

## **Annexure - I**

### **SYLLABUS for Test ( POST – Assistant Engineer/ Electrical), now Re-designated as Assistant Executive Engineer/ Electrical.**

#### **1. Electrical Circuits:**

KVL, KCL, node and mesh analysis, star/delta transformation, electromagnetic induction, mutual induction, ac fundamentals, transient response of dc and ac networks, sinusoidal steady state analysis, resonance, ideal current and voltage sources, Network theorems, two-port networks, three phase circuits, power measurement in 3-phase circuits.

#### **2. Electrical Measurements:**

Bridges and potentiometers, PMMC, moving coil, moving iron, dynamometer, induction type measuring instruments, measurement of voltage, current, power, energy, power factor, digital volt meters, multi-meters, phase, frequency measurements, Q-meters, oscilloscopes, smart metering of electrical energy.

#### **3. Control Systems:**

Principles of feedback control systems, transfer function, block diagram reduction, signal flow graph, Mason's gain formula, time response, steady state error, Routh, Nyquist criterion, Bode plot, root locus, compensation design.

#### **4. Analog and digital electronics:**

Characteristics of p-n diode, Zener diode, BJT, FET, amplifiers, biasing, low frequency and high frequency equivalent circuits, frequency response, feedback amplifiers, oscillators, combinational and sequential logic circuits, multiplexer, Schmitt trigger, A/D, D/A converters, basics of 8-bit, 16 bit microprocessors, architecture, programming, interfacing.

#### **5. Electrical Machines:**

Single phase transformer, equivalent circuit, phasor diagram, tests, regulation, efficiency, 3-phase transformer connections, parallel operation, auto transformer, DC machines: types, armature windings, characteristics of dc generators and motors, armature reaction, commutation, starting and speed control of dc motors 3-phase induction motors: principle of operation, types, characteristics, computation of performance, equivalent circuit, starting and speed control Single phase induction motors: types, methods of starting, characteristics Synchronous Machines: emf equation, armature

reaction, equivalent circuit, regulation, parallel operation, load sharing, operation with infinite busbars, synchronous motor, synchronous condenser, V and Inverted V curves.

**6. Power Systems:**

Basic power generation concepts, transmission line models and performance, Under ground cables, string insulators, corona, distribution systems, per unit quantities, bus impedance and admittance matrices, load flow studies, voltage control, power factor correction, economic operation, symmetrical components, fault analysis, principles of over current, differential, and distance protection, protection of alternators, protection of transformers, protection of transmission lines, protection from lightning, neutral grounding, circuit breakers, types and operation of CBs, system stability concept, swing curves, equal area criterion.

**7. Utilization:**

Electric heating, resistance heating, induction heating, dielectric heating, Electric traction, lighting calculations, types of lamps and their working , LED lighting.

**8. Power Electronics and Drives:**

SCR, IGBT, MOSFET, static and dynamic characteristics, triggering circuits, phase control rectifiers, bridge rectifiers, principles of dc-dc converters, Inverters, basic principles and characteristics of adjustable speed dc and ac drives.

**Instruction to Candidates:**

1. The question paper consists of 100 multiple choice questions.
2. The answers are to be marked on separate OMR answer sheet using blue or black ball point pen. The answer cannot be erased once it is marked. Use of white correction fluid is strictly prohibited.
3. The duration of the test is 2hrs (120 minutes).

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