MODEL QUESTION PAPER-I
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 electrostatic shielding?

2. A wire of resistivity ρ is stretched to three times its length. What will be its new resistivity?

3. Mention the SI unit of magnetic moment.

4. State Gauss's law in magnetism.

5. Name the law used to find the polarity of induced emf in a coil.

6. Name the physical quantity which remains same for microwaves of wavelength 1 mm and UV radiations of 160 nm in vacuum.

7. A concave lens of refractive index 1.5 is immersed in a medium of refractive index 1.65. What is the nature of the lens?

8. How does the stopping potential of a photosensitive material vary with intensity of incident radiation?

9. Mention any one limitation of Bohr's atomic model.

10. Write the relation between radius of the nuclei and its mass number.

PART-B

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

11. State and explain Coulomb's law.

12. Write the relation between electric field and potential. A point charge +Q is placed at point O as shown in the figure. Is the potential difference $V_A - V_B$ positive, negative or zero?
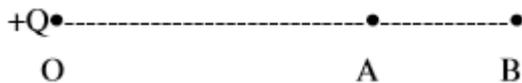
13. Define the terms: (a) drift speed and (b) mobility of an electron in a conductor.

14. Explain how galvanometer can be converted to an ammeter.

15. Write the expression for magnetic field inside a solenoid and explain the terms.

16. Define magnetic dip and declination.

17. A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20 A in 0.5 s, what is the change of flux linkage with the other coil?

18. What is a wave front? Name the type of wave front observed from a distant point source.

PART- C

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

19. Write any three properties of electric field lines.

20. Derive the expression for potential energy of a system of two point charges in the absence of external electric field.

21. Write any three limitations of Ohm's law.

22. State Kirchhoff's laws. Name the Kirchhoff's law which is a consequence of principle of conservation of energy.

23. Obtain the expression for radius of circular path of charged particle in a magnetic field.

24. Name any three sources of energy loss in a transformer.

25. Write any three characteristics of nuclear force.

26. Give any three differences between n-type and p-type semiconductors.

PART-D

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

27. Derive an expression for electric field on the equatorial line of an electric dipole.

28. Using Biot Savarts's law, obtain the expression for magnetic field along the axis of a circular current loop.

29. What is AC generator? Derive an expression for the instantaneous emf in AC generator.

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

30. Derive lens makers formula.

31. Using Bohr's postulate obtain the expression for total energy of electron in hydrogen atom.

32. With the help of a neat circuit diagram, explain the working of full wave rectifier.

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

33. A 4 µF capacitor is charged by a 200 V supply. It is then disconnected from the supply, and is connected to another uncharged 2 µF capacitor. How much electrostatic energy of the first capacitor is lost in the form of heat and electromagnetic radiation?

34. Six lead-acid type of secondary cells each of emf 2.0 V and internal resistance 0.015 Ω are joined in series to provide a supply to a resistance of 8.5 Ω. What are the current drawn from the supply and its terminal voltage?

35. A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which R = 3 Ω, L = 25.48 mH, and C = 796 µF. Find (a) the impedance of the circuit, (b) the phase difference between the voltage across the source and the current and (c) the power dissipated in the circuit.

36. In a Young's double-slit experiment, the slits are separated by 0.28 mm and the screen is placed 1.4 m away. The distance between the central bright fringe and the fourth bright fringe is measured to be 1.2 cm. Determine the fringe width and the wavelength of light used in the experiment.

37. The work function of caesium is 2.14 eV. Find (a) the threshold frequency for cesium and (b) the wavelength of the incident light if the photocurrent is brought to zero by a stopping potential of 0.60V.

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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.

21. 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. $2 \times 5 = 10$

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. $2 \times 5 = 10$

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 nth 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. $3 \times 5 = 15$

33. Two charges 5×10^{-8} C and $- 3 \times 10^{-8}$ 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 $= 9.1 \times 10^{-31}$ kg).