JAIN COLLEGE, JAYANAGAR
II PUC PHYSICS (33) JAN 2019
MOCK PAPER-I

Time: 3 Hours 15 min **Max Marks : 70**

Instructions:

a) **All parts are compulsory.**
b) **Answers without relevant diagram / figure wherever necessary will not carry any marks.**
c) **Direct answers to the numerical problems without detailed solutions will not carry any marks.**

PART – A

I. Answer all the following questions: (10x1 = 10)

1. What is the permittivity of a medium whose dielectric constant is one.
2. Draw equipotential surface due to a point charge.
3. Write colour code of the resistor whose resistance is 450 ± 10%.
4. State Ampere's circuital law.
5. For which class of magnetic material, magnetic susceptibility is small and negative value?
6. Define dip.
7. What is the conclusion of Davison and Germer experiment on the nature of electron?
8. Name the spectral series of hydrogen atom that lies in the ultraviolet region of electromagnetic spectrum.
9. In the following nuclear reaction, identify the particle X:
   $n \rightarrow p + e^{-} + X$
10. What is attenuation in communication system?

PART – B

II. Answer any FIVE of the following questions: (5x2 = 10)

11. Define (a) surface charge density and (b) linear charge density.
12. How does electrical conductivity vary when the temperature rises in (a) metal and (b) semiconductor?
13. Write two properties of magnetic field lines.
14. Current in a coil falls from 2.5 A to 2.0 A in 0.01 second. Calculate the value of self induced emf.
15. What is a toroid? Mention an expression for magnetic field at a point inside a toroid.
16. Mention two applications of polaroid.
17. What are isotopes and isobars?
18. Draw block diagram for communication system.

PART – C

III. Answer any FIVE of the following questions. (5x3 = 15)

19. Explain how do you convert a moving coil galvanometer into a voltmeter.
20. Obtain an expression for the effective capacitance when 2 capacitors are connected in parallel.
21. Derive the expression for energy stored in an inductor.
22. Derive the expression for current when an ac voltage is applied to a resistor.
23. Write three characteristics of nuclear forces.
24. What is myopia? With a neat diagram explain how it can be corrected.
25. What are matter waves? Obtain the expression for wavelength of matter waves.
26. Distinguish between intrinsic and extrinsic semiconductor.

PART – D

IV. Answer any TWO of the following questions. (2x5 = 10)

27. State Gauss law. Obtain an expression for the electric field at a point due to an infinitely long straight conducting wire.
28. What is Wheatstone's network. Arrive at the balance condition for Wheatstone's network.
29. What is Impedance? A series LCR circuit is connected to an ac source having a voltage $V = V_o \sin\omega t$. Derive an expression for the impedance, instantaneous current and its phase relationship to the applied voltage.

V. Answer any TWO of the following questions. (2x5 = 10)

30. Derive the relation between n, u, v and R for refraction through single spherical surface where the symbols have their usual meaning.
31. State Radioactive decay law. Show that $N = N_o e^{-\lambda t}$.
32. With the help of a neat labelled diagram explain the working of n-p-n transistor in CE mode as an amplifier.

PART – E

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

33. ABCD is a square of side 1 m. Point charges 2×10^{-10} C, -4×10^{-10} C and 8×10^{-10} C are placed at the corners A, B and C respectively. Calculate the amount of workrequired in transferring a charge of 10 μC from D to the point of intersection of diagonals.
34. Three equal resistors connected in series across a source of emf of negligible internal resistance together dissipate 10 watts of power. What would be the power dissipated if the resistors are connected in parallel across the same source of emf.
35. A straight wire of length Π/2 is bent into a circular shape. O is the center of the circle formed and P is a point on its axis which is at a distance 3 times the radius from O. A current of 1 A is passed through it. Calculate the magnitude of the magnetic field at the points O and P.
36. In Young's double slit experiment, the slits are separated by 0.3 mm and the screen is placed 1.3 m away. The distance between the central fringe and the fifth bright fringe is measured to be 0.012 m. Calculate the wavelength of light used.
37. The threshold wavelength of a photosensitive metal is 662.5 nm. If this metal is irradiated with a radiation of wavelength 331.3 nm, find the maximum kinetic energy of the photoelectrons. If the wavelength of radiation is increased to 496.5 nm, calculate the change in maximum kinetic energy of the photoelectrons. (Planck's constant, $h = 6.625 \times 10^{-34}$Js and speed of light in vacuum = 3×10^8 ms^{-1})

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