Q1. 21 January Shift 1

A light wave described by $E = 60 \left[\sin \left(3 \times 10^{15} \right) t + \sin \left(12 \times 10^{15} \right) t \right]$ (in SI units) falls on a metal surface of work function 2.8 eV. The maximum kinetic energy of ejected photoelectron is (approximately) ____ eV. $\left(h = 6.6 \times 10^{-34} \text{ J. s. and } e = 1.6 \times 10^{-19} \text{C} \right)$

(1) 7.8   (2) 6.0   (3) 5.1   (4) 3.8

Q2. 21 January Shift 2

A particle having electric charge 3×10^{-19}C and mass 6×10^{-27} kg is accelerated by applying an electric potential of 1.21 V. Wavelength of the matter wave associated with the particle is $\alpha \times 10^{-12}$ m. The value of α is ____ - (Take Planck's constant $= 6.6 \times 10^{-34}$ J. s)

Q3. 22 January Shift 2

Light is incident on a metallic plate having work function 110×10^{-20} J. If the produced photoelectrons have zero kinetic energy then the angular frequency of the incident light is ____ rad/s. $\left(\text{h} = 6.63 \times 10^{-34} \text{ J. s} \right)$.

(1) 1.04×10^{13} (2) 1.04×10^{16} (3) 1.66×10^{16} (4) 1.66×10^{15}

Q4. 23 January Shift 1

The de Broglie wavelength of an oxygen molecule at $27°$C is $x \times 10^{-12}$ m. The value of x is (take Planck's constant $= 6.63 \times 10^{-34}$ J. s, Boltzmann constant $= 1.38 \times 10^{-23}$ J/K, mass of oxygen molecule $= 5.31 \times 10^{-26}$ kg)

(1) 24   (2) 26   (3) 30   (4) 20

Q5. 24 January Shift 2

When a light of a given wavelength falls on a metallic surface the stopping potential for photoelectrons is 3.2 V. If a second light having wavelength twice of first light is used, the stopping potential drops to 0.7 V. The wavelength of first light is ____ m. $\left(\text{h} = 6.63 \times 10^{-34} \text{ J. s}, \text{e} = 1.6 \times 10^{-19} \text{C}, \text{c} = 3 \times 10^8 \text{ m/s} \right)$

(1) 2.5×10^{-7} (2) 2.2×10^{-8} (3) 3.1×10^{-7} (4) 2.9×10^{-8}

Q6. 28 January Shift 1

The ratio of de Broglie wavelength of a deutron with kinetic energy E to that of an alpha particle with kinetic energy $2E$, is $n : 1$. The value of n is ____.
(Assume mass of proton $=$ mass of neutron) :

Q7. 28 January Shift 2

Number of photons of equal energy emitted per second by a 6 mW laser source operating at 663 nm is _____.

(Given : h $= 6.63 \times 10^{-34}$ J. s and c $= 3 \times 10^8$ m/s)

(1) 2×10^{16}
(2) 10×10^{15}
(3) 5×10^{15}
(4) 5×10^{16}

ANSWER KEYS

1. (3) **2.** 10 **3.** (2) **4.** (4) **5.** (1) **6.** 2 **7.** (1)