

**SECTION – I****2. Write short answers to any EIGHT (8) questions :****16**

- (i) Give similarity and difference between Coulomb and Gravitational forces.
- (ii) Summarize the properties of electric field lines.
- (iii) Do electrons tend to go to region of high potential or of low potential?
- (iv) Electric lines of force never cross. Why?
- (v) What is the function of grid in cathode ray oscilloscope?
- (vi) What should be the orientation of current carrying coil in a magnetic field so when the torque maximum acting upon the coil?
- (vii) How can you use a magnetic field to separate isotopes of chemical element?
- (viii) Why the resistance of an ammeter should be very low?
- (ix) Why are heavy nuclei unstable?
- (x) What is the radioactive tracer? Describe one application each in medicine.
- (xi) How can radioactivity help in treatment of cancer?
- (xii) What is meant by absorber dose, also write down the unit of absorber dose?

**3. Write short answers to any EIGHT (8) questions :****16**

- (i) Explain why the terminal potential difference of a battery decreases when current drawn from it is increased?
- (ii) What is wheatstone bridge? How can it be used to determine an unknown resistance?
- (iii) What is a potentiometer, how can it be used to measure the emf of a battery?
- (iv) How the reception of a particular radio station is selected on your radio set?
- (v) What is meant by A.M. and F.M.?
- (vi) Write down the properties of parallel resonance circuit.
- (vii) Distinguish between intrinsic and extrinsic semiconductors.
- (viii) What information is obtained from the area of hysteresis loop?
- (ix) Explain energy band theory.
- (x) Draw diagram, write equation and give truth table of exclusive OR-gate.
- (xi) What is meant by op. amp. as a comparator?
- (xii) What is principle of virtual ground? Apply it to find the gain of an inverting amplifier.

**4. Write short answers to any SIX (6) questions :****12**

- (i) Differentiate between mutual induction and mutual inductance.
- (ii) When an electric motor, such as an electric drill, is being used, does it also act as a generator? If so what is the consequence of this?
- (iii) Can an electric motor be used to drive an electric generator with the output from the generator being used to operate the motor?
- (iv) Describe briefly black body radiations.
- (v) Find the mass of a moving object with speed  $0.8c$ .

(Turn Over)

4. (vi) Does the dilation means that time really passes more slowly in moving system or that it only seems to pass more slowly?
- (vii) Is it possible to create a single electron from energy? Explain.
- (viii) How hydrogen spectrum is obtained?
- (ix) Can X-rays be reflected, refracted, diffracted and polarized just like any other waves? Explain.

### SECTION – II

**Note :** Attempt any **THREE** questions.

5. (a) Define electric intensity and electric potential. Derive a relation between them. 5
- (b) A rectangular bar of iron is 2 cm by 2 cm in cross-section and 40 cm long. Calculate its resistance if resistivity is  $5.2 \times 10^{-8} \Omega m$ . 3
6. (a) Determine the  $e/m$  of electron. How the path of electrons is made visible? 5
- (b) A circular coil has 15 turns of radius 2 cm each. The plane of the coil lies at  $40^\circ$  to the uniform magnetic field of 0.2 T. If the field is increased by 0.5 T in 0.2 s, find the magnitude of the induced emf. 3
7. (a) What is meant by rectification? Explain half wave and how full wave rectifiers attain by using bridge rectifier. 5
- (b) A 10 mH,  $20 \Omega$  coil is connected across 240 V and  $180 / \pi$  Hz source. How much power does it dissipate? 3
8. (a) What is hysteresis loop? Describe the different features of hysteresis loop for a ferromagnetic material. 1,4
- (b) An electron is accelerated through a potential difference of 50 V. Calculate its de-Broglie wavelength. 3
9. (a) State three postulates of Bohr's model of the hydrogen atom. And describe mathematically the de-Broglie interpretation of Bohr's orbits. 5
- (b) Find the mass defect for tritium, if the atomic mass of tritium is 3.016049u. 3

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