

## Syllabus of Electrical Engineering (Graduate)

### (1) Em Theory:

Electric and magnetic fields. Gauss's Law and Ampere's Law. Fields in dielectrics, conductors and magnetic materials. Maxwell's equations. Time varying fields. Plane Wave propagation in di-electric and conducting media. Transmission lines.

### (2) Electrical Circuits:

Circuit's elements. Kirchhoff 's Laws. Mesh and nodal analysis. Network Theorems and applications. Natural response and forced response. Transient response and steady state response for arbitrary inputs. Properties of networks in terms of poles and zeros. Transfer function. Resonant circuits. Three-phase circuits. two-port networks. Elements of two element network synthesis.

### (3) Measurements and Instrumentation:

Units and Standards. Error analysis, measurement of current. Voltage, power, Power-factor and energy. Indicating instruments. Measurement of resistance, inductance, capacitance and frequency. Bridge measurements. Electronic measuring instruments. Digital voltmeter and frequency counter. Transducers and their applications to the measurement of non-electrical quantities like temperature, pressure, flow-rate displacement, acceleration, noise level, etc. Data acquisition systems. A/D and D/A Converters.

### (4) Electrical Machines and Power Transformers:


Magnetic Circuits-Analysis and Design of Power transformers.

Construction and testing. Equivalent circuits. Losses and efficiency. Regulation. Auto-transformer. 3-phase transformer. Parallel operation.

Basic concepts in rotating machines. EMF, torque, basic machine types. (Prime Construction and operation, leakage, losses and efficiency.

AC & D.C. Machines. Construction, Excitation methods. Circuit models. Armature reaction and commutation. Characteristics and performance analysis. Generators and motors. Starting and speed control. Testing. Losses and efficiency.

Synchronous Machines. Construction. Circuit model. Operating characteristics and performance analysis. Synchronous reactance. Efficiency. Voltage regulation. Salient-pole machine. Parallel operation. Hunting. Short circuit transients.

  
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 ಬೆಂಗಳೂರು ನೀರು ಸರಬರಾಜು ಮತ್ತು  
 ಒಳಚರಂಡಿ ಮಂಡಳಿ  
 ಕಾವೇರಿ ಭವನ, ಬೆಂಗಳೂರು-560 009.

Induction Machines. Construction. Principle of operation. Rotating fields. Characteristics and performance analysis. Determination of circuit model. Circle diagram. Starting and speed control. Fractional kW motors. Single-phase synchronous and induction motors.

**(5) Power systems:**


Power transmission lines. Modeling and performance characteristics. Voltage control. Load flow studies. Optimal power system operation. Load frequency control. Symmetrical short circuit analysis. Z-Bus formulation. Symmetrical Components. Per Unit representation. Fault analysis. Transient and steady-state stability of power systems. Equal area criterion.

Power system Transients. Power system Protection Circuit breakers. Relays. HVDC transmission.

**(6) Communication Systems:**

Types of modulation; AM, FM and PM. Demodulators. Noise and bandwidth considerations. Digital communication systems. Pulse code modulation and demodulation. Elements of sound and vision broadcasting. Carrier communication. Frequency division and time division multiplexing, Telemetry system in power engineering.

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