

Mandsaur University

Ph.D. Entrance Exam syllabus DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

1. Electric Circuits: Mesh current and Node voltage method of analysis for D.C and A.C. circuits, Star delta conversion. Network Theorems, Self and mutual inductance – Coefficient of coupling, Transient response of RL, RC and RLC Circuits, Two port networks, analysis of three phase circuits.

2. Electrical Machines:

Single phase transformer: equivalent circuit, phasor diagram, open circuit and short circuit tests, regulation and efficiency; three phase transformers: connections, parallel operation; Auto-transformer, Electromechanical energy conversion principles, DC machines: separately excited, series and shunt, motoring and generating mode of operation and their characteristics, starting and speed control of dc motors; Three phase induction motors: principle of operation, types, performance, torque-speed characteristics, no-load and blocked rotor tests, equivalent circuit, starting and speed control.

3. Analog and Digital Electronics:

Characteristics of diodes, BJT, MOSFET; rectifiers; Amplifiers: Biasing, Equivalent circuit and Frequency response; Oscillators; Operational amplifiers: Characteristics and applications; Combinational and Sequential logic circuits, A/D and D/A converters, 8085 Microprocessor.

4. Power Electronics:

Characteristics of semiconductor power devices: Diode, Thyristor, MOSFET, IGBT; DC to DC conversion: Buck, Boost and Buck-Boost converters, PWM control of dc-dc converters; Single and three phase configuration of uncontrolled rectifiers, Line commutated thyristor based converters, Bidirectional ac to dc voltage source converters, Issues of harmonics, Power factor, Distortion factor of ac to dc converters, Single phase and three phase inverters, Sinusoidal pulse width modulation.

5. Control Systems: Mathematical modeling and representation of systems, Feedback principle, transfer function, Block diagrams and Signal flow graphs, Transient and Steady-state analysis of linear time invariant systems, Routh-Hurwitz and Nyquist criteria, Bode plots, Root loci, Stability analysis, Lag, Lead and Lead-Lag compensators; P, PI and PID controllers; State space model, State transition matrix.

6. Signal and Image Processing:

Signals and Systems: - Continuous-time and discrete-time signals and systems, LTI systems and representations, Sampling and reconstruction, Transform domain analysis (Fourier, Laplace, and Z-transforms), Basics of filter design, DFT, FFT, Design of FIR Digital filters, Design of IIR Digital filters. **Neural Network:** Structure of neural network, Back-Propagation Algorithm, Radial Basis network, Associative Memory **Fuzzy Logic:** Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Operations, properties, fuzzy relations **Medical Imaging and Telemetry:** X-RAY machine, Computer Tomography, Magnetic Resonance Imaging System, Ultra Sonography, different types of telemetry system