H

Thoothukudi District

COMMON HALF YEARLY EXAMINATION – 2022
Standard XII   Reg.No. :

PHYSICS

Time: 3.00 hrs.   Part - I   Marks: 70

I. **Choose the correct answer:**   15 x 1 = 15

1. The wavelength λ_e of an electron and λ_p of a photon of same energy E are related by

   a) $\lambda_p \propto \lambda_e$
   b) $\lambda_p \propto \sqrt{\lambda_e}$
   c) $\lambda_p \propto \dfrac{1}{\sqrt{\lambda_e}}$
   d) $\lambda_p \propto \lambda^2{}_e$

2. The ratio between the velocities of first three orbits & hydrogen atom is

   a) 1:2:3
   b) 2:4:6
   c) 1:4:9
   d) $1 : \dfrac{1}{2} : \dfrac{1}{3}$

3. Which one of them is used to produce a propagating electromagnetic wave?
   a) an accelerating charge
   b) a charge moving with constant velocity (c)
   c) a stationary charge
   d) an uncharged particle

4. The zener diode is primarily used as
   a) rectifier
   b) amplifier
   c) oscillator
   d) voltage regulator

5. The flux linked with a coil at any instant t is given by $\phi_B = 10t^2 - 50t + 250$. The induced emf at t = 3 s is
   a) −190 V
   b) −10 V
   c) 10 V
   d) 190 V

6. Rank the electrostatic potential energies for the given system of charges in increasing order
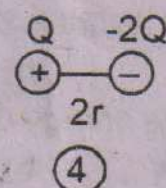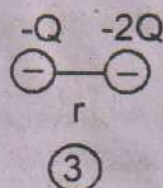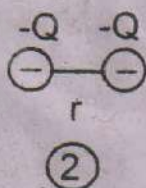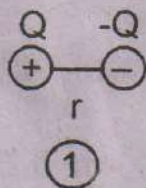
   a) 1 = 4 < 2 < 3
   b) 2 = 4 < 3 < 1
   c) 2 = 3 < 1 < 4
   d) 3 < 1 < 2 < 4

7. In the graph potential (V) is plotted as a function of distance (X) from the centre. In which part of the region the magnitude & X-components & electric field becomes zero?
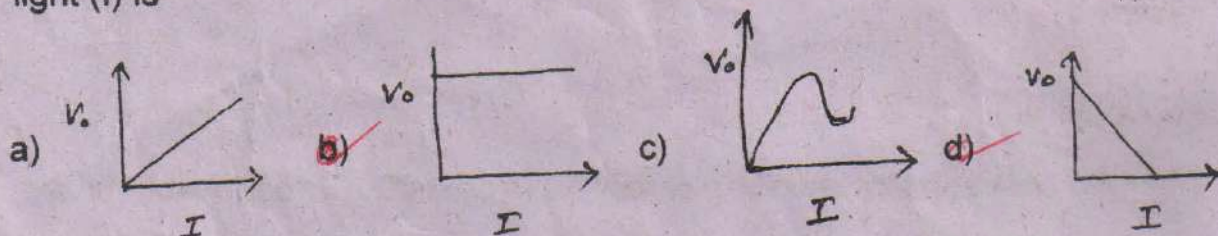
   a) 1
   b) 2
   c) 3
   d) 4
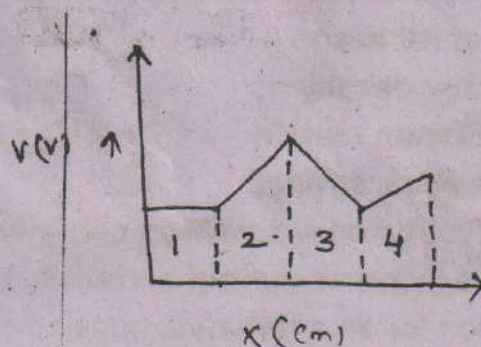
8. A carbon resistor of (74 ± 7.4) KΩ to be marked with rings of different colours for its identification. The colour code sequence will be

   a) yellow - green - violet - gold
   b) yellow - violet - orange - silver
   c) violet - yellow - orange - silver
   d) green - orange - violet - gold

9. The correct curve between the stopping potential (V_o) and intensity of incident light (I) is

10. The alloys used for muscle wires in Robots are

    a) shape memory alloys
    b) gold copper alloys
    c) gold silver alloys
    d) two dimensional alloys

11. A glass has refractive index $\frac{3}{2}$. What is the speed of lights through it?

    a) 2.26×10^8 m/s
    b) 2×10^8 m/s
    c) 1.5×10^8 m/s
    d) 3×10^8 m/s

12. A piece of copper and germanium are heated from 80K to 300K. The resistance of

    a) each of them increases
    b) each of them decreases
    c) copper increases and germanium decreases
    d) copper decreases and germanium increases

13. Light transmitted by Nicol prism is

    a) partially polarised
    b) unpolarised
    c) plane polarised
    d) elliptically polarised

14. The vertical component of Earth's magnetic field at a place is equal to horizontal component. What is the value of angle of dip at this place?

    a) 30°
    b) 45°
    c) 60°
    d) 90°

15. The average energy of thermal neutron is

    a) 0.025 eV
    b) 0.5 MeV
    c) 1000 eV
    d) 0.25 eV

Part - II

II. **Answer any 6 questions. (Q.No.24 is compulsory)** 6 x 2 = 12

16. Define work function of a metal. Give its unit.
17. Obtain the relation between phase difference and path difference.
18. State Law of refraction.
19. Define current density.
20. Prove the Boolen Identity i) $ABC + AC = AC$ ii) $A(\overline{A} + B) = AB$
21. What is dielectric strength?
22. Why are electromagnetic waves non-mechanical?
23. How can we increase current sensitivity of a galvanometer?
24. The equation for an alternating current is given by $i = 77 \sin 314 t$. Find the peak current, frequency of current.

Part - III

III. Answer any 6 questions. (Q.No.33 is compulsory)   6 x 3 = 18

25. What is frequency range of UV light. Write uses of UV light.
26. Define Inductive and capacitive reactance. Give their units.
27. State and prove De-Morgan's first and second theorem.
28. Resistance of a material at 20°C and 40°C are 45Ω and 85Ω respectively. Find its temperature coefficient of resistivity.
29. What is beta decay and write the properties of neutrino.
30. Derive an expression for potential energy of a dipole placed in uniform electric field.
31. State and explain the Brewster's law.
32. State Biot-Savart's law. Derive the vector form of equation for the Biot-Savart's law.
33. A monochromatic light of wavelength of 500 nm strikes a grating and produces fourth order maximum at angle of 30°. Find the number of slits per centimetre.

Part - IV

IV. Answer all the questions.   5 x 5 = 25

34. a) Explain the effect of dielectrics in capacitor when the battery remains connected to the capacitor.

   (OR)

   b) Derive the equation for acceptance angle and numerical aperture of optical fibre.

35. a) Sketch the static characteristics of a common emitter transistor and bring out the essential features of input and output characteristics.

   (OR)

   b) Describe the microscopic model of current and obtained general form of Ohm's Law.

36. a) Explain the types of absorption spectrum.

   (OR)

   b) Obtain the equation for bandwidth in Young's double slit experiment.

37. a) i) Derive an expression for de-Broglie wavelength of electrons.

      ii) What is the value of de-Broglie wavelength of an electron when its accelerated by the potential of 81 V.

   (OR)

   b) Derive an expression for the force on a current carrying conductor in a uniform magnetic field.

38. a) Show that the Mutual inductance between a pair of coils is same. ($M_{12} = M_{21}$)

   (OR)

   b) Write down the postulates of Bohr's atom model and obtain the expression radius of nth orbits.

****** A. Muthuganesh, M.Sc. M.Phil, B.Ed
Department of Physics.
K.V.S. Matric. Hr. Sec. School
Thoothukudi - 2.