

Vnr12P

Virudhunagar District  
Common Quarterly Examination - 2024

## 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  
 a) its intensity  
 b) its wavelength  
 c) the nature of propagation  
 d) the motion of the source w.r.t. medium

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

- 16) What are the properties of an equipotential surface?  
 17) 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.  
 18) What is Peltier effect?  
 19) Define: Electrical resistivity  
 20) Define: Ampere  
 21) State Lenz's law.  
 22) Define: Displacement current  
 23) 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.  
 24) 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.****6×3=18****2. Question No. 33 is compulsory.**

- 25) Obtain the expression for energy stored in the parallel plate capacitor.  
 26) The resistance of the wire is  $20\Omega$ . What will be the new resistance, if it is stretched uniformly 8 times its original length?  
 27) Derive the expression for effective resistance when resistors are connected in series.  
 28) 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.  
 29) Describe the various energy losses in a Transformer.  
 30) List out any six properties of electro magnetic waves.  
 31) Write a note on "Microwaves".  
 32) What is critical angle? Mention the conditions for total internal reflection of light?  
 33) 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**

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