D–8–Y

Roll No. .....

Total No. of Questions : 22] [Total No. of Printed Pages : 8

12th ARM(H/Z)JKUTL2024-25
608–Y
PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

SECTION–A **1 each**

1. (i) When air is replaced by a dielectric medium of constant K, the maximum capacitance of the capacitor :

   (A) Increases K times

   (B) Increases K^2 times

   (C) Remains unchanged

   (D) Decreases K times

   (ii) Electric field varies as r^{-3} due to :

   (A) A point charge

   (B) An electric dipole

   (C) An infinite line charge

   (D) An infinite plane sheet of charge

(iii) A Kilowatt-hour is a unit of

(A) Energy

(B) Electric current

(C) Electric charge

(D) Power

(iv) Which of the following has negative co-efficient of resistance ?

(A) Copper

(B) Aluminium

(C) Iron

(D) Germanium

(v) Susceptibility is positive and large for a :

(A) Diamagnetic

(B) Non-magnetic

(C) Ferromagnetic

(D) Paramagnetic

(vi) Choose the correct answer :

(A) All electrons possess magnetic moment

(B) All protons possess magnetic moment

(C) All nuclei possess magnetic moment

(D) All atoms possess magnetic moment

(vii) Which has the longest wavelength ?

(A) Infrared rays

(B) X-rays

(C) Ultraviolet rays

(D) Radio waves

(viii) A lens behaves as a converging lens in air and a diverging lens in water. The refractive index of the material of lens is :

(A) Equal to unity

(B) Equal to 1.33

(C) Between unity and 1.33

(D) Greater than 1.33

(ix) If c is the velocity of light, their momentum of a photon of frequency ν is :

(A) $h\nu/c^2$

(B) ν/c

(C) $h\nu/c$

(D) $h\nu c^2$

(x) The main difference between conductors, semiconductors and insulators is because of :

(A) Binding energy of electrons

(B) Work functions

(C) Mobility of electrons

(D) Width of forbidden energy gap

SECTION–B

2 each

2. Explain nuclear fission and fusion.

3. What is an equipotential surface ? Give *two* properties of equipotential surface.

4. Find the work done in placing a charge of 8×10^{-18} coulomb on a capacitor of capacity 100 microfarad.

5. Define Conductivity and Conductance. Give their S.I. units.

6. An ammeter of resistance 100 Ω can measure a maximum current of 5 mA. What will you do to measure maximum current of 5 A with it ?

7. Define Mutual Inductance. Give its S.I. unit.

8. The instantaneous voltage from an a.c source is given by $V = 300 \sin 314\, t$. What is the root mean square value of the source ?

9. What is displacement current ? Explain its causes.

10. Derive the relation between critical angle and refractive index of the medium.

SECTION–C

3 each

11. Using Gauss' theorem, derive an expression for electric field at a point due to a uniformly charged infinite plane sheet.

12. Apply Kirchhoff's laws to obtain the condition of balanced Wheatstone bridge.

13. Define interference of light. Write *four* conditions for obtaining sustained interference.

14. The radii of curvature of the faces of a double convex lens are 10 cm and 12 cm respectively. If the focal length of the lens is 12 cm, find the refractive index of the material of the lens.

15. What is Photoelectric Effect ? Derive the Einstein's photoelectric equation.

16. What is Binding Energy ? Explain the significance of binding energy per nucleon in the stability of the nucleus.

17. Write three postulates of Bohr's model of atom.

18. Explain the function of *p-n* junction diode as full-wave rectifier by giving a diagram.

19. What are Extrinsic Semiconductors ? Describe P-type semiconductor.

SECTION–D

5 each

20. Draw the labelled diagram of a moving coil galvanometer. Describe its principle, construction and working.

Or

Derive an expression for the force per unit length between two long parallel straight current carrying conductors in the same or opposite direction. Hence, define ampere.

21. Derive an expression for the average power in an a.c circuit containing L, C and R.

Or

State Faraday's laws of electromagnetic induction and explain any *one* method of producing induced e.m.f.

22. State Huygen's principle. Hence derive laws of reflection from it.

Or

Describe construction and working of an astronomical telescope. Calculate its magnifying power in normal adjustment.