

Standard 12

PHYSICS

PART - I

Marks: 70
15x1=15

Time: 3.00 Hours

- Note:** i) Answer all the questions.
ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.
- 1) Two identical conducting balls having positive charges q_1 and q_2 are separated by a centre to centre distance 'r'. If they are made to touch each other and then separated to the same distance, the between them will be
 - a) less than before
 - b) same as before
 - c) more than before
 - d) zero
 - 2) 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
 - 3) In Joule's heating law, When 'R' and 'I' are constants, If the Heat Produced (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
 - 4) A metallic wire of length 'l' has resistance of $10\ \Omega$. The wire is bent in the form of a semicircle of radius 1m. The resistance between the two ends of the semi-circular wire is
 - a) $10\pi\ \Omega$
 - b) $10\ \Omega$
 - c) $\frac{10}{\pi}\ \Omega$
 - d) $\frac{\pi}{10}\ \Omega$
 - 5) The temperature co-efficient of resistance of a wire is $0.00125\ \text{per}^\circ\text{C}$. At 20°C , its resistance is $1\ \Omega$. The resistance of the wire will be $2\ \Omega$ at.
 - a) 800°C
 - b) 700°C
 - c) 850°C
 - d) 820°C
 - 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) A Circular coil having 'N' turns and radius 'R' carries a current 'Q'. At what distance from the centre of the coil along its axis, the magnetic field is $\frac{1}{27}$ of its value at the centre?
 - a) $x=8R$
 - b) $x=\sqrt{2}R$
 - c) $x=\sqrt{3}R$
 - d) $x=\sqrt{8}R$
 - 8) In an Oscillating LC circuit, the maximum charge on the capacitor is 'Q'. The Charge on the capacitor when the energy is stored equally between the electric field and magnetic field is
 - a) $\frac{Q}{2}$
 - b) $\frac{Q}{\sqrt{3}}$
 - c) $\frac{Q}{\sqrt{2}}$
 - d) Q
 - 9) A step-down transformer reduces the supply voltage from 220 V to 11 V and increases the current from 64 to 100A. Then its efficiency is
 - a) 1.2
 - b) 0.83
 - c) 0.12
 - d) 0.9
 - 10) The unit $\frac{\text{joule}}{\text{ampere}^2}$ (JA^{-2}) is equivalent to the unit
 - a) henry
 - b) ohm
 - c) farad
 - d) ampere
 - 11) Which of the following is false for electro magnetic waves?
 - a) transverse
 - b) Non-mechanical waves
 - c) longitudinal
 - d) produced by accelerating charges
 - 12) An e.m. is propagating in a medium with a velocity $\vec{v} = v\hat{k}$. The instantaneous oscillating electric field of this e.m. wave is along +y axis, then the direction of oscillating magnetic field of the e.m. wave will be along
 - a) -y direction
 - b) -x direction
 - c) +z direction
 - d) -z direction
 - 13) Which of the following is an electromagnetic wave?
 - a) α -rays
 - b) β -rays
 - c) positive rays
 - d) γ -rays

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- 14) 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 w.r.t medium
- 15) Stars twinkle due to
 a) reflection
 b) total internal reflection
 c) refraction
 d) Polarisation

PART - II**6x2=12**

Note: i) Answer any six questions.
 ii) Question Number 24 is compulsory.

- 16) Define : Electric flux and give its unit.
 17) What are the properties of an equipotential surface
 18) Mention any two applications of seebeck effect.
 19) Define: Ampere
 20) The self-inductance of an air-core solenoid is 4.8 mH. If its core is replaced by Iron core, then its self - inductance becomes 1.8 H. Find out the relative permeability of Iron.
 21) When does power factor of a series RLC circuit become maximum?
 22) Define : Displacement current
 23) State Snell's law of refraction
 24) A copper wire of cross - sectional area 0.5 mm^2 carries a current of 0.2A. If the free electron density of copper is $8.4 \times 10^{28} \text{ m}^{-3}$ then compute the drift velocity of free electrons.

PART - III**6x3=18**

Note: i) Answer any six questions.
 ii) Question Number 33 is compulsory.

- 25) Obtain the expression for energy stored in the parallel plate capacitor.
 26) How will you determine the internal resistance of a cell using Voltmeter.
 27) a) State (Macroscopic form of) Ohm's Law.
 b) State Kirchoff's current Law and Voltage law.
 28) List out the properties of dia and para magnetic materials.
 29) Calculate the magnetic field at the centre of a square loop which carries a current of 1.5A, length of each side being 50cm.
 30) Mention any six properties of electromagnetic waves.
 31) Explain the various Energy losses in a Transformer.
 32) Obtain the relation between the focal length and radius of curvature of a spherical mirror.
 33) Consider a point charge +q placed at the origin and another point charge - 2q placed at a distance of qm from the charge +q. Determine the point between the two charges at which the electric potential is zero.

PART - IV**5x5=25**

Note: Answer all the questions

- 34) a) Derive an expression for electrostatic potential at a point due to an electric dipole. **(OR)**
 b) Describe Maxwell's equations in integral form.
 35) a) Derive the mirror equation. **(OR)**
 b) i) Compute the speed of the electromagnetic waves in a medium if the amplitude of electric and magnetic fields are $3 \times 10^4 \text{ NC}^{-1}$ and $2 \times 10^{-4} \text{ T}$.
 ii) Explain the types of Emission spectrum
 36) a) Explain in detail the principle, construction and working of a Van de Graff generator. **(OR)**
 b) i) What are the methods of production of induced emf in a circuit.
 ii) Explain how will an emf be induced by changing the area enclosed by the coil.
 37) a) Explain the working of a single phase AC generator with necessary diagram. **(OR)**
 b) Obtain the condition for bridge balance in wheatstone's Network.
 38) a) How the emf of two cells are compared using potentio meter. **(OR)**
 b) Obtain the expression for magnetic field at a point on the axial line of a bar magnet.

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