V12P   Virudhunagar District
                    Common Second Mid Term Test - 2024

                    Standard 12

Time: 1.30 Hours   **PHYSICS**   Marks: 50
                    Part - I

I.   **Choose the correct answer:**   **10×1=10**

1) Two coherent monochromatic light beams of intensities I and 4I are superposed. The maximum and Minimum possible intensities in the resulting beam are
   a) 5 I and I   b) 5 I and 3 I   c) 9 I and I   d) 9 I and 3 I

2) In a diffraction grating experiment, the first order maximum is obtained at an angle of diffraction of 30°. The second order maixmum is obtained at an angle of diffraction of
   a) 60°   b) 45°   c) 90°   d) 0°

3) The transverse nature of light is shown in
   a) interference   b) Diffraction   c) Scattering   d) Polarisation

4) In a photoelectric experiment, the wavelength of the light incident on a metal is changed from 300 nm to 400 nm. Then the stopping potential will
   a) increase   b) decrease   c) remain the same   d) increase (or) decrease

5) In an electron microscope, the electrons are accelerated by a voltage of 14 KV. If this voltage is changed To 224 KV, then the de Broglie wavelength associated with the electrons would
   a) increase by 2 times   b) decrease by 2 times
   c) decrease by 4 times   d) increase by 4 times

6) In the characteristics X-ray spectrum, K_α line is obtained, when the electron in the target atom makes transition from
   a) L-level to K-level   b) M-level to K-level
   c) M-level to L-level   d) N-level to K-level

7) The ratio between the first three orbits of hydrogen atom is
   a) 1 : 2 : 3   b) 2 : 4 : 6   c) 1 : 1: 9   d) 1 : 3 : 5

8) The nucleus is approximately spherical in shape. Then the surface area of nucleus area of nucleus having mass number A varies as
   a) $A^{2/3}$ b) $A^{2/3}$ c) $A^{1/3}$ d) $A^{3/2}$

9) Atomic number of H-like atom with ionisation potential 122.4 V for n = 1 is
   a) 1   b) 2   c) 3   d) 4

10) According to Bohr's Atom model, the number of transitions made by an electron from an excited state of H-atom is 6. The potential energy of the electron in the excited state is
   a) 1.7eV   b) –1.7eV   c) –0.85.eV   d) 0.85 eV

                    Part - II

II.   **Answer any six of the following questions**   **6×2=12**
      Question No. 19 is compulsory.

11) What is Huygen's principle

12) What is double refraction?

13) A small telescope has an objective lends of focal length 125 cm and an eyepiece of focal length 2 cm. What is the magnification of the telescope

14) What is photolectric effect?

15) Define: stopping potential

16) Calculate the cut-off wavelength and cut-off frequency of X-rays from an X-rays of accelerating potential 20000 V.

17) Define: Impact parameter

18) What is nuclear fission?

19) Calculate the radius of $_{79}Au^{197}$ nucleus.

Part - III

III. Answer any six of the following questions   6x3=18
Question No. 28 is compulsory.

20) Write the difference between Fresnel diffraction and Fraunhofer diffraction. (Any three

21) Mention the uses of Polaroid. (Any three)

22) State the laws of photoelectric emission

23) Two Polaroids are kept with their transmission axes inclined at 30°. Unpolarized light of intensity I falls on the first polarised. Find out the intensity of light emerging from the second polaroid.

24) What are the characteristics of photons? (any three)

25) Obtain the expression for De Broglie wavelength of electrons

26) Explain α-decay with an example

27) Explain the Lyman and Balmer series of Hydrogen spectrum

28) The work function of potassium is 2.30 eV. UV radiation of wavelength 3000°A is incident on the potassium surface. Determine the maximum kinetic energy of the photo electrons.

Part - IV

IV. Answer all the following questions in detail   2x5=10

29) a) Derive the expression for band width of interference fringes in young's double slit experiment .

(OR)

b) Based on Neils Bohr's postulates, obtain the expression for
   i) radius of the nth orbit
   ii) Velocity of electron in that orbit of hydrogen atom

30) a) Describe Davission - Gremer Experiment

(OR)

b) Obtain the expression for law of radioactivity and draw the graph for the law.

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