DEPARTMENT OF PRE-UNIVERSITY EDUCATION, KARNATAKA
MODEL QUESTION PAPER - 2022
II PUC PHYSICS (33)

Time Duration:**3 Hrs 15 Minutes** Max. Marks: **70**

Instructions:

1. All parts are compulsory.
2. Answers without relevant diagram/figure/circuit wherever necessary will not carry any marks.
3. Direct answers to the numerical problems without writing the relevant formula and detailed solutions will not carry any marks.

PART- A

I. Answer any TEN of the following questions: **10 × 1 = 10**

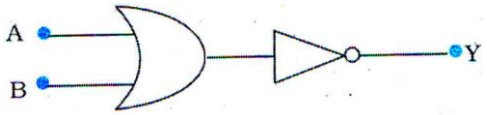
1. Write the physical quantity, whose SI unit is 'coulomb'.
2. Define linear charge density.
3. How does resistivity of the nichrome vary with absolute temperature?
4. The coloured rings marked on a carbon resistor are Red, Red, Red, and Silver. What is the tolerance of this resistor?
5. What is Lorentz force?
6. State Gauss's law in magnetism.
7. Draw the pattern of magnetic field lines for a bar magnet.
8. What is wattles current?
9. Mention the angle between electric field and magnetic field in an electromagnetic wave.
10. Name the electromagnetic wave which keeps the Earth warm by greenhouse effect.
11. Write the condition for diffraction maxima in terms of wavelength of light and slit width.
12. How does the resolving power of a telescope change on decreasing the aperture of its objective lens?
13. Define impact parameter in α scattering experiment.
14. In which type of extrinsic semiconductor, holes are minority charge carriers?
15. Draw the circuit symbol for p-n junction diode.

PART- B

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

16. Write any two differences between polar and non-polar molecules.
17. State Ohm's law and write its one limitation.
18. Define magnetic declination and inclination of the Earth.
19. Draw a typical hysteresis loop for a ferromagnetic material. Mark coercive fields in it.
20. What is displacement current? Write its expression.
21. Mention the two factors on which the Fresnel distance depends.
22. Write any two uses of polaroids.
23. Find the potential difference through which an electron be accelerated so that its de Broglie's wavelength becomes 0.1227 nm.
24. Write any two limitations of Bohr's atomic model.

25. In the following circuit, if $A = 1$ and $B = 1$, what is the value of Y? Name the equivalent logic gate that this circuit represents



PART- C

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

26. Obtain the relation between electric field and electric potential.
27. Two resistors of resistances R_1 and R_2 are connected in series. Derive the expression for its equivalent resistance.
28. Using Ampere's circuital law, obtain the expression for magnetic field at a point due to a straight infinitely long, steady current carrying wire.
29. Write any three properties of diamagnetic substance.
30. Describe coil and magnet experiment to demonstrate the phenomenon of electromagnetic induction.
31. Mention any three sources of energy loss in an actual transformer.
32. Using Huygens principle, show that the angle of incidence is equal to angle of reflection.
33. Give de-Broglie's explanation of Bohr's second postulate.
34. Write any three differences between nuclear fission and nuclear fusion.
35. Explain the Zener diode used as a voltage regulator.

PART- D

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

36. Derive the expression for electric field at a point on the equatorial plane of an electric dipole.
37. Using Kirchhoff's rules, obtain the condition for balance of Wheatstone's bridge.
38. Obtain the expression for force between two long parallel current carrying conductors. Hence define 'ampere'.
39. Give the principle on which AC generator works. With the schematic diagram explain the basic parts of the ac generator.

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

40. Show that the current leads the voltage by $\pi/2$ rad in an AC circuit containing a pure capacitor. Draw the phasor diagram for it.
41. Two thin convex lenses of focal lengths f_1 and f_2 are kept in contact co-axially. Obtain the expression for the equivalent focal length.
42. Write Einstein's photo electric equation. Using it explain the experimental observations of photoelectric effect.
43. What is rectification? With the suitable circuit diagram explain the working of p-n junction diode as a half-wave rectifier. Draw the input and output waveforms.

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

44. Two charges of 2 μC and 8 μC are separated by 4 cm. Calculate the electrostatic force between them. If the distance between the charges is halved and a medium of dielectric constant 2 is placed between them, find the new electrostatic force. Also find the change in force. (Given: $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9\ Nm^2C^{-2}$)

45. A parallel plate capacitor consists of two circular metal plates, each of radius 1.38 cm. A coating of Teflon 40 μm thick is applied to the inner surface of one plate to provide a dielectric layer, and then the plates are pressed together. Find the voltage to be applied between the plates of this capacitor to establish a charge of 0.5 nC on each plate. (Given: $\varepsilon_0 = 8.854 \times 10^{-12}$ F/m and dielectric constant of Teflon = 2).
46. Two cells of emf 3 V and 4 V and internal resistance 1 Ω and 2 Ω respectively are connected in parallel so as to send the current in the same direction through an external resistance of 5 Ω. Find the potential difference across 5 Ω resistor.
47. Two circular loops of radii 6.28 cm and 3.14 cm are arranged concentric to one another with their planes at right angles to each other. If a current of 2 A is passed through each of them, calculate the magnitude of the magnetic field at their common centre (Given: $\mu_0 = 4\pi \times 10^{-7}\ Hm^{-1}$).
48. An object is placed at 10 cm in front of a concave mirror of radius of curvature 15 cm. Find the position and the magnification of the image. Write the nature of the image.
49. Two narrow parallel slits separated by 0.850 mm are illuminated by a light of wavelength 600 nm and the viewing screen is placed at 2.80 m from the slits. Find (a) the phase difference between the two interfering waves on the screen at a point 2.50 mm from the central bright fringe and (b) the ratio of the intensity at this point to the intensity at the centre of a bright fringe.
50. The half-life of radon is 3.8 days. Find its decay constant. Calculate, after how many days will 5% of the sample be left over.

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