CHAPTER 20
ATOMIC SPECTRA

1. Encircle the correct answers.

i. The value of Rydberg constant is:

a) $1.0974 \times 10^{7} m^{-1}$

b) $1.0974 \times 10^{-7} m^{-1}$

c) $1.0974 \times 10^{6} m^{-1}$

d) $1.0974 \times 10^{-6} m^{-1}$

ii. Which of the following is one of the spectral series of atomic hydrogen?

a) Brockett series
b) Balmer series
c) P fund series
d) All of above

iii. If the ionization energy of hydrogen atom is 13.6 eV, its ionization potential will be:

a) 146.0 volt
b) 3.0 volt
c) 13.6 volt
d) None of these

iv. The 1st Bohr atom in the hydrogen atom has radius:

a) $3.56 \times 10^{-10} m$

b) $0.053 \times 10^{-11} m$

c) $0.53 \times 10^{-11} m$

d) $5.30 \times 10^{-11} m$

v. An atom can reside in excited state for:

a) 10^{-8} second
b) One second
c) 10^{-10} second
d) More than one second

vi. The process by which lesser beam can be used to generate 3-dimensional images of objects is called:

a) Holography
b) Geo graphy
c) Tomography
d) Radio graphy

vii. Reflecting mirrors in laser is used to:

a) Further stimulation
b) For producing more energetic lasers
c) Both (a) and (b)
d) None of these

viii. Life time of metastabel states is:

a) 10^{-6} sec or more
b) 10^{-3} sec or more
c) 10^{-5} sec or more
d) None of these

ix. Helium-Neon laser discharge tube contains neon:

a) 82 %
b) 15 %
c) 25 %
d) 85 %

x. The idea of laser device was first introduced by C.H. Townes and Authers Schowlan is:

a) 1972
b) 1965
c) 1958
d) 1913

Q.2 Write the short answers.

i. Can the electron in the ground state of hydrogen atom absorb a photon of energy 13.6 eV and greater than 13.6 eV?

ii. How can the spectrum of hydrogen contain so many lines when hydrogen contains one electron?

iii. Is energy conserved when an atom emits a photon of light?

iv. What do we mean when say that the atom is excited?

v. Can X-rays be reflected, refracted, diffracted and polarized just like any other waves? Explain.

vi. What are the advantages of lasers over ordinary light?

vii. What do we mean when we say that the atom is excited?

viii. What do you understand by stimulated or induced emission?

Note: Long questions:

Q.3 **(a)** Explain characteristic X-ray and continuous X-ray spectra.

(b) Find the wavelength of the spectral line corresponding to the transition in hydrogen from n=6 state to n= 3 state?

Q.4 **(a)** Define spectroscopy, drive expression for radii of quantized orbit.

(b) Calculate the longest wavelength of radiation for the Paschen series.