

**PART-A****I. Answer all the following questions.****10x1=10**

1. What is the net charge on the charged capacitor?
2. When is the flux linked with a closed planar coil held in a magnetic field zero?
3. Define retentivity.
4. Peak value of an ac is 220V. What is its rms value?
5. What is the phase difference between the current and voltage in a pure inductive circuit?
6. A proton and an electron have same kinetic energy. Which of these has larger de Broglie wavelength?
7. Identify  $x$  in  ${}_0n^1 \rightarrow H^1 + e^0 + x$
8. Write an expression for the speed of electromagnetic waves.
9. Give the truth table of an OR gate.
10. What are ground waves?

**PART-B****II. Answer any Five of the following questions.****5x2=10**

11. Draw equipotential surfaces for an  
(i) isolated point charge (ii) uniform electric field.
12. Write an expression for magnetic field at  
(i) a point inside the turns of the toroid  
(ii) the center of the toroid.
13. Define (i) Intensity of magnetisation  
(ii) Magnetic susceptibility.
15. Define Q-factor. How does sharpness of resonance curve vary with resistance?
16. What is displacement current? Write the expression for it.
17. Give any two limitations of Bohr's atomic model.
18. Explain the terms transmitter and receiver in communication system.

**PART-C****III. Answer any Five of the following questions.****5x3=15**

19. Derive an expression for the electric field at a point, due to an infinitely long, straight, uniformly charged wire, using Gauss theorem.
20. Obtain an expression for drift velocity of free electrons in a conductor.
21. Distinguish between ferromagnetic and diamagnetic materials.
22. What is electrical resonance? Derive the condition for electrical resonance.
23. What is total internal reflection? Give the condition for total internal reflection.
24. Give the de Broglie's explanation for Bohr's second postulate.
25. Explain how Zener diode is used as a voltage regulator.
26. What are polaroids? Give any two applications of polaroids.

**PART-D****IV. Answer any Two of the following questions.****2x5=10**

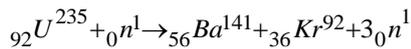
27. Derive an expression for electric field at a point on the equatorial line of an electric dipole.
28. Obtain the expression for equivalent emf and internal resistance of two cells connected in parallel.
29. Derive the expression for magnetic field inside a solenoid using Ampere's circuital law.

**V. Answer any Two of the following questions.**

30. Using Huygen's wave theory of light, derive Snell's law of refraction.
31. What is photoelectric effect? Write the experimental observations of photoelectric effect with relevant graphs.
32. With the help of a circuit diagram explain transistor as a switch.

**VI. Answer any THREE of the following questions.****3x5=15**

33. Three point charges  $0.67\text{nC}$ ,  $0.97\text{nC}$  and  $-0.35\text{nC}$  are placed at the corners A,B and C of square ABCD. Find what charge must be placed at the corner D of the square so that the electric potential at the center of the square is zero.
34. The four arms ABCD of a Wheatstones network have the following resistances  $AB=2\Omega$ ,  $BC=4\Omega$ ,  $CD=4\Omega$  and  $DA=8\Omega$ . A galvanometer of resistance  $10\Omega$  is connected between B and D. Find the current through the galvanometer, when the potential difference between A and C is  $5\text{V}$ .
35. A square coil of side  $10\text{cm}$  with 60 turn is rotated at a uniform speed of 500 rpm about an axis at right angles to a uniform field of  $0.57\text{ T}$ . Calculate the maximum emf developed in the coil. What is the instantaneous value of emf, when the plane of coil makes an angle of  $30^\circ$  with uniform magnetic field.
36. Focal length of a convex lens is  $0.1\text{m}$ . A liquid lens is formed between a plane surface and one face of this lens of radius of curvature  $0.12\text{m}$ . The converging combination formed is found to have a focal length of  $0.18\text{m}$ . Calculate the refractive index of liquid.
37. Calculate the energy released in MeV by  $1\text{g}$  of  $U^{235}$  in the following reaction.



Given mass of  $U_{92}^{235} = 235.04394\text{ amu}$

mass of  $Kr^{92} = 91.88544\text{ amu}$

mass of  ${}_6Ba^{141} = 140.91784\text{ amu}$

mass of  ${}_0n^1 = 1.00874\text{ amu}$

\*\*\*\*\*