



## Standard 12

### PHYSICS

Time: 3.00 Hrs.

Marks: 70

#### Part - I

Note: i) Answer all the questions.

15×1=15

ii) Choose the most appropriate answer from the given four options and write the option code and the corresponding answer.

- 1) Two points 'A' and 'B' are maintained at a potential of 7V and -4V respectively. The work done in moving 50 electrons from A to B is
  - a)  $8.80 \times 10^{-17}$  J
  - b)  $-8.80 \times 10^{-17}$  J
  - c)  $4.40 \times 10^{-17}$  J
  - d)  $5.8 \times 10^{-17}$  J
- 2) If voltage applied on a capacitor is increased from V to 2V, choose the correct conclusion.
  - a) 'Q' remains same, 'C' is doubled
  - b) 'Q' is doubled, 'C' is doubled
  - c) 'C' remains same, 'Q' is doubled
  - d) Both 'Q' and 'C' remain same
- 3) A charge "q" is placed in the space between two infinitely plane sheets of charge of surface charge densities  $+\sigma$  and  $+\sigma$ . The electric force acting on the charged particle is
  - a)  $\frac{\sigma}{\epsilon_0} q$
  - b)  $\frac{\sigma}{\epsilon_r \epsilon_0} q$
  - c)  $\frac{\sigma}{\epsilon_0 q}$
  - d) zero
- 4) The temperature co-efficient of resistance of a wire is 0.00125 per°C. At 20°C, its resistance is 1Ω. The resistance of the wire will be 2Ω at
  - a) 800°C
  - b) 700°C
  - c) 850°C
  - d) 820°C
- 5) In Joule's heating law, when 'R' and 't' are constants, if 'H' is taken along y axis and  $I^2$  is taken along x-axis, the graph is
  - a) straight line
  - b) parabola
  - c) circle
  - d) ellipse
- 6) In a wheatstone's network, P = 3Ω, Q = 12Ω, R = 12Ω and S = 24Ω. In order to balance the bridge, the resistance to be connected with "Q" is
  - a) 12Ω in series
  - b) 12Ω in parallel
  - c) 4Ω in series
  - d) 24Ω in parallel
- 7) A circular coil of radius 5 cm and 50 turns carries a current of 3A. The magnetic dipole moment of the coil is nearly
  - a) 1 Am<sup>2</sup>
  - b) 1.2 Am<sup>2</sup>
  - c) 0.5 Am<sup>2</sup>
  - d) 0.8 Am<sup>2</sup>
- 8) A 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 places?
  - a) 30°
  - b) 45°
  - c) 60°
  - d) 90°
- 9) Which magnetic material is repelled when placed in a non-uniform magnetic field?
  - a) dia magnetic material
  - b) para magnetic material
  - c) ferro magnetic material
  - d) all
- 10) The average value of AC measured over one complete cycle is
  - a) 0.637 Im
  - b) 0.707 Im
  - c) 1.414 Im
  - d) zero
- 11) 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 and magnetic fields is
  - a)  $\frac{Q}{2}$
  - b)  $\frac{Q}{\sqrt{3}}$
  - c)  $\frac{Q}{\sqrt{2}}$
  - d) Q
- 12) Which of the following is false for electro magnetic waves?
  - a) transverse
  - b) Non-mechanical waves
  - c) longitudinal
  - d) produced by accelerating charges
- 13) To which part of the electro-magnetic spectrum, an electromagnetic wave of frequency 2450 MHz (Mega Hertz) belongs to
  - a) Radio waves
  - b) Micro waves
  - c) X-rays
  - d) UV rays
- 14) Stars twinkle due to
  - a) reflection
  - b) total internal reflection
  - c) refraction
  - d) polarisation

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- 15) The speed of light in an isotropic medium depends on
- its intensity
  - its wavelength
  - the nature of propagation
  - the motion of the source w.r.t. medium

**Part - II****Note: 1. Answer any six questions.****2. Question No. 24 is compulsory.****6×2=12**

- What are the properties of an equipotential surface?
- A point charge +q placed at the origin and another point charge -2q is placed at a distance of 9m from the charge +q. Determine the point between the two charges at which electric potential is zero.
- What is Peltier effect?
- Define: Electrical resistivity
- Define: Ampere
- State Lenz's law.
- Define: Displacement current
- Compute the speed of the electromagnetic wave in a medium if the amplitude of electric and magnetic fields are  $3 \times 10^4 \text{ Nc}^{-1}$  and  $2 \times 10^{-4} \text{ T}$ , respectively.
- The angle of minimum deviation for a prism is  $37^\circ$ . If the angle of prism is  $60^\circ$ . Find the refractive index of the material of the prism.

**Part - III****Note: 1. Answer any six questions.****2. Question No. 33 is compulsory.****6×3=18**

- Obtain the expression for energy stored in the parallel plate capacitor.
- The resistance of the wire is  $20\Omega$ . What will be the new resistance, if it is stretched uniformly 8 times its original length?
- Derive the expression for effective resistance when resistors are connected in series.
- Compute the intensity of magnetisation of the bar magnet whose mass, magnetic moment and density are 200g,  $2\text{Am}^2$  and  $8\text{g/cm}^3$  respectively.
- Describe the various energy losses in a Transformer.
- List out any six properties of electro magnetic waves.
- Write a note on "Microwaves".
- What is critical angle? Mention the conditions for total internal reflection of light?
- The magnetic flux passing perpendicular to the plane of the coil and directed into the paper varies with respect to time as per the following relation.

$$\Phi_E = (2t^3 + 3t^2 + 8t + 5) \text{ mWb}$$

What is the magnitude of the induced emf in the coil when  $t = 3\text{s}$ ?**Part - IV****Answer all the questions:****5×5=25**

- Explain in detail, the principle, construction and working of a Van de Graff Generator. **(OR)**
  - Derive the expression for the force on a current carrying conductor in a magnetic field.
- Give the properties of dia, para and ferro magnetic materials. **(OR)**
  - Show mathematically that the rotation of a coil in a magnetic field in a magnetic field over one rotation induces an alternating emf of one cycle.
- Describe the microscopic model of current and obtain microscopic form of ohm's law. **(OR)**
  - Describe the Fizeau's method to determine the speed of light.
- Obtain the expression for electric field due to a charged infinite plane sheet. **(OR)**
  - Explain the types of emission spectrum.
- Find out the phase relationship between voltage and current in a pure capacitive circuit. **(OR)**
  - Explain the determination of the internal resistance of a cell using Voltmeter (or) using Potentiometer.