

D.Karthic PG Assistant

Standard XII

PHYSICS

Part - I

Marks: 70

15 x 1 = 15

Time: 3.00 hrs.

1. Choose the correct answer:

1. An electric dipole is placed at an alignment angle of 30° with an electric field of $2 \times 10^5 \text{ NC}^{-1}$. It experiences a torque equal to 8 Nm. The charge on the dipole if the dipole length is 1 cm is
 a) 4 mC b) 8 mC c) 5 mC d) 7 mC
2. Which of the following is a non-polar molecule?
 a) H_2O b) N_2O c) NH_3 d) O_2
3. A toaster operating at 240V has a resistance of 120Ω . Its power is
 a) 400W b) 2W c) 480W d) 240W
4. A copper wire of cross-sectional area 05 mm^2 carries a current of 0.2A. If the free electron density of copper is $8.4 \times 10^{20} \text{ m}^{-3}$, then the drift velocity of free electron is _____
 a) $0.6 \times 10^{-2} \text{ ms}^{-1}$ b) $0.03 \times 10^{-3} \text{ ms}^{-1}$ c) $30 \times 10^{-3} \text{ ms}^{-1}$ d) $0.03 \times 10^3 \text{ ms}^{-1}$
5. The vertical component of magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?
 a) 30° b) 45° c) 60° d) 90°
6. A step-down transformer reduces the supply voltage from 220V to 11V and increases the current from 6A to 100A, then its efficiency is
 a) 1.2 b) 0.83 c) 0.12 d) 0.9
7. Which of the following electromagnetic radiation is used for viewing objects through fog
 a) microwave b) gamma rays c) X-rays d) infrared
8. Number of images produced by two parallel plane mirror is
 a) infinity b) zero c) 3 d) 8
9. In a young's double-slit experiment the slit separation is doubled. To maintain the same fringe spacing on the screen the screen -to-slit distance D must be changed to
 a) 2D b) $\frac{D}{2}$ c) $\sqrt{2} D$ d) $\frac{D}{\sqrt{2}}$
10. For a myopic eye, the defect is cured by using a
 a) Convex lens b) concave lens c) cylindrical lens d) plane glass
11. The threshold wavelength for a metal surface whose photo electric work function is 3.313 eV is
 a) 4125 \AA b) 3750 \AA c) 6000 \AA d) 2062.5 \AA
12. The energy equivalence of one atomic mass unit is
 a) 931 MeV b) 9.31 eV c) 931 eV d) $1.66 \times 10^{-27} \text{ J}$
13. The radius of the 5th orbit of hydrogen atom is 13.25. Calculate the wavelength of the electron in the 5th orbit
 a) $\lambda = 16.64 \text{ \AA}$ b) $\lambda = 26.50 \text{ \AA}$ c) $\lambda = 13.25 \text{ \AA}$ d) $\lambda = 13.64 \text{ \AA}$
14. The frequency range of 3 MHz to 30 MHz is used for
 a) Ground wave propagation b) Space wave propagation
 c) Sky wave propagation d) Satellite communication
15. "ski-wax" is an application of Nano product in the field of
 a) Medicine b) Textile c) Sports d) Automotive industry

Part - II

II. Answer any 6 questions. (Q.No.24 is compulsory)

6 x 2 = 12

16. State Coulomb's law.
17. State Kirchhoff's voltage rule.
18. Using the relation $\vec{B} = \mu_0 (\vec{H} + \vec{M})$, Show that $\chi_m = \mu_r - 1$
19. Define Q factor.
20. What are the conditions for total internal reflection/
21. State Huygen's principle.
22. What is Bremsstrahlung?
23. Why are NOR and NAND gates called universal gates?
24. In a nuclear fission 0.1% mass is converted into energy calculate the energy released by the fission of 1kg mass.

Part - III

III. Answer any 6 questions. (Q.No.33 is compulsory)

6 x 3 = 18

25. State the applications of capacitors.
26. What is Seebeck effect? State the application of Seebeck effect.
27. Why is the path of a charged particle not a circle when its velocity is not perpendicular to the magnetic field?
28. Discuss about Nicol prism.
29. Calculate the momentum and the de-Broglie wavelength of an electron with K.E. 25 eV.
30. Explain proton-proton cycle.
31. Give the Barkhausen condition for sustained oscillations.
32. State Rayleigh's scattering law. What is the reason for reddish appearance of sky during sun set and sun rise.
33. The self-inductance of an air core solenoid is 4.8 mH. If its core is replaced by iron core, then self-inductance becomes 1.8H. Find out the relative permeability of iron.

Part - IV

IV. Answer all the questions.

5 x 5 = 25

34. a) Calculate the electric field due to a dipole on its equatorial plane. (OR)
b) Discuss about simple microscope and obtained the equation for magnification for near point focusing and normal focusing.
35. a) Explain the determination of the internal resistance of a cell using potentiometer. (OR)
b) Derive the mirror equation and the equation for lateral magnification.
36. a) Explain the principle construction and working of a cyclotron in detail. (OR)
b) Obtain Einstein's photo electric equation with necessary explanation.
37. a) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit. (OR)
b) Explain the J.J.Thomson experiment to determine the specific charge of an electron.
38. a) Write down Maxwell equations in integral form. (OR)
b) Draw the circuit diagram of a half wave rectifier and explain its working.
