

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)

- Define electron volt (ev). Show that $1 \text{ ev} = 1.6 \times 10^{-19} \text{ J}$.
- Show that $\frac{1 \text{ volt}}{1 \text{ meter}} = \frac{1 \text{ newton}}{1 \text{ coulomb}}$. Explain.
- Is $\vec{E}$ necessarily zero inside a charged rubber balloon, if balloon is spherical? Assume that charge is uniformly distributed over the surface.
- Prove that ohm x farad = second.
- How can a galvanometer is made more sensitive? Explain briefly.
- Suppose that a charge q is moving in a uniform magnetic field with a velocity v . Why is there no work done by magnetic force that acts on charge q ?
- Draw a circuit diagram of current measuring part of avometer.
- Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate? Explain.
- What do you understand by back ground radiations? State any two sources of radiation.
- How can radioactivity help in the treatment of cancer?
- Differentiate between mass defect and binding energy.
- Define nuclear fission and nuclear fusion.

3. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- Describe a circuit which will give a continuously varying potential.
- A wire of length 10 m has resistance 100Ω . If the wire is stretched to increase its length three times. What will be its new resistance?
- What is meant by an electromotive force (emf)? Give its unit.
- Explain the condition under which electromagnetic waves are produced from a source.
- What is meant by phase difference?
- Write four properties of parallel resonance circuit.
- Differentiate between paramagnetic and ferromagnetic substances.
- Define modulus of elasticity. Write down its three kinds.
- Why a photo diode is operated in reverse biased state?
- Distinguish between soft magnetic material and hard magnetic material.
- What is solar cell? Give its uses.
- Draw the symbol of pnp and npn transistors six parts.

4. Write short answers to any SIX questions.

(2 x 6 = 12)

- Does the induced emf always act to decrease the magnetic flux through a circuit?
- Can a D.C motor be turned into a D.C generator? What changes are required to be done?
- How fluctuations of the output can be reduced in D.C generator?
- What is meant by efficiency of transformer? Write few steps to improve the efficiency.
- Which has the lower energy quanta? Radio waves or x – rays.
- Why don't we observe a Compton effect with visible light?
- Find the mass m of a moving object with speed $0.8 c$.
- Find the speed of electron in the first Bohr orbit.
- Is energy conserved when an atom emits a photon of light?

SECTION - II

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

- Define electric potential. Derive the relation of an electric potential at a point due to point charge. (5)
 - A platinum wire has resistance of 10 ohm at 0°C and 20 ohm at 273°C . Find the value of temperature co-efficient of resistance of platinum. (3)
- What is transformer? How does it work? Explain its use in transmission of electric load to long distances. (5)
 - What current should pass through a solenoid that is 0.5 m long with $10,000$ turns of Copper wire so that it will have a magnetic field of 0.4 T ? (3)
- What is comparator circuit? How can it be used as a night switch? (5)
 - A 10 mH , 20Ω coil is connected across 240 v and $\frac{180}{\pi} \text{ Hz}$ source. How much power does it dissipate? (3)
- What is meant by strain energy? How can it be determined from the force extension graph? (5)
 - Assuming you radiate as does a black body at your body temperature about 37°C , at what wavelength do you emit the most energy? (3)
- What is LASER? Describe its working, population inversion and laser action. (5)
 - Find the mass defect and the binding energy for tritium, if the atomic mass of tritium is 3.016049 u . (3)