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COMMON QUARTERLY EXAMINATION - 2024

Standard XII

Reg.No. | | | | | | |

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PHYSICS

Time : 3.00 hrs *Marks : 70*

Part - I

I. Choose the correct answer: **15 x 1 = 15**

1. A parallel plate capacitor stores a charger '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

2. The dielectric strength of air is

   a) $3 \times 10^6\ Vm^{-1}$ b) $3 \times 10^6\ V\ cm^{-1}$ c) 3×10^8 ms d) $3 \times 10^8\ ms^{-1}$

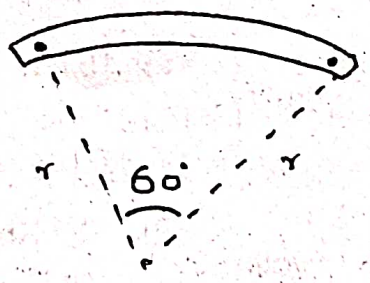
3. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is

   a) 0.2 Ω b) 0.5 Ω c) 0.8 Ω d) 1.0 Ω

4. Two wires of A and B with circular cross-section are made up of the same material with equal lengths. Suppose $R_A = 3R_B$, then what is the ratio of radius of wire A to that of B?

   a) 3 b) $\sqrt{3}$ c) $\frac{1}{\sqrt{3}}$ d) $\frac{1}{3}$

5. A bar magnet of length '*l*' and magnetic moment P_m is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be



   a) Pm b) $\frac{3}{\pi}$Pm c) $\frac{2}{\pi}$Pm d) $\frac{1}{2}$Pm

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6. The vertical component of earth's 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°
7. $\frac{20}{\pi^2}$H inductor is connected to a capacitor of capacitance c. The value of c in order to impart maximum power at 50 Hz is,
   a) 50 μF b) 0.5 μF c) 500 μF d) 5 μF
8. A step down transformer reduces the supply voltage from 220 V to 11 V and increases the current from 6 A to 100 A. Then its efficiency is
   a) 1.2 b) 0.83 c) 0.12 d) 0.9
9. Which of the following is an electro-magnetic wave?
   a) α-rays b) β-rays c) γ-rays d) all of them
10. The electric and magnetic fields of an electro-magnetic wave are
    a) in phase and perpendicular to each other
    b) out of phase and not perpendicular to each other
    c) in phase and not perpendicular to each other
    d) out of phase and perpendicular to each other
11. For light incident from air on a slab of refractive index 2, the maximum possible angle of refraction is
    a) 30° b) 45° c) 60° d) 90°
12. The radius of curvature of curved surface at a thin plano convex lens is 10 cm and the refractive index is 1.5. If the plane surface is silvered, then the focal length will be
    a) 5 cm b) 10 cm c) 15 cm d) 20 cm
13. The frequency range of visible light is from
    a) 4×10^{14} KHz to 8×10^{14} KHz b) 4×10^{14} Hz to 8×10^{14} Hz
    c) 10^{11} Hz to 4×10^{14} Hz d) 10^{11} KHz to 4×10^{14} KHz
14. In order to increase the range of voltmeter 'n' times. The value of resistance to be connected in series with the galvanometer is
    a) $R_h = (1 - n) R_g$ b) $R_g = (n - 1) R_h$
    c) $R_h = (n - 1) R_g$ d) $R_h = (1 + n) R_g$

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15. The refractive index of water is

a) 1.333 b) 3.133 c) 3.313 d) 1.123

Part - II

II. Answer any 6 questions. (Q.No.19 is compulsory) **6 x 2 = 12**

16. Define electric field. Give its unit.
17. The electric field lines never intersect. Why?
18. What is Peltier effect?
19. A potential difference across 24 Ω resistor is 12 V. What is the current through the resistor?
20. How the current sensitivity of a galvanometer can be increased?
21. State Lenz's law.
22. Why capacitor blocks DC?
23. What is displacement current?
24. Why does sky appear blue?

Part - III

III. Answer any 6 questions. (Q.No.30 is compulsory) **6 x 3 = 18**

25. Obtain an expression for electric potential at a point due to a point charge.
26. Obtain the macroscopic form of Ohm's law from its microscopic form.
27. Explain the principle of a potentiometer.
28. How a galvanometer converted into a voltmeter?
29. How will you induce an emf by changing the area enclosed by the coil?
30. Find the impedence of a series RLC circuit of the inductive reactance, capacitive reactance and resistance are 184 Ω, 144 Ω and 30 Ω respectively.
31. Write down the properties of electromagnetic waves.
32. Give the uses of

ii) IR radiation

ii) UV radiation

33. Derive the relation between 'f' and 'R' for a spherical mirror.

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Part - IV

IV. Answer all the questions. 5 x 5 = 25

34. a) Explain in detail the construction and working of Van-de-Graff generator.

(OR)

b) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.

35. a) Write down Maxwell equations in integral form.

(OR)

b) Obtain the condition for bridge balance in Wheatstone's bridge.

36. a) Describe the principle, construction and working of cyclotron.

(OR)

b) Describe the Fizeau's method to determine the speed of light.

37. a) Explain the working of a single-phase AC-generator with necessary diagram.

(OR)

b) Explain the determination of unknown resistance using metre bridge.

38. a) What is emission spectra? Explain their types.

(OR)

b) Calculate the electric field due to a dipole on its equatorial line.

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