

Head Technical Assistants

Electrical Engineering

(Syllabus)

FM: 100, PM: 40

1. Fundamental of Electrical Engineering
 - 1.1. Electrical Circuit: Types and Components
 - 1.2. Electrical Sources and its types
 - 1.3. Ohms Law and Kirchhoff's Law
 - 1.4. Network Theorem: Thevenin's theorem, Norton's theorem, Superposition theorem and Maximum power transfer theorem
 - 1.5. Generation of Single phase and three phase Alternating voltage and current
 - 1.6. Series and Parallel analysis of R, L, C, RL, RC and RLC AC Circuits
 - 1.7. Resonance in series and parallel AC Circuits
 - 1.8. AC Quantities Measurements in Star and Delta Connected AC Circuits.
 - 1.9. Three phases balanced and unbalanced AC circuit analysis

2. Electrical Machine
 - 2.1. Transformer
 - 2.1.1. Construction, Operating Principle and Types
 - 2.1.2. No-load operation and loaded operation: phasor diagram and equivalent circuit
 - 2.1.3. Voltage Regulation
 - 2.1.4. Losses and Efficiency of transformer
 - 2.1.5. Auto transformer and Instrumental Transformer
 - 2.2. Three Phase Induction Machines
 - 2.2.1. Construction, Rotating Magnetic Field and Working Principle
 - 2.2.2. Equivalent Circuit of Induction motor: Standstill and Running Condition
 - 2.2.3. Torque-Speed characteristics, effect of applied voltage on T-S characteristic, effect of rotor resistance on T-S characteristic.
 - 2.2.4. Starting method and Speed Control of Induction Motor
 - 2.2.5. Induction Generator: Voltage Buildup and Excitation Requirements
 - 2.3. Three Phase Synchronous Generator
 - 2.3.1. Construction and Operating principle
 - 2.3.2. Loaded operation
 - 2.3.3. Synchronization and Parallel operation of Synchronous Generator
 - 2.4. Single Phase AC Motors
 - 2.4.1. Induction Motor: Operating Principle, types and applications
 - 2.4.2. Synchronous motor: Operating Principle, types and applications
 - 2.5. DC Machines
 - 2.5.1. Construction and Operating Principles
 - 2.5.2. Types of DC Machines
 - 2.5.3. Armature reaction and method of reducing armature reaction.

2.5.4. Commutation and methods of improving commutation.

2.5.5. Back emf

2.5.6. DC Motor Starter

2.5.7. Speed Control of DC Motor

3. Power Electronics

3.1. Power Electronics Devices: Thyristor, MOSFET and IGBT

3.2. Single Phase Half and Full wave controlled and uncontrolled rectifier

3.3. Three phase uncontrolled rectifier

3.4. Stepup and Stepdown Chopper

3.5. Single phase square wave inverters

3.6. Three phase 180° Inverter

3.7. Application of inverter in speed control of induction motor and synchronous motor

3.8. Single phase and three phase AC Voltage Controller

3.9. Applications in speed control of induction motor, Electronic load controller for MHP generator.

4. Electrical Installations

4.1. Earthing: Types of earthing and its application

4.2. Types of earthing equipment

4.3. Design and location of MDB and SDB

4.4. Design of lighting and power sub circuits

4.5. Guidelines for installation of fittings

4.6. Load assessment

4.7. Selection of cable size, wires and permissible voltage drop.

4.8. Design electric circuits with and with-out relays

4.9. Design and estimation for domestic and industrial wiring

4.9.1. Procedure and steps for domestic and industrial wiring estimation

4.9.2. Modern trends in electrical wiring-MCB, ELCB, RCCB, SPD

4.9.3. Schematic (layout) and wiring diagram

4.9.4. Bill of quantity preparations

5. Electrical Testing

5.1. Testing of MCB and MCCB

5.2. Testing of Electrical Cables

5.3. Testing of Transformers

6. Industrial Automation and Repair and Maintenance

6.1. Sensor: Strain Gauge, Potentiometer and tachogenerators

6.2. Actuators

6.3. Introduction to Smart metering technology

6.4. Introduction to AMI

6.5. Relay Logic and PLCs: Introduction and its application in building control circuits using ladder logic and Tuning a process control system

6.6. Repair and Maintenance of Electric Iron, Room Heater and Rice Cooker

Written Exam Questions [Full Marks: 100, 3Hrs]

Chapters	1	2	3	4	5	6	Total Marks
MCQ	3	4	4	4	2	3	20
Short [5 marks each]	1	2	1	2	1	1	40
Long [10 marks each]		1	1	1		1	40

- Practical exam related to theory [full Marks: 20]
- Interview [Full Marks: 20]