QUARTERLY EXAMINATION - 2024

12 - STD PHYSICS

Time : 3.00 Hours Max.Marks:70

PART - A 15 x 1 = 15

Choose the correct answer and write it with option :

1) The value of dielectric strength of air

a) $9 \times 10^9\ NmC^{-2}$ b) $3 \times 10^6\ Vm^{-1}$

c) $1.602 \times 10^{-19}\ C$ d) $4\pi \times 10^{-7}\ Hm^{-1}$

2) An electric dipole is placed at an alignment angle of 30° with an electric field of 2×10^5 NC^{-1}. It experiences a torque equal to 8 N m.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

3) The ratio of maximum and minimum resistance obtained by combining 'n' resistors, each of resistance R is

a) n b) n^2 c) $\frac{1}{n}$ d) $\frac{1}{n^2}$

4) In Joule's heating law, when R and t are constant, if the H is taken along the y axis and I^2 along the x axis, the graph is

a) straight line b) parabola c) circle d) ellipse

5) The quantity which increased in step - down ideal transformer is

a) current b) voltage c) Power d) Frequency

6) A non-conducting charged ring carrying a charge of q, mass m and radius r is rotated about its axis with constant angular speed ω. Find the ratio of its magnetic moment with angular momentum is

a) $\frac{q}{m}$ b) $\frac{2q}{m}$ **c)** $\frac{q}{2m}$ d) $\frac{q}{4m}$

7) The potential energy of magnetic dipole whose dipole moment is $\overrightarrow{p_m} = (-0.5\,\hat{i} + 0.4\,\hat{j})Am^2$ kept in uniform magnetic field $\overrightarrow{B} = 0.2\,\hat{i}\,T$

a) –0.1 J b) –0.8 J c) 0.1 J d) 0.8 J

8) In a series RL circuit, the resistance and inductive reactance are the same. Then the phase difference between the voltage and current in the circuit is

a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$ c) $\frac{\pi}{6}$ d) $zero$

9) Which of the following is an electromagnetic wave?

a) $\gamma - rays$ b) $\beta - rays$ c) $\alpha - rays$ d) all of them

10) The speed of light in an isotropic medium depends on,

(a) its intensity (b) its wavelength

(c) the nature of propagation

(d) the motion of the source with respect to medium

11) A metal coin is at the bottom of a beaker filled with liquid to a height of 6 cm . The refractive index of the liquid is 4/3. To an observer looking above the surface of the liquid the coin will appear raised up by

a) 4.5 cm b) 6.75 cm c) 1.5 cm d) 7.5 cm

12) If the amplitude of the magnetic field is 10^{-6} T, then amplitude of the electric field for a electromagnetic waves is

a) 100 V m^{-1} b) 300 V m^{-1}

c) 600 V m^{-1} d) 900 V m^{-1}

13) A Parallel plate capacitor stores a charge Q at a voltage V. Suppose the area of the parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change?

a) capacitance b) charge c) voltage d) energy density

14. The temperature coefficient of resistance of a wire is 0.00125 per °C. At 20°C, its resistance is 1 Ω. The resistance of the wire will be 2 Ω at

a) 800^0 C b) 700^0 C c) 850^0 C d) 820^0 C

15. Stars twinkle due to .....

a) refraction b) polarization

c) reflection d) total internal reflection

PART- B 6 x 2 = 12

Answer any SIX questions and Question No.19 is compulsory.

16) Define temperature co-efficient of resistivity.

17) Why phosphor-bronze is used as suspension in galvanometer?

18) State Lenz law.

19) The relative magnetic permeability of the medium is 2.5 and the relative electrical permittivity of the medium is 2.25.compute the refractive index of the medium

20) What is displacement current?

21) Distinguish between self-induction and mutual induction.

22) What is corona discharge ?

23) Write any two applications of the capacitor.

24) What is power of the Lens?

PART - C 6 x 3 = 18

Answer any SIX questions and Question No. 29 is compulsory.

25) List the properties of electric field lines.

26) Write down the various forms of expression for power in electrical circuit.

27) Distinguish between Coulomb force and Gravitational force.

28) How is a galvanometer converted into a voltmeter?

29) The angle of minimum deviation for an equilateral prism is 37^0. Find the refractive index of material of the prism.

30) Find out the phase relation between voltage and current in a pure resistor circuit.

31) Write short notes on microwaves and x-ray.

32) What is total internal reflection? Write the two conditions for total internal reflection.

33) How will you induce an emf by changing the area enclosed by the coil?

PART - D 5 x 5 = 25

Answer all Questions:

34) A) Calculate the electric field due to a dipole on its axial plane.
(OR) B) Define emission spectrum and explain the types of emission spectrum.

35) A) Obtain the condition for bridge balance in Wheatstone bridge.
(OR) B) Obtain lens maker's formula.

36) A) Explain the construction and working of transformer. **(OR)**
B) Write down Maxwell equations in integral form.

37) A) Explain Lorentz force. **(OR)**
B) Obtain an expression for electric field due an infinitely long charged wire.

38) A) Explain the determination of the internal resistance of a cell using voltmeter. **(OR)**
B) (i) Write Faraday's law of electromagnetic induction.
(ii) A straight metal wire crosses a magnetic field of flux 4 m Wb in a time 0.4 s. Find the magnitude of the emf induced in the wire.