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COMMON QUARTERLY EXAMINATION - 2023

Std - XII

D. karthic PG ASSISTANT

Time : 3.00 Hours

PHYSICS

Marks: 70

Part - I

15 x 1 = 15

Answer all the questions:

Choose the correct answer:

- If voltage applied on a capacitor is increased from V to $2V$. choose the correct conclusion
 - Q remains the same, C is doubled
 - Q is doubled, C doubled
 - C remains same, Q doubled
 - Both Q and C remain same
- Two identical conducting balls having positive charges q_1 and q_2 are separated by a center to center distance r . If they are made to touch each other and then separated to the same distance, the force between them will be
 - less than before
 - same as before
 - more than before
 - zero
- In a large building there are 15 bulbs of 40 W, 5 bulbs of 100W, 5 fans of 80W and 1 heater of 1KW are connected. The voltage of electric mains is 220V. The maximum capacity of the main building will be
 - 14A
 - 8A
 - 10A
 - 12A
- The temperature coefficient of resistance of wire is 0.00125 per $^{\circ}\text{C}$. At 20°C , its resistance is 1Ω . the resistance of the wire will be 2Ω at
 - 800°C
 - 700°C
 - 50°C
 - 820°C
- A thin insulated wire forms a plane spiral of $N=100$ tight turns carrying current $I=8\text{mA}$. The radii of inside and outside turns are $a = 50$ mm and $b = 100$ mm respectively. The magnetic induction at the Centre of the spiral is
 - $5\mu\text{T}$
 - $7\mu\text{T}$
 - $8\mu\text{T}$
 - $10\mu\text{T}$
- 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?
 - 30°
 - 45°
 - 60°
 - 90°
- When the current changes from $+2\text{A}$ to -2A in 0.05s , an emf of 8V is induced in a coil. The coefficient of self-induction of the coil is
 - 0.2H
 - 0.4H
 - 0.8H
 - 0.1H
- In a series resonant RLC circuit, the voltage across 100Ω resistor is 40 V. The resonant frequency ω is 250rad/s . If the value of C is $4\mu\text{F}$, then the voltage across L is
 - 600V
 - 4000V
 - 400V
 - 1V
- Which of the following electromagnetic radiations is used for viewing objects through fog?
 - Microwave
 - Gamma rays
 - C-rays
 - Infrared
- Which of the following is false for electromagnetic waves?
 - Transverse
 - Non-mechanical waves
 - Longitudinal
 - Produced by accelerating charges
- For light incident from air on a scale of refractive index 2, the maximum possible angle of refractions is
 - 30°
 - 45°
 - 60°
 - 90°
- Which of the following is a polar molecule?
 - HCl
 - H_2
 - O_2
 - CO_2

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XII-PHY

13. A semiconductor with a negative temperature of coefficient of resistivity is called
 a) Thermistor b) conductors c) insulator d) none of these
14. The value of gyro-magnetic ratio is
 a) $8.78 \times 10^{10} \text{ c kg}^{-1}$ b) $7.87 \times 10^{10} \text{ c kg}^{-1}$ c) $8.87 \times 10^{10} \text{ c kg}^{-1}$
 d) $9.87 \times 10^{10} \text{ c kg}^{-1}$
15. The magnetic field at the center the current carrying loop is B, if the radius of the loop is doubled, keeping the current of the loop would be
 a) B b) B/2 c) B/4 d) 2B

Part - II

6 x 2 = 12

Answer any six Questions. Question No. 24 is compulsory.

16. State Coulomb's law in electrostatics.
 17. Define capacitance. Give its unit.
 18. State macroscopic form of Ohm's law.
 19. What is Peltier effect?
 20. Define magnetic flux. Give its unit.
 21. State Lenz's law.
 22. What are Fraunhofer lines? Give its uses.
 23. Mention the ways of producing induced emf.
 24. The relative magnetic permeability of the medium is 2.5 the relative electrical permittivity of the medium is 2.25. Compute the refractive index of the medium.

Part - III

6 x 3 = 18

Answer any six questions. Question No. 33 is compulsory.

25. Discuss the conversion of galvanometer into an ammeter.
 26. How will you induce an emf by changing the area enclosed by the coil?
 27. Write down any six properties of electromagnetic waves.
 28. Derive the relation between f and R for a spherical mirror.
 29. Find the heat energy produced in a resistance of 10Ω when 5A current flows through it for 5 minutes.
 30. Derive an expression for the torque experienced by a dipole due to uniform electric field.
 31. Write a note on energy losses in transformer.
 32. What are the conditions for total internal reflection and derive an expression for critical angle?
 33. The equation for an alternating current is given by $i = 77 \sin 314t$. Find the peak current, frequency and time period.

Part - IV

5 x 5 = 25

Answer all the questions.

34. Obtain the conditions for balancing the bridge in Wheatstone's bridge. (OR)
 Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.
 35. Derive an expression for electrostatic potential due to and electric dipole. (OR)
 Derive the expression for force on a current carrying conductor in a magnetic field.
 36. State Gauss law and obtain the expression for electric field due to an infinitely long charged wire. (OR)
 Explain the determination of internal resistance of cell using voltmeter.
 37. Explain the principle, construction and working of a transformer. (OR)
 Write down the Maxwell equation in integral form.
 38. Derive the expression for mirror equation. (OR)
 Obtain lens maker's formula and mention its significance.