

Physics - ICS Part 2 Physics Chapter 20 Short Questions Preparation

Q1. Distinguished between stimulated emission and spontaneous emission.

Ans 1: Stimulated emission: If a atom is excited for a longer lifetime of about 10^{-3} sec than an incident photon of energy equal to the difference of two energy levels induces the atom to decay by emitting a photon that travel in the direction of incident photon. This process is called stimulated or induced emission.

Ans 2: Spontaneous Emission: As excited is highly unstable with life time of 10^{-8} sec, so electron will de excite itself with emission of a photon in any arbitrary direction is called spontaneous emission.

Q2. What do you mean by inner shell transition?

Ans 1: A transition in which an electron from higher orbit, emits energy and accommodate a hole in the lower orbit. Such a transition is called inner shell transition. The photons emitted in such transition are called characteristic x-rays.

Q3. What is meant by lasing action?

Ans 1: When a large percentage of atom or sample is in population inversion then large number of coherent photons along same direction of motion could be obtained to form laser light. The combination of spontaneous emission of first and then stimulated emission cause the laser to generate coherent beam of light at a single frequency which is called lasing action.

Q4. Define normal population and population inversion.

Ans 1: In normal population, the lower energy state has a greater population than the higher energy state. Population inversion occurs when no more electron are in a higher energy state than in lower energy state.

Q5. Can x-rays be reflected, diffracted polarized just like any other waves? Explain

Ans 1: Yes x rays can be reflected, refracted diffracted by crystal only and polarized just like any other waves.

Q6. What do we mean when we say that the atom is excited?

Ans 1: When energy from some external source is provide to an atom in its normal state, then its electron will jump from lower energy state to higher energy state. And atom is said to be excited.

Q7. How can spectrum of hydrogen contain so many lines, whereas hydrogen atom contain one electron?

Ans 1: The single electron in hydrogen atom occupies ground state but it can be excited to several states by absorbing energy. During de-excitation, it can emit several lines of different wavelength.

Q8. How does a K_{α} -rays differ K_{β} -rays?

Ans 1: When an electron from L -shell jumps to occupy the hole in K- shell K_{α} -rays is emitted .

And

When an electron from M -shells jumps to occupy the hole in K-Shell K_{β} -rays is emitted.

Q9. Can electron reside inside the nucleus?

Ans 1: No,electron cannot reside inside the nucleus .If electron resides inside nucleus then uncertainty in position.

Q10. Bohr's theory of hydrogen atom is based upon several assumptions.Do any of these assumptions contradict classical physics?

Ans 1: Bohr's first assumptions contradicts classical physics.Bohr said that electron do not radiate energy during revolving while according to classical physics,electron radiate energy during revolving and fall into the nucleus which is impossible.
