

34. The energy of an atom (or ion) in first excited state is -13.6 eV . It may be

- (A) ${}_1\text{H}^1$ (B) ${}_1\text{H}^2$
(C) He^+ (D) Li^{++}

35. The time-period of revolution of an electron around a nucleus of charge Ze in n^{th} Bohr orbit is proportional to

- (A) n^2 (B) $\frac{n^3}{Z^2}$
(C) $\frac{n^2}{Z^3}$ (D) $\frac{n}{Z}$

36. The magnetic moment (μ) of a revolving electron around the nucleus varies with principal quantum number n as

- (A) $1/n$ (B) $1/n^2$
(C) $1/n^3$ (D) n

37. The centripetal acceleration of electron around a nucleus of charge Ze in n^{th} Bohr orbit is proportional to

- (A) $\frac{n^3}{Z^2}$ (B) $\frac{n^4}{Z^3}$
(C) $\frac{Z^3}{n^4}$ (D) $\frac{Z^2}{n^2}$

38. A diatomic molecule has moment of inertia I . By Bohr's quantisation condition, its rotational energy in the n^{th} level ($n = 1, 2, \dots$) is

- (A) $\frac{1}{n^2} \left(\frac{h^2}{8\pi^2 I} \right)$ (B) $\frac{1}{n} \left(\frac{h^2}{8\pi^2 I} \right)$
(C) $n \left(\frac{h^2}{8\pi^2 I} \right)$ (D) $n^2 \left(\frac{h^2}{8\pi^2 I} \right)$

- (C) $\left(\frac{nh}{2\pi eB} \right)^{\frac{1}{2}}$ (D) $\left(\frac{nhB}{2\pi e} \right)^{\frac{1}{2}}$

42. The maximum angular speed of the electron in a stationary orbit is nearly

- (A) $2 \times 10^{16} \text{ rad/s}$ (B) $4 \times 10^{16} \text{ rad/s}$
(C) $8 \times 10^{16} \text{ rad/s}$ (D) $16 \times 10^{16} \text{ rad/s}$

43. An electron makes a transition from an excited state to the ground state of a hydrogen like atom

- (i) K.E. increases (ii) P.E. decreases
(iii) Total energy increases
(iv) Angular momentum increases
(A) (i), (iii) (B) (i), (iv)
(C) (ii), (iii) (D) (ii), (iv)

44. A hydrogen like atom has one electron and a stationary nucleus. The energy required to excite the electron from ground to first excited state is 91.8 eV . The atomic number of the atom is

- (A) 2 (B) 3
(C) 4 (D) 5

45. If the electron in a hydrogen atom jumps from fourth orbit to the ground state, the wavelength of the radiation emitted is R (Rydberg's constant)

- (A) $\frac{36}{5R}$ (B) $\frac{16}{5R}$
(C) $\frac{6}{5R}$ (D) $\frac{1}{5R}$

46. In a hydrogen like atom, the wavelength of the radiation emitted in the transition from the n^{th} energy level with quantum number n to the $(n-1)^{\text{th}}$ energy level with quantum number $(n-1)$ is proportional to