

# UNIVERSITY OF JAMMU

## Syllabus of Entrance/Screening Test for the Post of Junior Engineers (Electrical)

S.No	Examination Type	Subject	No. of Question	Marks	Duration
1	Multiple Choice Questions	General Intelligence and Reasoning General Awareness (Common to all disciplines)	20	20	2hrs
2		Discipline oriented	80	80	

### **GENERAL INTELLIGENCE & REASONING:**

15 Marks

Questions of both verbal and non-verbal type. The test may include questions on analogies, similarities, differences, space visualization, problem-solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc. The test will also include questions designed to test the ability to deal with abstract ideas and symbols and relationships, arithmetical computations and other analytical functions.

### **GENERAL AWARENESS:**

05 Marks

Questions will be aimed at testing general awareness of the environment around and its application to society. Questions will also test the knowledge of current events and of matters of everyday observations and experience in scientific aspect. The test will also include questions relating to India and its neighboring countries especially pertaining to History, Culture, Geography, Economic, Science, General Polity.

### **DISCIPLINE ORIENTED**

#### **1. Electric Circuits:**

20 Marks

Basic concepts: Concepts of resistance, inductance, capacitance and various factors effecting them, Circuit laws: ohms law KCL, KVL, node and mesh analysis, resonance, ideal current and voltage sources, Sources conversions Thevenin's Norton's and Superposition and Maximum Power Transfer theorems Simple Circuit solution using network theorems. Sinusoidal steady-state analysis, Transient response of dc and ac networks. Three phase circuits; Two port networks, Power and power factor in ac circuits.



**2. Control Systems:**

05 Marks

Basic control system components; block diagram and Signal flow graphs, reduction of block diagrams. Feedback principle, Open loop and closed loop (feedback) systems, Transient and Steady state analysis of linear time invariant systems, Stability Analysis, State space model, State transition matrix.

**3. Electrical and Electronic Measurements:**

05 Marks

Bridges and potentiometers; PMMC, moving iron, dynamometer and induction type instruments; Extension of range, measurement of voltage, current, power (active/reactive) energy and power factor; instrument transformers; digital voltmeters and multi-meters; phase, time and frequency measurement; oscilloscopes; Transducers, Megger, Error analysis.

**4. Analog & Digital Electronics:**

07 Marks

Energy bands in Semiconductors, Characteristics of diodes, BJT, MOSFET; Simple diode circuits: clipping, clamping, rectifiers; Amplifiers, Biasing, Equivalent circuit and Frequency response; Oscillators and Feedback amplifiers; Operational amplifier: Characteristics and applications; Simple active filters, VCOs and Times, Binary, decimal, octal, hexadecimal, BCD number systems and their conversions, Binary and hexadecimal addition, subtraction multiplication, 1's and 2's complement methods of addition/subtraction. Boolean algebra, minimization of Boolean functions; logic gates Combinational and Sequential logic circuits, Multiplexer, De multiplexer, Schmitt trigger, Sample and hold circuits, A/D and D/A converts, 8085 Microprocessor: Architecture, Programming and Interfacing.

**5. Power Electronics and Drives**

07 Marks

Characteristics of semiconductor power devices: Diode, Thyristor, Triac, GTO, MOSFET, IGBT; DC to DC conversion: Buck, Boost and Buck-Boost converters; Single and three phase configuration of uncontrolled rectifiers, Line commutated thyristor based converters, Bidirectional ac to dc voltage source converters, Issues of line current harmonics, Power factor, Distortion factor of ac to dc Converters, Single phase and three phase inverters, Sinusoidal pulse width modulation.

**6. Electrical Machines:**

20 Marks

Single phase transformer – equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers – connections, parallel operation; auto-transformer, Energy conversion principles, Electro-mechanical energy conversion; DC machines – types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors; three phase induction motors-principles, types, performance characteristics, starting and speed control; single phase induction motors; synchronous machines – cylindrical and salient pole machines, performance, regulation and parallel operation of generators, motor starting, characteristics and applications; servo and stepper motors. Braking of DC and AC motors; Types of losses and efficiency calculation of electric machines.

**7. Power Systems:**

12 Marks

Power generation concepts, ac and dc transmission concepts; models and performance of transmission lines and cables, Series and shunt compensation, Electric field distribution and insulator; corona and radio interference; per unit quantities, voltage and frequency control, distribution systems; power factor correction; Load flow methods. Economic operation; symmetrical components, Symmetrical and

unsymmetrical fault analysis; principles of over – current, differential and distance protection; Generator, feeder, transformer and bus-bar protection, Lightning protection; solid state relays and circuit breakers; Sub-Station Practices, Load frequency Control, Tariffs, Earthing. Utilistation of Electrical energy: Illumination, electrical heating and welding, electroplating. System Stability concepts, Equal area criteria.

**8. Electromagnetic Fields:**

4 Marks

Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss's Law, Divergence, Electric field and potential due to point, line, plane and spherical charge distributions, Effect of dielectric medium, Capacitance of simple configurations, Biot-Savart's law, Ampere's law, Curl, Faraday's law, Lorentz force, Inductance, Magnetomotive force, Reluctance, Magnetic circuits, Self and Mutual inductance of simple configurations.

  
Registrar