REVISED SYLLABUS FOR ADMISSION TEST TO Ph.D. PROGRAMME

(ELECTRICAL ENGINEERING)

Unit 1:

ELECTRIC DRIVES: DC Drives: Starting, speed control and braking operations. Analysis of chopper controlled and phase controlled dc drives. Dual converter controlled drives.
Starting, speed control and braking operations of Induction motor and Synchronous motor based drives. Drives for traction.DSP based drives.

POWER ELECTRONICS : Controlled and uncontrolled ac - dc converters. Conventional and PWM inverters. Switched-mode power supplies: Basic configurations, analysis in continuous and discontinuous conduction modes. Applications of power electronics in renewable energy systems.

Unit 2:

POWER SYSTEMS: Modeling of synchronous machines, governor, excitation systems, transformers, and loads including induction motor.
Z_{BUS} formulation. Load flow analysis: Gauss-Seidel, Newton-Raphson, decoupled and fast decoupled. Economic operation of power systems including hydro-thermal coordination, optimal power flow. Short circuit analysis. Contingency analysis. Automatic generation control: Single and two area systems. State estimation.
Power system stability: Transient and small signal stability of power systems. Voltage stability: P-V and P-Q curves. Static VAR systems and FACTS devices: Scope in transmission and load compensation and their applications. HVDC transmission systems. Power system protection. Circuit breakers. High voltage engineering: Generation of HVAC, HVDC and impulse voltages including their measurements.

Unit 3:

RENEWABLE ENERGY: Photovoltaic and wind energy conversion systems. Principle and operation of direct energy conversion systems. Grid tied and stand alone systems. EVs.

Unit 4:

INSTRUMENTATION AND MEASUREMENT: Types of measuring instruments: PMMC, MI, dynamometer, induction, thermal, Hall effect, digital, etc. AC bridges. Type of transducers: Potentiometer, strain gauge, thermistor, thermo-couple, LVDT, capacitor, Hall effect, optoelectronic and digital.

CONTROL SYSTEMS: Analysis of time invariant systems: Transfer function, signal flow graph, time response. Stability of dynamical systems. State variable representation of dynamical systems, controllability and observability. Controllers and its application.

Unit 5:

NETWORK THEORY : Network characterization, network functions, n-port networks and their parameters, analysis of linear time invariant networks, State variable representation of networks and their time-domain solutions.

OPTIMIZATION TECHNIQUES : Formulation of optimization problems. Unconstrained and constrained optimization,Fuzzy Theory