresses.

PRACTICAL/DRAWING/DESIGN

EE-1506-P ANALOG ELECTRONIC LAB (0-0-3)

List of Experiments:

- To design and test of a multistage RC-coupled amplifier with given specifications.
- To design and test a current mirror using BJTs.
  - (a)Set up an RC oscillator using BJT to give sinusoidal output at 2khz.
  - (b)Set up a Wien bridge oscillator using a BJT to give sinusoidal output at 2 kHz.
- To design and test a series voltage regulator with short circuit protection.
- To design and test a complementary symmetry power amplifier and observe the performance.
- To implement a summer and integrator by using op-amps.

SUGGESTED BOOKS & REFERENCES:

- Sedra Adel, S. And Smith Kenneth C.,"Microelectronic Circuits Engineering", June 1997.
- Sedra, K.C., "1995 problems supplement to Microelectronic Circuits", Oxford University Press,1995
- Roberts, G.W. and Sedra, A.S., "Spice (The Oxford Series in Engineering and Computer Engineering)", second edition,1996
- Millman&Taub, " Pulse Digital Switching Waveforms"McGrew Hill.**EE 1509-P**

EE1509- PDIGITAL ELECTRONICS & LOGIC DESIGN LAB (0-0-3)

List of Experiments:

- Verification of logic Gates.
- Verification and realization of different Flip-flops.
- Study of 4-Bit Register.
- Study of Synchronous Counter.
- Study of BCD Counters.
- Study of Ripple Counters.
- Design of MOD 6 Counters.
- Design of Up and Down Counter.

Suggested Books & References:

- Malvino,A.P. *" Digital Computer Electronics"*
- Taub& Shilling, "Digital Integrated Electronics" McGraw Hill, 1976.

EE 1507-P ELECTRICAL MACHINE II LAB (0-0-3)

List of Experiments:

- Parallel operation of two identical Three-phase transformers.
- No-Load Short circuit and Zero power Factor test on synchronous machine.
- Determination of Torque-speed Characteristics of a three phase induction machine in braking, motoring and generating regions and its calibrations.
- Study the effect of rotor resistance on the load characteristics of a wound rotor induction motor.
- Speed Control of a induction Motor- Conventional and Electronics control. Solid State Speed Control Using (i) V Constant, (ii) V/f constant, (iii) Slip-energy injection.
- Load Characteristics of Induction generator working in (i) Grid Connected Mode, (ii) Self-excited mode.
- Determine the Equivalent circuit and parameter of single phase Induction motor. Prediction of torque-speed Characteristics and Verification of Load Test.
- Load Characteristics of Universal motor, operation of DC and AC supply. Comparison of performance with two results.
- Starting of slip-ring induction motor by using (a) three phase variac, (b) star connected rheostat, (c) Oil-immersed rotor resistance starter.
- Experimental determination of performance characteristic of two-phase servo motor.
- Determination of equivalent circuit parameters of three –phase Induction Motor by (i) no-load test, (ii) Blocked rotor test; and to draw the circle diagram of 3-phase Induction Motor.
- Determination of torque and slip rate characteristics of stepper motor & determination of operating range.
- Load characteristics of hysteresis motor and shaded pole motor.
- Characteristics of permanent magnet motor.
- Characteristics of Switched Reluctance Motor.

Suggested Books & References:

- Mepherson, George, *"Introduction to Electric Machines and Transformers"* John Wiley and Sons, 1980.
- Naser Syed, A., *"Electric machine and Transformer "*New York, Macmillan, 1984.

EE 1508-P POWER SYSTEM II LAB (0-0-3)

List of Experiments:

- Power factor control of a system excited by single phase supply.
- To determine phase sequence of a three-phase circuit using (i) RC Methods, (ii) two lamp methods.
- Measurement of Earth resistance by Earth Tester.
- Study the different type of insulator.
- Simulation of DC distribution by network analyzer.
- To determine positive, negative and zero sequence impedance of three-phase transformer/three-phase induction motor.
- Power factor control of a system excited by single-phase supply.
- Simulation of DC distribution by Network Analyzer.
- To determine generalized constant A, B, C, D of a given System.
- To determine dielectric strength of insulating oil.

Suggested Books & References:

- Elgerd, O.I.,"*Electrical Energy system Theory: An introduction* ", Tata McGraw Hill. Second Edition, 1982.
- Kundur,p., "Power system stability, Vol I: Elements of Stability Calculations" John Wiley & Sons,1948.
- Kundur,p.," Power System Stability and Control" McGrew Hill, 1994.