Amrita Vishwa Vidyapeetham
Syllabus for PhD entrance- June, 2018
Electrical and Electronics Engineering

ELECTRICAL AND ELECTRONICS ENGINEERING Max 60 Marks

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.

Electrical Machines:
Dc machines – separately excited, series and compound machines. Induction machines – squirrel cage and wound rotor. Synchronous machines. Methods of speed control of dc and induction machines. Theory and operation of single and three phase transformers, equivalent circuit, Testing of machines

Electrical and Electronic Measurements:
Bridges and Potentiometers, Measurement of voltage, current, power, energy and power factor; Instrument transformers, Digital voltmeters and multi-meters, Phase, Time and Frequency measurement; Oscilloscopes, Error analysis. Basics of instrumentation, sensors and transducers.

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, 8085Microprocessor.

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.

Power Systems:
Power generation concepts, ac and dc transmission concepts, Models and performance of transmission lines and cables, Distribution systems, Utilization of electrical energy. Series and shunt compensation, Per-unit quantities, Bus admittance matrix, Gauss- Seidel and Newton-

Raphson load flow methods, Voltage and Frequency control, Power factor correction, Symmetrical components, Symmetrical and unsymmetrical fault analysis, Principles of over-current, differential and distance protection; Circuit breakers, System stability concepts, Equal area criterion. Introduction to Solar Photovoltaic Systems, Wind power systems.

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.

Books:

William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, **Engineering Circuits Analysis**, Tata McGraw Hill publishers
Grainger and Stevenson, **Power System Analysis**, Tata McGraw Hill
Ned Mohan and Tore Undeland, **Power Electronics**, John Wiley
Katsuhiko Ogata, **Modern Control Engineering**, Prentice Hall, 2010
Nagrath and Kothari, **Electric Machines**, McGraw Hill
Cooper Helfrick, "**Electrical Instrumentation and Measuring Techniques**", Prentice Hall India, 1986