

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

SECTION - I

2. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- Electric lines of force never cross why?
- Prove that $1 \text{ ohm} \times 1 \text{ farad} = 1 \text{ second}$.
- Distinguish between electric field and electric field intensity.
- How can you identify that which plate of a capacitor is positively charged?
- What is the function of the grid in a CRO?
- Why the voltmeter should have a very high resistance?
- How can you make an electronic trajectory visible?
- Why does the picture on a T.V screen become distorted when a magnet is brought near the screen?
- How does radioactivity help in the treatment of cancer?
- Why are heavy nuclei unstable?
- Distinguish between a thermal reactor and a fast reactor.
- Define self-quenching.

3. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- Do bends in a wire affect its electrical resistance? Explain.
- A charge of 9C passes through a conductor in one hour. What is the current in the conductor?
- Define temperature co-efficient of resistivity. Give its unit.
- How many times per second will an incandescent lamp reach maximum brilliance when connected to 50 Hz source?
- What do you mean by phase lag and phase lead?
- Explain the power factor in A.C circuit.
- Write down a note on super conductor.
- Distinguish between intrinsic and extrinsic semi-conductor.
- Define curie temp. What is its value for iron?
- Why ordinary silicon diodes do not emit light?
- Draw the symbol and truth table of NAND gate.
- Why charge carriers are not present in the depletion region?

4. Write short answers to any SIX questions.

(2 x 6 = 12)

- Can an electric motor be used to drive an electric generator with the output from the generator being to operate the motor?
- Does the induced emf always act to decrease the magnetic flux through a circuit?
- Can a step-up transformer increase the power level?
- How would you position a flat loop of wire in a changing magnetic field, so that there is no emf induced in the loop?
- Can pair production take place in vacuum? Explain.
- Photon 'A' has twice the energy of photon 'B'. What is the ratio of momentum of 'A' to that of 'B'?
- Will bright light ejected more electrons from metal surface than dimmer light of same colour.
- What do we mean when we say that the atom is excited?
- Is energy conserved when an atom emits a photon of light?

SECTION - II

Note: Attempt any THREE (3) questions from Section II.

- (a) What is capacitor? Derive a relation for the energy density in terms of electric field in the capacitor? (5)

(b) The resistance of an iron wire at 0°C is $1 \times 10^4 \Omega$. What is the resistance at 500°C , if the temperature coefficient of resistance is $5.2 \times 10^{-3} \text{ K}^{-1}$? (3)
- (a) Define motional emf. Derive an expression for motional emf. (5)

(b) A galvanometer having an internal resistance $R_g = 15.0 \Omega$ gives full scale deflection with current $I_g = 20.0 \text{ mA}$. It is to be converted into an ammeter of range 10.0 A . Find the value of shunt resistance R_s . (3)
- (a) What is a transistor? Describe the use of transistor as a amplifier and calculate its voltage gain. (5)

(b) What is the resonance frequency of the circuit, which includes a coil of inductance 2.5 H and a capacitance $40 \mu\text{F}$. (3)
- (a) Define strain energy. Derive a relation for strain energy in deformed material? (5)

(b) What is the energy of a photon in a beam of infrared radiation of wavelength 1240 nm ? (3)
- (a) State Bohr's model of hydrogen atom. Derive relation for quantized energies for hydrogen atom. (5)

(b) Radiation from a point source obeys the inverse square law. If the count rate at a distance of 1.0 m from Geiger counter is 360 counts per minute. What will be its count rate at 3.0 m from the source? (3)