MODEL QUESTION PAPER-II
FOR REDUCED SYLLABUS 2020-21

Time: 3 Hours 15 min. **II PUC** **PHYSICS (33)** **Max.Marks:70**

General Instructions:

(i) *All parts are compulsory.*
(ii) *Answers without relevant diagram/figure/circuit wherever necessary will not carry any marks.*
(iii) *Direct answers to Numerical problems without detailed solutions will not carry any marks.*

PART-A

I. Answer ALL the following questions. **10 × 1 = 10**

1. What is an equipotential surface?
2. Mention one application of potentiometer.
3. Write the value of Bohr magneton.
4. What is the value of dip at a point on the magnetic equator?
5. How does self-inductance of an ideal coil vary with the current passing through it?
6. Which kind of electromagnetic radiations are used in LASIK eye surgery?
7. Define critical angle for total internal reflection.
8. Write the expression for the de Broglie wavelength of a particle of mass *m* moving with a speed *v*.
9. Name the series of hydrogen spectrum that lies in visible region.
10. Give an example for conversion of mass to energy.

PART-B

II. Answer any FIVE of the following questions. **5 × 2 = 10**

11. What is an electric dipole? Write the SI unit of dipole moment.
12. Mention any two factors on which capacitance of a parallel plate capacitor depends.
13. Draw a neat diagram of a Wheatstone's network. Mention the condition for its balance.
14. A proton and an electron enter a uniform magnetic field at the same angle with the field and with the same speed. Do they experience force of same magnitude? Justify your answer.
15. Calculate the magnitude of magnetic field at a distance of 2 m from a very long straight wire carrying a current of 5 A?
16. Write any two properties of magnetic field lines.
17. Write any two applications of eddy currents.
18. What is the shape of the emergent wavefront when a plane wavefront is incident on: (a) a prism and (b) a convex lens?

PART-C

III. Answer any FIVE of the following questions. **5 × 3 = 15**

19. Write the fundamental properties of charges.
20. Derive an expression for energy stored in a charged capacitor.

Arrive at the expression for the drift velocity of free electrons in a conductor in terms of applied electric field and relaxation time.

22. Draw graphs showing variation of resistivity with temperature for (a) copper, (b) nichrome and (c) a semiconductor.
23. How do you convert a galvanometer into a voltmeter? Explain with a circuit diagram.
24. Show that the current and the voltage are in phase for the passage of AC through a resistor.
25. Write any three differences between nuclear fission and nuclear fusion.
26. Distinguish between conductors, insulators and semiconductors based on the band theory of solids.

PART D

IV. Answer any TWO of the following questions. 2 × 5 = 10

27. State Gauss law in electrostatics. Derive an expression for electric field at a point due to an infinitely long uniformly charged wire.
28. Derive an expression for force per unit length between two infinitely long straight parallel current carrying conducting wires. What is the nature of the force if the currents are flowing in opposite directions?
29. State and explain Faraday's law of electromagnetic induction. Derive an expression for the motional emf induced in a rod which is moving in a plane perpendicular to a uniform magnetic field.

V. Answer any TWO of the following questions. 2 × 5 = 10

30. Derive the expression for refractive index of a prism in terms of angle of the prism and angle of minimum deviation.
31. Using Bohr's postulates, obtain the expression for radius of n^{th} orbit of electron in hydrogen atom.
32. What is rectification? With the help of a neat circuit diagram explain the working of half wave rectifier.

VI. Answer any THREE of the following questions. 3 × 5 = 15

33. Two charges 5×10^{-8} C and -3×10^{-8} C are located 16 cm apart. At what points on the line joining the two charges is the electric potential zero? Take the potential at infinity to be zero.
34. A wire of length 2 m, area of cross-section 0.5 mm^2 and resistivity 1.5×10^{-6} Ωm is connected in series with a cell of emf 4 V. If the current through the wire is 0.5 A, calculate: (a) the internal resistance of the cell and (b) the rate of energy dissipated by the wire.
35. Calculate the resonant frequency of a series *LCR* circuit with L = 2.0 H, C = 32 μF and R = 10 Ω. What is the Q-value of this circuit?
36. In a Young's double slit experiment setup with monochromatic light, fringes are obtained on a screen placed at a certain distance from the slits. If the screen is moved by 5 cm towards the slits, the change in fringe width is 20 μm. Given the distance between two slits to be 1.2 mm, calculate the wavelength of the light used.
37. Light of frequency 7.21×10^{14} Hz is incident on a metal surface. The cut-off wavelength for photoelectric emission from the metal surface is 540 nm. Determine the maximum speed of the photoelectrons emitted from the surface. (Given: $h = 6.63 \times 10^{-34}$ Js, mass of an electron = 9.1×10^{-31} kg).