XIIARKDN20
2001–B
PHYSICS

Time : 3 Hours]   [Maximum Marks : 70

Section–A   1 each

(Very-Very Short Answer Type Questions)

1. A copper wire of resistivity 'ρ' is stretched to reduce its diameter to half of its previous value. What will be its new resistivity ?

2. Why are pole pieces of a galvanometer made concave ?

3. What is the phase relationship between current and voltage across an inductive a.c. ?

4. Does each incident photon eject a photoelectron ? If not, why ?

5. What is the order of energy gap in :

   (i) a semiconductor and

   (ii) insulator ?

Section–B   2 each

(Very Short Answer Type Questions)

6. State Ampere Circuital Law. Write an expression for magnetic field due to infinitely long straight conductor carrying current.

Or

What are elements of earth's magnetic field ? Name them.

7. If frequency of a.c. is doubled, what happens to resistance, inductive reactance and capacitive reactance ?

8. What are the factors, which help in increasing the efficiency of a transformer ?

9. Why sky appears blue ?

10. Why ground waves are suitable for broadcast only at low frequency ?

Section–C   3 each

(Short Answer Type Questions)

11. An infinite line charge produces an electric field of 9×10^4 N/C at a distance of 2 cm. Find the line charge density.

12. With the help of circuit diagram explain how you will compare e.m.fs of two primary cells using potentiometer.

Or

Using Kirchhoff's laws derive the condition for balance of a Wheatstone bridge circuit.

13. A wire of length 12 m and uniform cross-section 4×10^{-6} m^2 has resistance of 6.0 ohms. What is the resistivity of the material of the wire ?

14. Using phasor-diagram solution of series LCR circuit, derive an expression for impedance.

15. Give *two* uses of each of the following :

    (i) Microwave

    (ii) Infrared waves

    (iii) X-rays

16. What is phenomenon of total internal reflection ? Give the conditions for its occurrence.

17. Show that the de-Broglie wavelength 'λ' of electron of energy 'E' is given by relation :

$$\lambda = \frac{h}{\sqrt{2m\,\mathrm{E}}}$$

18. Show that in Bohr's hydrogen atom $r \propto n^2$, where 'r' is the radius and 'n' is the principal quantum number.

19. Define mass defect and obtain an expression for binding energy per nucleon.

20. With the help of a circuit diagram explain the voltage regulating action of Zener diode.

21. Give logic symbol, Boolean expression and truth-table of an AND gate.

22. What is amplitude modulation ? Discuss its advantages.

Section–D

4

(Value Based Questions)

23. Ravi was very much fascinated towards astronomy that he decided to make a telescope. He carefully studied about the construction of telescope and prepared his own model and presented his ideas in a science seminar and got first prize.

Questions :

(a) What qualities do Ravi possess ?

(b) What kind of telescope he might have made and draw ray diagram for the same ?

Section–E 5 each

(Long Answer Type Questions)

24. State and explain Coulomb's Law in vector form. Hence define unit charge.

Or

What is parallel plate capacitor ? Derive an expression for its capacitance. where dielectric slab is introduced between its plates.

25. Discuss the principle. construction and working of a moving coil galvanometer.

Or

What are dia-. para- and ferro-magnetic materials. Discuss their important properties.

26. Discuss the phenomenon of refraction through a prism and prove that for a prism :

$$\mu = \frac{\sin\left(\dfrac{A + \delta_m}{2}\right)}{\sin\dfrac{A}{2}}$$

Or

Define fringe width. Derive an expression for fringe width in interference pattern.