

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

SECTION - I

2. Write short answers to any EIGHT questions.

(2 × 8 = 16)

- Define electric field intensity. Also give its mathematical form.
- Define electron volt? Relate electron volt with Joule.
- The time constant of a series RC circuit is, $t = RC$. Verify that an Ohm times Farad is equal to Second.
- Why the resistance of an ammeter should be very low?
- Electric lines of force never cross. Why?
- How can you use a magnetic field to separate isotopes of chemical elements?
- What do you mean by lamp-scale arrangement?
- What is Lorentz force?
- A particle which produces more ionization is less penetrating. Why?
- How can radioactivity help in the treatment of Cancer?
- Differentiate between nuclear fission and nuclear fusion.
- Define isotopes. Write down isotopes of Hydrogen atom.

3. Write short answers to any EIGHT questions.

(2 × 8 = 16)

- Describe a circuit which will give a continuously varying potential.
- What is the difference between the emf and potential difference?
- What is the temperature co-efficient of resistance?
- How the reception of a particular radio station is selected on your radio set?
- What is the principle of metal detector?
- Why power loss in a pure capacitance circuit is zero?
- What is meant by hysteresis loss? How it is used in the construction of a transformer?
- What is meant by Retativity and Coercivity?
- How can you identify tumors and inflamed tissues using 'MRI'?
- Why is the base current in a transistor very small?
- Explain OP-AMP as a comparator.
- What is the voltage gain of transistor?

4. Write short answers to any SIX questions.

(2 × 6 = 12)

- Name the factors upon which the self-inductance depends.
- Write down the methods to improve the efficiency of a transformer.
- Can a D.C. motor be turned into a D.C. generator? What changes are required to be done?

(Turn Over)

- iv. Define work function and threshold frequency.
- v. Calculate the value of Compton wavelength of electron.
- vi. We do not notice a de-Broglie wavelength for a pitched cricket ball. Explain why?
- vii. When does light behave as a wave and when does it behave as a particle?
- viii. Describe the types of spectra and give its example.
- ix. What are advantages of laser over ordinary light?

SECTION - II.

- 5. (a) How did Millikan calculate the charge on an electron? Explain (5)
- (b) A rectangular bar of iron is 2.0cm by 2.0cm in cross section and 40cm long. Calculate its resistance if the resistivity of iron is $1 \times 10^{-7} \Omega\text{m}$ (3)
- 6. (a) Define galvanometer. Explain its principle, construction and working. (5)
- (b) The back emf in a motor is 120V when the motor is turning at 1680 rev per min. What is the back emf when the motor turns 3360 rev per min? (3)
- 7. (a) Explain Reverse Biased p-n junction and describe how depletion region increases due to Reverse Biased of p-n junction. (5)
- (b) Find the value of the current flowing through a capacitor of capacitance $0.5\mu\text{F}$, when connected to a source of 150V at 50Hz. (3)
- 8. (a) State and explain photoelectric effect. Write down its experimental results. (5)
- (b) The length of a steel wire is 1m and its cross-sectional area is $0.03 \times 10^{-4} \text{m}^2$. Calculate the work done in stretching the wire when a force of 100N is applied within the elastic region. Young's modulus of steel is $3.0 \times 10^{11} \text{Nm}^{-2}$. (3)
- 9. (a) Derive the expression for Quantized Energy of Hydrogen atom on the basis of Bohr's atomic model. (5)
- (b) How much energy is absorbed by a man of mass 80Kg who receives a lethal whole body dose of 400 rem in the form of low energy neutrons for which RBE factor is 10? (3)