1. **Electric Machines:-**
   
i. Transformers: Construction, Detailed Analysis, Equivalent circuit diagram, pharos diagram, efficiency, voltage regulation, analysis of three-phase transformers, transformer tests, instrument transformers.

   ii. D.C Machines: Principle of operation, emf and torque equations, equivalent and circuits, types of DC machines, DC Generator characteristics, parallel operation, DC Motor Torque speed characteristics, Speed control techniques, DC motor starting, Applications.

   iii. Induction Machines: Operating principle, Torque equation, Equivalent circuit, no-load and blocked rotor tests, torque speed characteristics, Speed – control techniques, starting, Applications, Induction generator,

   iv. Synchronous Machines: Voltage equation, windings, tests, characteristics, application, synchronous motor starting, V-curves, Synchronous condenser.

2. **Power Systems:**

   Introduction to Power System generation, transmission and distribution. Element of AC distribution, Single fed, double fed and ring main distributor. Transmission line parameters and their evaluations, types of overhead conductors with calculations of inductance and capacitance. Models of short, medium and long transmission lines, skin, proximity and Ferranti effect. Classification of cables, Cable conductor’s, insulating materials, insulation resistance, grading of cables.,

   Per unit Representation of power Systems: Fault Analysis (Balanced Faults): Faults, types of faults, symmetrical 3-phase balanced faults, calculation of fault currents, current limiting reactors. Fault Analysis, (unsymmetrical faults) Symmetrical components, sequence impedances, sequence networks, unsymmetrical faults-single line to ground, line to line, double line to ground faults on unloaded alternators and on power systems. Insulation Co-ordination. Surge performance of Transmission lines: Traveling waves on transmission lines, open-end line, short-circuited line, line terminated through a resistance, line connected to a cable. Interference of Power Lines with communication Circuit.


3. **Electrical Measurements & Instrumentation**


4. **Power Electronics**

Power semiconducting devices, characteristics, snubber circuits, Gate drive circuits, series and parallel operations of Thyristors, single-phase and three phase uncontrolled and controlled rectifiers, DC-DC converters (Continuous and Discontinuous conduction modes of operation), AC voltage controllers, Cycloconverters, Inverter, Pulse Width Modulation Techniques, Variable-frequency Induction motor drives, Converter-Fed DC Motor Drives, Chopper-Fed DC Motor Drives, Electric Drives, Applications of Power Electronics.

5. **Circuit Analysis:**

   i. D.C circuit Analysis: series and parallel resistor, KCL, KVL, circuit theorems, Nodal analysis, Mesh current analysis.

6. **Control Systems**


7. **Engineering Mathematics & General Aptitude:**


Sd/- Dr. A. H. Bhat

(Prof. & Head)