TVL12P

Tirunelveli District

Common Second Mid Term - 2024

Standard 12

PHYSICS

Part - I

Time: 1.30 Hours Marks: 35

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

1) The transverse nature of light is shown in

a) interference b) diffraction c) scattering d) polarisation

2) The momentum of electron beam having wavelength 2A° is

a) 6.626×10^{-24} kgms^{-1} b) 6.626×10^{-34} kgms^{-1}

c) 3.315×10^{-24} kg d) 3.313×10^{24} kgms^{-1}

3) Emission of electrons by the absorption of heat energy is called ..... emission

a) Photoelectric b) Field c) Thermionic d) Secondary

4) Two radiations with photon energies 0.9eV and 3.3 eV respectively are falling on a metallic surface successively. If the work function of the metal is 0.6eV, then the ratio of maximum speeds of emitted electrons in the two cases will be

a) 1 : 4 b) 1 : 3 c) 1 : 1 d) 1 : 9

5) If the mean wavelength of light from sun is taken as 550 nm and its mean power as 3.8×10^{26} W then the average number of photons received by the human eye per second from sunlight is of the order of

a) 10^{45} b) 10^{42} c) 10^{54} d) 10^{51}

6) The radius of atomic nucleus $^{27}_{13}Al$ is

a) 1.2 F b) 2.6 F c) 3.6 F d) 3.2 F

7) The ratio of energies of hydrogen atom in the fire three orbits is

a) $1:\frac{1}{4}:\frac{1}{9}$ b) 1 : 4 : 9 c) 1 : 9 : 4 d) $\frac{1}{2}:\frac{1}{4}:\frac{1}{8}$

8) A radio active element has N_0 number of nuclei at t=0, The number of nuclei remaining after half of a half life (that is at time $t = \frac{1}{2}\pi/2$)

a) $N_o/2$ b) $N_o/\sqrt{2}$ c) $N_o/4$ d) $N_o/8$

9) The density of atomic nuclei is nearly

a) 2.3×10^{17} kgm^{-3} b) 3.2×10^{17} kgm^{-3}

c) 2.3×10^{-17} kgm^{-3} d) 2.3×10^{19} kgm^{-3}

10) A radio acive nucleus (initial mass number A and atomic number z) emits two α particles and 2 positrons. The ratio of number of neutrons to that of proton in the final nucleus will be

a) $\frac{A-Z-4}{Z-2}$ b) $\frac{A-Z-2}{Z-6}$ c) $\frac{A-Z-4}{Z-6}$ d) $\frac{A-Z-12}{Z-4}$

Part - II

Answer any three of the following. Q.No. 14 is compulsory. 3×2=6

11) What is presbyopia?

12) Define : stopping potential

13) List any four characteristics of photons

14) The radius of the 5th orbit of hydrogen atom is 13.25A°. Calculate the de-broglie wavelength of the electron orbitting in the fifth orbit

15) Define: 1 curie.

Part - III

Answer any three of the following. Q.No. 17 is compulsory. 3×3=9

16) Give the applications of photocells

17) Calculate the cutoff wavelength and cutoff frequency of X rays from an X ray tube of accelerating potential 20,000V.

18) Write note on Nicol prism

19) Explain in detail the nuclear force.

20) Discuss the spectral series of hydrogen atom.

Part - IV

Answer all the questions. 2×5=10

21) Obtain the law of radioactivity

(OR)

Obtain Einsteins photoelectric equation with necessary explanation

22) Explain J.J. Thomson experiment to determine the specific charge of electron

(OR)

Describe briefly Davission - Germer experiment which demonstrated the wave nature of electrons.

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COMMON MID TERM - 2021.

Standard - 12

PHYSICS

(ANSWER KEY)

I) Choose the correct answer:

1) d) Polarisation.

2) c) 3.315×10^{-24} kg ms^{-1}.

3) c) Thermionic

4) b) 1:3

5) a) 10^{45}

6) c) 3.6 F

7) b) 1:4:9

8) b) $\frac{No}{\sqrt{2}}$

9) a) 2.3×10^{17} kgm^{-3}

10) b) $\frac{A-Z-2}{Z-6}$

II

14) Given data:

$n = 5$

$r = 13.25 A^{\circ} = 13.25 \times 10^{-10}$ m

$\lambda = ?$

Solution:

$2\pi r = n\lambda$

$\lambda = \frac{2 \times 3.14 \times 13.25 \times 10^{-10}}{5}$

$\lambda = 16.64 A^{\circ}$

III

17) Given data:

Accelerating potential, $V = 20000V$

cut-off wavelength : $\lambda_0 = ?$

cut-off frequency, $\nu_0 = ?$

Solution:

cut-off wavelength of x-rays is given by,

$$\lambda_0 = \frac{12,400}{V} A^\circ$$

$$= \frac{12400}{20000}$$

$$\boxed{\lambda_0 = 0.62 \text{Å}}$$

cut-off frequency is,

$$\nu_0 = \frac{c}{\lambda_0}$$

$$= \frac{3 \times 10^8}{0.62 \times 10^{-10}}$$

$$= 4.84 \times 10^{8+10}$$

$$\boxed{\nu_0 = 4.84 \times 10^{18} \text{ Hz}}$$