

SECTION-I

2. Write short answers of any eight parts from the following:

(8x2=16)

- Electric lines of force never cross. why?
- Draw the circuit diagram of charging and discharging of a capacitor.
- Suppose that you follow an electric field line due to a positive point charge. Do electric field and electric potential increase or decrease?
- How Millikan's measured the radius of Droplet during measuring the charge on an electron?
- Is it possible to orient a current loop in a uniform magnetic field such that loop will not tend to rotate? Explain.
- How lamp and scale arrangement is used to measure the angle of deflection of a coil of galvanometer?
- Why the 'Voltmeter' should have very high resistance?
- What is the use of 'Grid' in cathode ray oscilloscope?
- What do you understand by back ground radiation? State the two sources of this radiation.
- Why thermal nuclear reactor so called thermal?
- What factors make a fusion reaction difficult to achieve?
- Describe briefly about 'Leptons'.

3. Write short answers of any eight parts from the following:

(8x2=16)

- What is a short circuit and an open circuit?
- Write the equation of balanced Wheatstone Bridge and draw its diagram.
- Why has a thin filament of light bulb more possibility to burn than the thicker one?
- Explain why a spark jumps across a switch contacts when it is reopened in a circuit with D.C source?
- Describe frequency modulation with diagram.
- Explain the relation between frequency of A.C signal and inductive reactance.
- What is strain energy? How it can be calculated from the force-extension graph?
- Differentiate elasticity and plasticity of materials.
- Illustrate by diagram, the energy bands for conductors and insulators.
- What are the semi conductors? Give their examples.
- Draw diagrams of n-p-n transistor with (a): Common-Emitter and (b): Common-Base Configurations.
- What is an operational amplifier? Draw its diagram.

4. Write short answers of any six parts from the following:

(6x2=12)

- How power is transferred in a transformer without transfer of charge?
- In a certain region, earth's magnetic field points vertically down. When a plane flies due south, which wing is negatively charged?
- What are the field coils in D.C motor? How are they connected with armature coil?
- Calculate Compton shift for scattering angle of 180° .
- Define work function. Write its SI unit.
- What are advantages of an electron microscope over an ordinary optical microscope?
- Why radio waves show wave nature while gamma rays do not?
- Why resonant cavity is necessary to sustain laser action?
- Can the electron in ground state of hydrogen absorb a photon of energy 13.6eV and greater than 13.6eV?

SECTION-II

Note Attempt any three questions. Each question carries equal marks:

(8x3=24)

- Define resistivity and write its unit. And derive temperature coefficient in terms of resistivity. 5
 - Determine the electric field at the position $\vec{r} = (4\hat{i} + 3\hat{j})$ m caused by a point charge $q = 5.0 \times 10^{-6} \text{ C}$ placed at origin. 3
- Define motional emf. Explain how emf induced by motion of conductor across magnetic field. 5
 - A power line 10.0 m high carries a current 200A. Find the magnetic field of wire at the ground. 3
- What is meant by Rectification? Explain the action of semi conductor diode as Half-wave and Full-wave rectification. 5
 - What is the resonant frequency of a circuit, which includes a coil of inductance 2.5 H and a capacitance $40 \mu\text{F}$? 3
- Define and explain photoelectric effect. Give Einstein's explanation of photoelectric effect. 5
 - A 1.25 cm diameter cylinder is subjected to a load of 2500 kg. Calculate the stress on the bar in mega Pascal. 3
- What is laser? Write down its properties. Explain how Helium-neon laser works? 5
 - How much energy is absorbed by a man of mass 80Kg who receives a lethal whole body equivalent dose of 400 3