



- I. Answer ALL questions** **1 X 10 = 10**
1. Define electrostatic shielding.
 2. Write the colour sequence for a carbon resistor of resistance $5.2 \text{ M}\Omega \pm 20\%$.
 3. What is the nature of force between two parallel wires carrying current in opposite direction?
 4. Define the term retentivity.
 5. What is self induction?
 6. What type of lens is used to correct hypermetropia?
 7. Who discovered electron?
 8. Why are nuclear forces called exchange forces?
 9. Which of the three regions of a transistor is heavily doped?
 10. Mention the bandwidth of optical fibre.
- II. Answer any FIVE questions** **2 X 5 = 10**
11. Mention two factors on which capacitance of a capacitor depend.
 12. What are the limitations of Ohm's law?
 13. Distinguish between diamagnetic and paramagnetic substances.
 14. Mention any two applications of eddy currents.
 15. What is displacement current? Give an expression for the same.
 16. What is a thin prism? Write the expression for Refractive Index of the material of the prism for minimum deviation condition.
 17. A photon has a wavelength of 500 nm. Calculate its energy in electron volts.
 18. Draw the block diagram for an AM receiver.
- III. Answer any FIVE questions** **3 X 5 = 15**
19. Give any three characteristics of electric lines of force.
 20. Derive the expression for magnetic force on a current carrying conductor.
 21. What is a hysteresis curve? Mention its importance.
 22. Obtain an expression for motional emf.
 23. Show that current leads voltage when alternating voltage is applied to a capacitor.
 24. Prove Snell's law using Huygen's wave principle.
 25. Give any three experimental results of photoelectric effect.
 26. Explain the formation of a p-n junction.
- IV. Answer any TWO questions** **2 X 5 = 10**
27. Obtain an expression for electric potential due to an isolated point charge.
 28. Derive an expression for equivalent emf and equivalent internal resistance when two cells are connected in parallel.
 29. Explain the working of transformer and mention the causes of power loss.
- V. Answer any TWO questions** **2 X 5 = 10**
30. Derive the relation between u , v , n and R for refraction at a spherical surface when a real object is placed towards the convex surface.

31. Give an account of the spectral series of hydrogen atom.
32. Write a note on p type and n type semiconductors.

VI. Answer any THREE questions

3 X 5 = 15

33. Four point charges +2 nC, -3 nC, +4 nC, -5 nC are placed at the vertices A, B, C, D of a square ABCD of side 0.2 m respectively. Calculate the electric field intensity at a point of intersection of the diagonals.
34. Resistors of resistances 2 Ω , 1 Ω , 3 Ω , and 4 Ω are arranged in a cyclic order to form a wheatstone's network ABCD. The junction B and D are connected by a galvanometer of resistance 2 Ω . A current of 0.1 A enters the junction 'A'. Calculate the current in the galvanometer.
35. Find the magnitude of magnetic induction at a point 0.06 m from the centre and along the axis of a circular coil of radius 0.03 m carrying a current of 2 A. Also calculate the magnitude of magnetic induction at the centre of the coil.
36. Monochromatic light of wavelength 600 nm from a narrow slit is incident on the double slit. If the separation of 15 fringes on the screen 1 m away is 3 cm. Find the slit separation.
37. A given coin has a mass 3.0 g, Calculate the nuclear energy that would be required to separate all the neutrons and protons from each other. Assume that the coin is entirely made of ${}_{29}\text{Cu}^{63}$ atoms of mass = 62.92960 u. Given Avogadro number = 6.023×10^{23} , Mass of proton $m_p = 1.00727$ u and mass of neutron $m_n = 1.00866$ u.



JAIN COLLEGE, J C Road Bangalore
Mock Paper -2, February - 2015
II PUC- Physics (33)

Time: 3 Hours 15 Minutes

Max. Marks: 70

I. Answer ALL the following questions:

1 X 10 = 10

1. Write the S.I unit of electric dipole moment.
2. On what principle Kirchhoff's voltage law works?
3. Does neutron experience any force when placed in a uniform magnetic field?
4. Define magnetisation.
5. State Lenz's law.
6. How inductive reactance varies with frequency?
7. What is diffraction?
8. Give Bohr's quantisation condition.
9. Name the particle liberated during the conversion of neutron to proton.
10. Mention one application of photo diode.

II. Answer any FIVE of the following questions:

2 X 5 = 10

11. State Coulomb's law in electrostatics and explain it in the case of free space.
12. How does the resistivity of the semiconductor vary with the increase in temperature? Explain.
13. Which type of magnetic material exhibits the property of hysteresis? Define coercivity.
14. Current in a circuit falls from 5 A to 0 A in 0.1 s. If an average emf of 200 V induced, give an estimate of the self inductance of the circuit.
15. Mention any two properties of an electromagnetic wave.
16. Give any two uses of Polaroid.
17. Draw a schematic diagram of experimental setup to study the photo electric effect.
18. Give the logic symbol and the truth table of NOR-gate.

III. Answer any FIVE of the following questions:

3 X 5 = 15

19. Derive an expression for effective capacitance when two capacitors are connected in parallel.
20. Explain with a circuit diagram, the conversion of a galvanometer to an ammeter.
21. Distinguish between diamagnetic and paramagnetic substances.
22. Arrive at an expression for energy stored in an inductor.
23. Mention two conditions necessary for total internal reflection and give one of its applications.
24. Define the terms: (i) work function (ii) threshold frequency (iii) stopping potential.
25. Explain with circuit diagram, transistor as a switch.
26. What is a ground wave? Draw the block diagram of basic communication system.

IV. Answer any TWO of the following questions:

2 X 5 = 10

27. State Gauss's law and derive the expression for the electric field at a point outside a uniformly charged spherical shell.
28. Arrive at the relation between electric current and drift velocity.
29. Derive the expression for magnetic field at a point on the axis of circular current loop.

V. Answer any TWO of the following questions:

2 X 5 = 10

30. Derive an expression for the fringe width of interference fringes in a double slit experiment.
31. Mention the characteristics of nuclear forces.

32. What is rectification? Describe with a circuit diagram, the construction and working of a half wave rectifier with input and output waveforms.

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

33. A metal sphere of radius 0.01 m is charged to a potential of 45 kV at the corner B of a right angled triangle ABC ($AB=0.3$ m, $BC=0.4$ m and $\angle ABC=90^\circ$). Calculate the work required to shift a charge of $2 \mu\text{C}$ from corner C to A of the triangle.
34. Two cells A and B are connected in series, each having an emf of 1.5 V. The internal resistances of A and B are 0.5Ω and 0.25Ω respectively. The combination is connected across a resistance of 2.25Ω . calculate (i) the current in the circuit. (ii) The potential difference across the terminals of each cell.
35. A bulb marked 60 W, 60 V is connected in series with a capacitor to a 220 V, 50 Hz oscillator. Calculate the capacitance of a capacitor that must be connected with the bulb in order to maintain the same current.
36. Focal length of a concave lens is 0.1 m. A liquid lens is formed between a plane surface and one face of this lens of radius of curvature 0.12 m. The converging combination formed is found to have a focal length of 0.18 m. Calculate the refractive index of the liquid.
37. An electron in hydrogen atom in the ground state is excited to $n = 4$ state. Calculate the energy absorbed and the wavelength of the electromagnetic radiation emitted when atom comes to ground state.