

VNR12P

Virudhunagar District
Common Half Yearly Examination - December 2024

Standard 12

PHYSICS

Time: 3.00 Hrs.

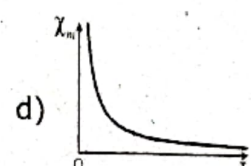
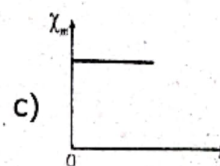
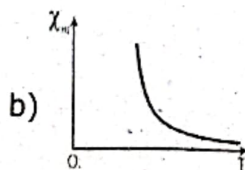
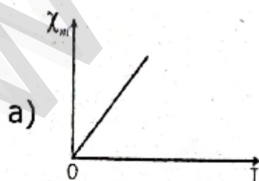
Marks: 70

Part - I

Choose the correct answer:

15×1=15

- 1) Two points A and B are maintained at a potential of 7V and -4V respectively. The workdone in moving 50 electrons from A to B is
a) 8.80×10^{-17} J b) -8.80×10^{-17} J c) 4.40×10^{-17} J d) 5.80×10^{-17} J
- 2) The gravitational waves were theoretically proposed by
a) Conrad Roentgen b) Marie Curie c) Albert Einstein d) Edward Purcell
- 3) If the input to the NOT gate is A = 1011, its output is
a) 1000 b) 1100 c) 0011 d) 0100
- 4) The internal resistance of 2.1 V cell which gives a current of 0.2 A through a resistance of 10Ω is
a) 0.2Ω b) 0.5Ω c) 0.8Ω d) 1.0Ω
- 5) 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) 1.0 Am^2 b) 1.2 Am^2 c) 0.5 Am^2 d) 0.8 Am^2
- 6) In a hydrogen atom, the electron revolving in the second orbit has angular momentum equal to
a) h b) $\frac{h}{\pi}$ c) $\frac{4h}{\pi}$ d) $\frac{2h}{\pi}$
- 7) $\frac{20}{\pi^2}$ Henry inductor is connected to a capacitor of capacitance 'C'. The value of 'C' in order to impart maximum power at 50 Hz is
a) $0.5 \mu\text{F}$ b) $50 \mu\text{F}$ c) $500 \mu\text{F}$ d) $5 \mu\text{F}$
- 8) The threshold wave length for a metal surface whose photo electric work function is 3.313 eV is
a) 4125 \AA b) 3750 \AA c) 6000 \AA d) 2062 \AA
- 9) The part of an electromagnetic wave spectrum whose frequency range is 10^{17} Hz to 10^{19} Hz known as
a) microwave b) radiowave c) x-ray d) I.R. Ray
- 10) The power of a biconvex lens of radius of curvature of each face 20 cm made of material of refractive index 1.5 is
a) +20 D b) +5D c) -5D d) +2D
- 11) The transverse nature of light is shown in
a) interference b) diffraction c) scattering d) polarisation
- 12) A metal sphere of radius 20 cm is given a charge of $16 \mu\text{C}$. The electric field on the surface of sphere is
a) $1.8 \times 10^6 \text{ NC}^{-1}$ b) zero c) $3.6 \times 10^6 \text{ NC}^{-1}$ d) $0.9 \times 10^6 \text{ NC}^{-1}$
- 13) Which of the following graph shows the variation of susceptibility of ferromagnetic material with temperature?



- 14) The charge of cathode rays particle is
a) positive b) negative c) neutral d) not defined
- 15) Stars twinkle due to
a) reflection b) total internal reflection c) polarisation d) refraction

Part - II

Answer any six of the following questions.

Answer the question no. 24 compulsorily:

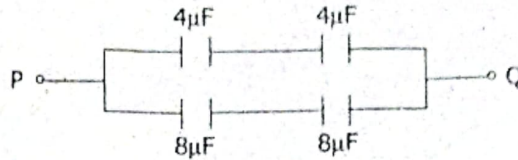
6×2=12

- 16) Define resistivity

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- 17) State Ampere's circuital law.
- 18) Define Q-factor.
- 19) Calculate the effective capacitance between P and Q of the circuit.
- 20) What are Fraunhofer lines?
- 21) State Brewster's law in polarisation.
- 22) How many photons of frequency 10^{14} Hz will make up 19.86 J of energy.
- 23) What are isotopes? Give example.
- 24) In Young's double slit experiment distance between the double slits is 0.15 mm. Light of wavelength 450 nm is passed through the slits. Find the fringe width of an interference spectrum formed on the screen kept at 2 m from the slits.

**Part - III**

Answer any six of the following questions.

6×3=18

Answer the question no. 33 compulsorily:

- 25) What are the differences between Coulomb force and gravitational force?
- 26) Derive an equation for equivalent resistance of series resistor circuit.
- 27) Write down the properties of electromagnetic waves.
- 28) The radius of the 5th orbit of hydrogen atom is 13.25 \AA . Calculate the deBroglie wavelength of the electron orbiting in the 5th orbit.
- 29) State and prove DeMorgan's first theorem.
- 30) Derive the relation between f and R for a spherical mirror.
- 31) Monochromatic light is incident on a grating consists of 4000 lines per cm width. If the second order diffraction maximum occurs at an angle 30° , calculate the wavelength of light used.
- 32) What is a photo cell? Mention its applications.
- 33) A short bar magnet has a magnetic moment of 0.5 JT^{-1} . Calculate the magnitude of magnetic field produced by the bar magnet at a distance 0.1 m from the centre of the magnet along the axial line.

Part - IV

Answer all the questions in details:

5×5=25

- 34) a) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.
(OR)
b) Draw the circuit diagram of a half wave rectifier and explain its working.
- 35) a) Write down Maxwell equations in integral form.
(OR)
b) Using Bohr's atom model, derive an expression for radius of n th orbit of electron and velocity of electron in hydrogen atom.
- 36) a) Discuss the working of Cyclotron in detail.
(OR)
b) Describe the Davisson-Germer experiment to explain the wavenature of electron.
- 37) a) Explain how the emf of two cells are compared using potentiometer.
(OR)
b) Obtain the equation for bandwidth in Young's double slit experiment.
- 38) a) Derive an expression for electrostatic potential due to an electric dipole.
(OR)
b) Derive the mirror equation.