

Sri Bhagawan Mahaveer Jain College

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PHYSICS

II PU MOCK PAPER-I

PART-A

I ANSWER ALL THE FOLLOWING QUESTIONS

10 X 1=10

1. What is the charge on a 1_7N nucleus?
2. Give the nature of force when two parallel conductors carry current in opposite directions.
3. The relative permeability of a substance is 0.99. Mention the type of magnetic substance.
4. Find the magnetic energy stored in a coil of 100mH carrying a current of 1A.
5. Write an expression for modified Ampere's circuital law.
6. What is a polaroid?
7. An electron and a proton have the same kinetic energy. Which of these has the shortest de broglie wavelength?
8. What is the energy of an electron of an atom when $n=\infty$?
9. Name a substance used as a moderator in a nuclear reactor.
10. What is a transducer?

PART-B

II ANSWER ANY FIVE OF THE FOLLOWING QUESTIONS

5 X 2=10

11. State Coulomb's law. Give its vector form.
12. A stream of electrons is moving with a drift velocity of 5mms^{-1} . If number density of electrons is $6 \times 10^{23} \text{cm}^{-3}$, calculate the current density.
13. Give an expression for the force experienced by a conductor placed in a uniform magnetic field. When is the force experienced by the conductor maximum?
14. Draw hysteresis curve for a ferromagnetic substance.
15. Write the expression for the velocity of electromagnetic wave in vacuum and explain its terms.
16. Draw a diagram showing plane of polarization and plane of vibration.
17. Write the circuit symbol and the truth table for a NOR gate.
18. Why sky waves are not used for transmission of TV signals?

PART-C

III ANSWER ANY FIVE OF THE FOLLOWING QUESTIONS

5 X 3 =15

19. Obtain the relation between electric field and electric potential.
20. Derive the expression for equivalent emf and internal resistance of two cells connected in series.
21. Derive an expression for two resistors connected in parallel.
22. State curie's law in magnetism. When does a ferromagnetic substance become a paramagnetic substance?
23. What is myopia? Mention its cause. How is it corrected?
24. Give the condition for electrical resonance. Obtain an expression for the resonant frequency of series LCR circuit.

25. Derive an expression for the velocity of an electron in the n^{th} orbit of a hydrogen atom.
 26. Explain how a Zener diode acts as a voltage regulator?

PART-D

IV ANSWER ANY TWO OF THE FOLLOWING QUESTIONS

2 X 5=10

27. Derive an expression for the capacitance of a parallel plate capacitor.
 28. Obtain the condition for balanced Wheatstone's network.
 29. Define self-inductance of a coil. Derive an expression for the energy stored in a coil.

V ANSWER ANY TWO OF THE FOLLOWING QUESTIONS

2 X 5 = 10

30. On the basis of Huygen's wave theory of light, prove Snell's law of refraction.
 31. Explain the experimental observations of photoelectric effect with the relevant graphs.
 32. Explain the formation of energy bands. Classify metals, semiconductors and insulators on the basis of energy bands.

VI ANSWER ANY THREE OF THE FOLLOWING QUESTIONS

3 X 5 = 15

33. The electrostatic force on a metal sphere of charge $0.4\mu\text{C}$ due to another identical metal sphere of charge $-0.8\mu\text{C}$ in air is 0.2N . Find the distance between the same two spheres and also find the force between the same two spheres when they are brought in to contact and then replaced in their initial positions.
34. A and B are two identical coils, of diameter 0.134m having 10 turns each. They are placed concentrically with their planes at right angles to each other. A current of 1A flows through each coil. Calculate the resultant magnetic field at their common centre.
35. A coil of inductance 0.5H and resistance 100Ω are connected to $200\text{V } 50\text{H}_2$ ac supply. Find the maximum current in the coil. Also find the time lag between the maximum voltage and the maximum current.
36. A square of side 4.0cm is placed 20.0cm away from the concave mirror of radius of curvature of 30cm . Calculate the area enclosed by the image of the square.
37. Calculate energy released in joule by 0.5mg of U^{235} in the following reaction
 ${}_{92}\text{U}^{235} + {}_0\text{n}^1 = {}_{56}\text{Ba}^{141} + {}_{36}\text{Kr}^{92} + 3 {}_0\text{n}^1 + \text{Energy}$
 Given: Rest mass of $\text{U}^{235} = 235.044 \text{ amu}$
 Rest mass of $\text{Ba}^{141} = 140.918 \text{ amu}$
 Rest mass of $\text{Kr}^{92} = 91.885 \text{ amu}$
 Rest mass of ${}_0\text{n}^1 = 1.009 \text{ amu}$