

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

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- (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 :**

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- (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 :**

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- (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 0.8 c.

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