

- Q.1 An electromagnetic wave of λ is incident on a photosensitive surface of negligible work function. Emitted photo electrons have a de Broglie wavelength λ_1 . Prove that $\lambda = \left(\frac{2mc}{h}\right) \lambda_1^2$ (3)
- Q.2 State the law of radioactive decay. Plot a graph showing variation of N with t for half life T . Mark the points corresponding to (i) $t = 3T$ (ii) $t = 5T$ (3)
- Q.3 A heavy nucleus of X (mass no = 240) and Av. Binding energy 7.6 MeV is split into two fragments Y and Z of mass numbers 110 and 130. ABE of Y and Z is 8.5 MeV. Find energy Q released in MeV. (3)
- Q.4 A proton and an alpha particle both initially at rest are accelerated by same potential difference. Find ratio of their de Broglie wavelength. (2)
- Q.5 Ground state energy of hydrogen atom is -13.6 eV.
(i) Find potential and kinetic energy of e^- in 3rd excited state
(ii) If electron jumps to ground state from 3rd excited state find frequency of photon emitted. (2)
- Q.6 Following table gives values of ' $\ln R$ ' for time ' t ' for a radioactive sample. $R =$ rate of disintegration (Bq). ' t ' is in min. (3)

t (min)	$\ln R$
10	5
20	3
30	X

- Find (i) ' X ' and disintegration constant ' λ '
(ii) time after which 75% of nuclei have decayed.