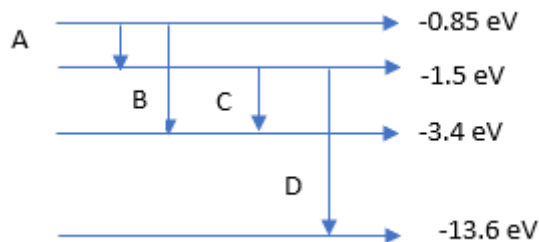


## CHAPTER NAME: EM WAVES AND ATOMS

1. What physical quantity is same for X-rays of wavelength  $10^{-19}\text{m}$ , redlight of wavelength  $6800 \text{ \AA}$  and radio wave of wavelength  $500 \text{ m}$ ?
2. A plane Electromagnetic wave travels in vacuum along Z-direction. What can you say about the direction of its electric and magnetic field? If the frequency of the wave is  $30 \text{ MHz}$ , what is its wavelength?
3. Suppose that the electric field amplitude of an EM wave is  $E_0 = 120 \text{ N/C}$  and its frequency is  $50.0 \text{ MHz}$ .
  - a) Determine  $B_0$ ,  $K$ ,  $\omega$  and  $\lambda$
  - b) Find expression for  $\vec{E}$  and  $\vec{B}$ .
4. A parallel plate capacitor made of circular plates each of radius  $R = 6.0 \text{ cm}$ , has a capacitance  $C = 100 \text{ pF}$ . The capacitance is connected to a  $230 \text{ V}$  a.c. supply with an angular frequency of  $300 \text{ rad/sec}$ 
  - a) What is the rms value of the conduction current?
  - b) Is the conduction current is equal to the displacement current?
  - c) Determine the magnitude of  $B$  at a point  $3.0 \text{ cm}$  from the axis between the plates.
5. Identify the part of the EM spectrum used in
  - a) Radar
  - b) Eye surgeryWrite their frequency range.
6. How are infrared wave produced? What role does infrared radiation play in
  - a) Maintaining the earth warmth
  - b) Physical therapy
7. The energy level diagram of an element is given below, which transition corresponds to the emission of a spectral line of wavelength  $102.7 \text{ nm}$ ?



8. In a head on collision between an alpha particle and gold nucleus ( $Z = 79$ ) the distance of closest approach is  $39.5 \text{ fermi}$ . Calculate the energy of alpha particle.
9. If we use a thin sheet of solid hydrogen in place of gold foil in case of alpha particle scattering experiment. What result do you expect?