60. Match the following:
A) Energy of ground state of He⁺ i) +6.4 eV
B) Potential H-atom of i orbit of H-atom
C) Kinetic energy of II excited state of He⁺
D) Ionisation potential of He
a) A - i, B - ii, C - iii, D - iv
b) A - iv, B - iii, C - ii, D - i
c) A - iv, B - ii, C - i, D - iii
d) A - ii, B - iii, C - i, D - iv

61. Which is correct relationship:
   a) \( E_i \) of H=1/2 \( E_0 \), of He⁺=1/3 \( E_0 \), of Li⁺=1/4 \( E_0 \) of Be²⁺
   b) \( E_i \) (H) = \( E_i \) (He⁺) = \( E_i \) (Li⁺) = \( E_i \) (Be²⁺)
   c) \( E_i \) (H) = 2\( E_i \) (He⁺) = 3\( E_i \) (Li⁺) = 4\( E_i \) (Be²⁺)
   d) None relation

62. Which is correct for any H like species:
   a) \( E_i - E_k > E_k - E_j > E_j - E_k \)
   b) \( E_i - E_k < E_k - E_j < E_j - E_k \)
   c) \( E_i - E_k = E_k - E_j \)
   d) \( E_i - E_k = E_k - E_j = E_j - E_k \)

63. Which is correct graph:
   a) K.E. \[ \frac{n}{n} \]
   b) K.E. \[ \frac{n}{n} \]
   c) K.E. \[ \frac{n}{Z} \]
   d) K.E. \[ \frac{n}{Z} \]

SPECTRUM AND RYDBERG FORMULA

64. In the following transition which is correct:
   a) \( E_a = E_b \)
   b) \( I_a = I_b \)
   c) \( E_a = E_b \)
   d) \( I_a = I_b \)

65. In which transition, one quantum of energy is emitted:
   a) \( n = 4 \oplus n = 2 \)
   b) \( n = 3 \oplus n = 1 \)
   c) \( n = 4 \oplus n = 1 \)
   d) All of them

66. The ratio of minimum frequency of Lyman & Balmer series will be:
   a) 1.25
   b) 0.25
   c) 5.4
   d) 10

67. When a hydrogen sample in ground state is bombarded then what potential is required to accelerate electron so that first Paschen line is emitted:
   a) 2.55 V
   b) 0.65 V
   c) 12.09 V
   d) 12.75 V

68. The binding energy of e⁻ in ground state of hydrogen atom is 13.6 eV. The energies required to eject out an electron from three lowest states of He⁺ atom will be (in eV):
   a) 13.6, 10.2, 3.4
   b) 13.6, 3.4, 1.5
   c) 13.6, 27.2, 40.8
   d) 54.4, 13.6, 6

69. In H-atom electron transitions from 6th orbit to 2nd orbit in multi step. Then total spectral lines (without Balmer series) will be:
   a) 6
   b) 10
   c) 4
   d) 0

70. Which transition emits photon of maximum frequency:
   a) second spectral line of Balmer series
   b) second spectral line of Paschen series
   c) Fifth spectral line of Humphery series
   d) first spectral line of Lyman series

71. Which one of the following species will give series of spectral lines similar to that of Mg²⁺:
   a) Al²⁺
   b) Na
   c) Mg⁺
   d) I

72. An atom has x energy level. Then total number of lines in its spectrum are:
   a) \( 1 + 2 + ... + (x-1) \)
   b) \( 1 + 2 + ... + (x^2) \)
   c) \( 1 + 2 + ... + (x-1) \)
   d) \( (x+1) (x+2) (x+4) \)

73. The wave number of first line of Balmer series of hydrogen atom is 15200 cm⁻¹. What is the wave number of first line of Balmer series of Li²⁺ ion?
   a) 15200 cm⁻¹
   b) 1366000 cm⁻¹
   c) 76000 cm⁻¹
   d) 13660 cm⁻¹

74. The figure indicates the energy level diagram for the origin of six spectral lines in emission spectrum (e.g line no. 5 arises from the transition from level B to X) which of the following spectral lines will not occur in the absorption spectrum:

   a) 1, 2, 3, 4, 5, 6
   b) 3, 2, 1
   c) 2, 3, 4, 5, 6
   d) 3, 2, 2

75. Given that in the H-atom the transition energy for n =1 to n = 2, Rydberg states is 10.2eV. The energy for the same transition in Be¹⁺ is:
   a) 20.4 eV
   b) 163.2 eV
   c) 30.6 eV
   d) 40.8 eV

76. The transition of electron in H-atom that will emit maximum energy is:
   a) \( n_1 \oplus n_2 \)
   b) \( n_1 \oplus n_3 \)
   c) \( n_1 \oplus n_4 \)
   d) All have same energy

77. Given that the H-atom transition energy for n =1 to n = 2, Rydberg states is 10.2eV. The energy for the same transition in Be¹⁺ is:
   a) 20.4 eV
   b) 163.2 eV
   c) 30.6 eV
   d) 40.8 eV

79. When an electron in H-atom jumps from n=4 to n= 1. ultra violet light is emitted, if the transition corresponds to n = 4 to n= 2, which of the following colour will be emitted:
   a) Ultra violet
   b) Green
   c) infra red
   d) No colour