Tsi12P

Tenkasi District

Common Half Yearly Examination - December 2024

23-12-24

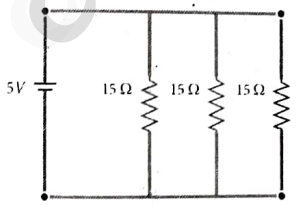
Standard 12

Time Allowed: 3.00 Hours PHYSICS Maximum Marks: 70

PART - A

Note: Answer all the questions. **15×1=15**

1) The gravitational waves were theoretically proposed by
   a) Edward Purcell b) Marie Curie
   c) Albert Einstein d) Conrad Rontgen
2) The frequency range of 3 MHz to 30 MHz is used for _____.
   a) Sky wave propagation b) Satellite communication
   c) Space wave propagation d) Ground wave propagation
3) The nucleus is approximately spherical in shape. Then the volume of nucleus having mass number A varies as
   a) $A^{4/3}$ b) A c) $A^{1/3}$ d) $A^{5/3}$
4) The threshold wavelength for a metal surface whose photoelectric work function is 3.313 eV is
   a) 4125 A° b) 2062.5 A° c) 6000 A° d) 3750 A°
5) A ray of light strikes a glass plate at an angle 60°. If the reflected and refracted rays are perpendicular to each other, the refractive index of the glass is
   a) $\sqrt{3}$ b) $\frac{3}{2}$ c) $\sqrt{\frac{3}{2}}$ d) 2
6) An object is placed in front of a convex mirror of focal length of f and the maximum and minimum distance of an object from mirror such that the image formed is real and magnified.
   a) c and ∞ b) f and o c) 2f and c d) None of these
7) An electric dipole is placed at an alignment angle of 30° with an electric field of 2×10^5 Nc^{-1}. It experiences a torque equal to 8 Nm. The charge on the dipole if the dipole length is 1 cm is
   a) 5 mc b) 7 mc c) 8 mc d) 4 mc
8) What is the current drawn out from the battery?



   a) 1A b) 3A c) 4A d) 2A
9) The potential energy of magnetic dipole. Whose dipole moment is $\vec{Pm} = (-0.5\hat{i} + 0.4\hat{j})Am^2$. Kept in uniform magnetic field $\vec{B} = 0.2\hat{i}T$.
   a) 0.1 J b) −0.1 J c) 0.8 J d) −0.8 J
10) In a transformer, the number of turns in the primary and the secondary are 300 and 1800 respectively. If the current in primary is 6A, then that in the secondary coil is
   a) 18A b) 1A c) 12A d) 2A
11) If the amplitude of the magnetic field is 3×10^{-6} T, then amplitude of the electric field for the electromagnetic waves is
   a) 100 Vm^{-1} b) 600 Vm^{-1} c) 900 Vm^{-1} d) 300 Vm^{-1}
12) In hydrogen atom, the energy of the electron revolving in the first orbit is −13.6 eV, then the energy of the electron revolving in the third orbit is _____.
   a) −3.4 eV b) −1.51 eV c) 10.2 eV d) −40.8 eV
13) Calculate the distance upto which ray optics is a good approximation for light of wave length 500 nm falls on an aperture of width 0.5 mm.
   a) 25 cm b) 35 cm c) 15 cm d) 10 cm

14) When the current changes from +2A to −2A in 0.05 sec, an emf of 8V is induced in a coil. The co-efficient of self-induction of the coil is
a) 0.2H b) 0.4H c) 0.8H d) 0.1H

15) The principle based on which a solar cell operates is
a) Diffusion b) Recombination c) Photovoltaic action d) Carrier flow

PART - II

Note: Answer any 6 questions. (Q.No. 24 is compulsory) **6×2=12**

16) Define temperature coefficient of resistance.
17) State Ampere's circuit law.
18) Define Q-factor.
19) Give two uses of uv radiation.
20) State Huygen's principle.
21) What are the conditions of Total Internal Reflection?
22) Calculate the cut-off wavelength and cut-off frequency of X-rays from an X-ray tube of accelerating potential 20,000V.
23) Calculate the number of nuclei of Carbon-14 undecayed after 22,920 years if the initial number of carbon-14 atoms is 10,000. The half-life of carbon-14 is 5730 years.
24) A sample of HCl gas is placed in a uniform electric field of magnitude 3×10^4 Nc^{-1}. The dipole moment of each HCl molecule is 3.4×10^{-30} cm. Calculate the maximum torque experienced by each HCl molecule.

PART - III

Note: Answer any 6 questions. (Q.No. 33 is compulsory) **6×3=18**

25) i) State Brewster's law.
ii) Calculate the refractive index of material whose Polarising angle is 60°.
26) Discuss the conversion of galvanometer into ammeter.
27) State and prove De-Morgan's first and second theorems.
28) List out of the laws of Photoelectric effect.
29) The equation for an alternating current is given by i = 77 sin 314t. Find the Peak value, Frequency, Time period.
30) Obtain the relation between current and drift velocity.
31) Derive the expression for resultant capacitance, when capacitors are connected in series.
32) Write the properties of neutron.
33) i) The angle of minimum deviation for an equilateral prism is 40°. Find the refractive index of the material of the prism.
ii) Why does sky appear blue?

PART - IV

Note: Answer all questions. **5×5=25**

34) a) Obtain Lens Maker's formula and mention its significance.
(OR)
b) Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle.

35) a) Discuss the working of cyclotron is details.
(OR)
b) Explain the construction and working of a full wave rectifier.

36) a) Explain the J.J. Thomson experiment to determine the specifif charge (e/m) of electron.
(OR)
b) What is spectra? Explain the types of Emission spectrum.

37) a) Obtain the equation for band width in youngs's Double slit experiment.
(OR)
b) i) Explain the determination of the internal resistance of a cell using Voltmeter.
ii) If the resistance of the coil is 3Ω at 20°C and a = 0.004/°C then determine its resistance at 100°C.

38) a) Define Gauss's Law. Obtain the expression for electric field due to an infinitely long charged wire.
(OR)
b) Describe briefly Davission - Germer experiment which demostrated the wave nature of electron.
