**1.** The number of possible lines of Paschen series when electron jumps from 7th excited state to ground state (in hydrogen like atom) is :

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

**2.** The wavenumber of the first line in the Balmer series of hydrogen is 15200 $cm^{-1}$. What would be the wave number of the first line in the Balmer series of the $Be^{3+}$ ion ?

(A) $2.4 \times 10^5$ $cm^{-1}$ (B) $24.3 \times 10^5$ $cm^{-1}$ (C) $6.08 \times 10^5$ $cm^{-1}$ (D) $60.8 \times 10^5$ $cm^{-1}$

**3.** The shortest wavelength in Lyman series of $Li^{2+}$ ion is :

(A) 10.13 A (B) 135 A (C) 13.5 A (D) 101.3 A

**4.** A hydrogen like ion having wavelength difference between first Balmer and Lyman series equals to 593 Å, has Z equal to :

(A) 2 (B) 3 (C) 4 (D) 1

**5.** Total number of lines in Lyman series of H spectrum will be (where n = no. of orbits):

(A) n (B) n - 1 (C) n -2 (D) n(n + l)

**6.** Number of visible lines when an electron returns from 5th orbit to ground state in H spectrum :

(A) 5 (B) 4 (C) 3 (D) 10

**7.** The difference between the wave number of 1st line of Balmer series and last line of Paschen series for $Li^{2+}$ ion is :

(A) $\frac{R}{36}$ (B) $\frac{5R}{36}$ (C) 4R (D) $\frac{R}{4}$

**8.** Which electronic transition in atomic hydrogen corresponds to the emission of visible light?

(A) $n = 5 \rightarrow n = 2$ (B) $n = 1 \rightarrow n = 2$ (C) $n = 3 \rightarrow n = 4$ (D) $n = 3 \rightarrow n = 1$

**9.** Wave number of a spectral line for a given transition is x $cm^{-1}$ for $He^+$, then its value for $Be^{3+}$ (isoelectronic with $He^+$) for same transition is :

(A) x $cm^{-1}$ (B) 4x $cm^{-1}$ (C) x/4 $cm^{-1}$ (D) 2x $cm^{-1}$

**10.** The ratio of wavelength of photon corresponding to the beta line of Lyman series in H-atom and β-line of Balmer series in He+ is:

(A) 1: 1 (B) 1: 2 (C) 1: 4 (D) 3 : 16

**11.** Match the following : [Atomic structure]

| **List-I** | **List-II** |
|---|---|
| (A) From n = 6 upto n = 3 (In H-atom sample) | (P) 10 lines in the spectrum |
| (B) From n = 7 upto n = 3 (In H-atom sample) | (Q) Spectral lines in visible region |
| (C) From n = 5 upto n = 2 (In H-atom sample) | (R) 6 lines in the spectrum |
| (D) From n = 6 upto n = 2 (In H-atom sample) | (S) Spectral lines in infrared region |

**12.** Suppose a hypothetical H-like atom produces a blue, yellow, red and violet line in emission spectrum. Match the above lines with their corresponding possible electronic transition :

| **Colour of spectral lines** | **Possible corresponding transitions** |
|---|---|
| (A) Blue | (P) $6 \rightarrow 3$ |
| (B) Yellow | (Q) $2 \rightarrow 1$ |
| (C) Red | (r) $5 \rightarrow 2$ |
| (D) Violet | (s) $4 \rightarrow 3$ |

(A) (A) $\rightarrow$ r , (B) $\rightarrow$ p , (C) $\rightarrow$ s , (D) $\rightarrow$ q (B) (A) $\rightarrow$ r , (B) $\rightarrow$ s , (C) $\rightarrow$ q, (D) $\rightarrow$ p

(C) (A) $\rightarrow$ p , (B) $\rightarrow$ r , (C) $\rightarrow$ s , (D) $\rightarrow$ q (D) (A) $\rightarrow$ p , (B) $\rightarrow$ r , (C) $\rightarrow$ q, (D) $\rightarrow$ s

**13.** If the shortest wavelength of Lyman series of H atom is x, then the wavelength of the first line of Balmer series of H-atom will be :

(A) $\frac{9x}{5}$ (B) $\frac{36x}{5}$ (C) $\frac{5x}{9}$ (D) $\frac{5x}{36}$

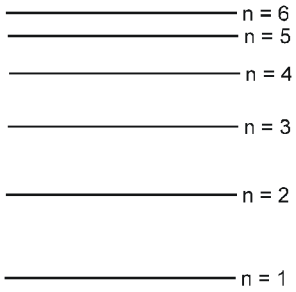
**14.** Which spectral series for hydrogen contains lines in the visible region of the spectrum?

(A) Lyman series (B) Balmer series (C) Paschen series (D) Brackett series

**15.** The ratio of wavelength of 1st line of Balmer series and $2^{nd}$ line of Lyman series is

(A) 32/5 (B) 2 (C) 3 (D) 16

**16.** What would be the maximum number of emission lines for atomic hydrogen that you would expect to see with the naked eye, if the only electronic energy levels involved are those shown in the Figure :




(A) 4 (B) 6 (C) 5 (D) 15

**17.** The radius ratio of two Bohr's orbit $n_1$ & $n_2$ are in the ratio of 4 : 9. If $n_1 + n_2 = 5$ & an electron make transition between these orbits then

(A) longest wavelength of lyman series will be emitted

(B) longest wavelength of paschen series will be emitted

(C) shortest wavelength of lyman series will be emitted

(D) Radiation emitted will have minimum frequency of Balmer series

**18.** An ion (atomic number Z), isoelectronic with Hydrogen, is in $n^{th}$ excited state. This ion emits two photons of energies 10.2 eV and 17eV successively to return to first exited state. It can also emit two photons of energies 4.25 and 5.95 eV successively to return to second excited state. What is the sum of values of n and Z ?

**19.** A sample of H–like ion is in a particular excited state $n_2$. The electron in it makes back transition upto a lower excited state $n_1$ producing a maximum of 10 different spectral lines. The change in angular momentum of electron corresponding to maximum frequency line is expressed as y $\frac{h}{4\pi}$ J-s. Then, find the value of y.

## RACE # 28

**1.** (B) **2.** (A) **3.** (D) **4.** (B) **5.** (B) **6.** (C) **7.** (D) **8.** (A) **9.** (B) **10.** (AB)
**11.** A–RS, B–PS, C–QRS, D–PQS **12.** (A) **13.** (B) **14.** (B) **15.** (A) **16.** (A) **17.** (D)
**18.** (9) **19.** (8)