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** Assignment-1 Unit-1

Ques-1- What is meant by population and how is it achived in prabice?

Ans-1- population inversion is a process of pumping electrons from ~~higher en~~ Lower energy level to higher energy level. OR when the electron at higher / Excited State is greater than the ground state.

In order to achieve population inversion we need to supply energy to laser medium - The process of supplying energy to the laser medium is called pumping.

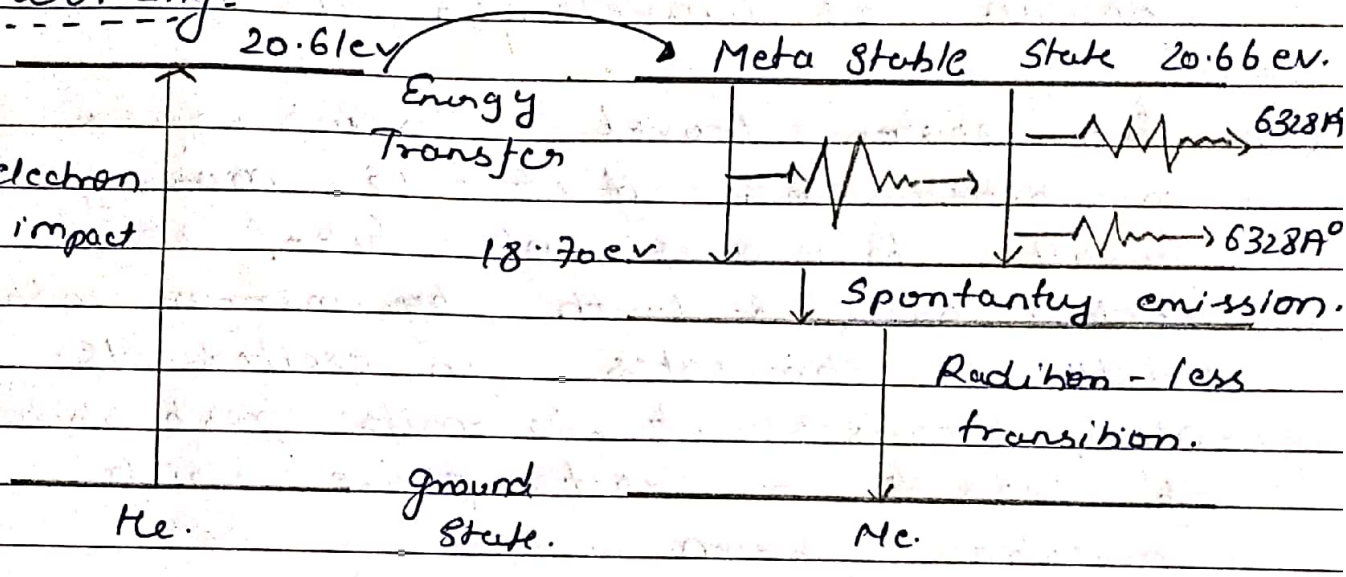
Ques-2- What is role of He in He-Ne laser? Explain the working with a suitable energy level diagram?

Ans-2-

In He-Ne laser light is produced by atomic transition within Neon atom. The Helium does not directly produce laser light but it acts as buffer gas, the produce of which

is to help the atoms of other gas to produce lasing in as manner.

Working:-



(1) He-Ne laser is based on fact that He has energy levels very close to meta-stable energy level of Ne.

(2) When power is switched on e-form discharge take excite gases atoms, thereby pumping take place & He and Ne atoms excited & reaches to excited to energy level at meta stable of 20.61ev.

(3) Some of excited He atoms transfer their energy to Ne atoms by inelastic atom collision with amount of 0.05 ev. Thus purpose of He atoms is to help in achieving population inversion in Ne-atoms

(4) When an excited Ne-atom passes through excited state of 20.66 ev to lower state of 18.70 ev, it emits a photon of wavelength of 6328 A°.

(5) This photon travel through gas mixture and if it is moving parallel to axis of tube, it reflect back & forth by mirror ends until it stimulates an excited Ne-atom & causes it to emits fresh photon of 6328 A° in exact phase with stimulating photon.

(6) This stimulated transition from 20.66 ev to lower state of 18.70 ev level in laser transition. This process is continue for all excited Ne-atoms.

Ques-3. How do CD use optical laser technology?

Ans-3.

CD players are neither mechanical nor magnetic but optical. They use flashing laser lights to record and read back information from shiny metal discs.

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Qus-4- Can we achieve two-level laser? Explain?

Ans-4. In a simple 2-level system it is not possible to obtain population inversion with optical pumping because system can absorb pump light only as long as population inversion & thus light amplification is not achieved.

Qus-5- How could you differentiate between holography and photography?

Ans-5:

Holography	Photography
(1) Use to generate 3-D images.	(1) Used to generate 2-D images.
(2) Lense Not Required to generate holograph.	(2) Lense are required to focous on object & generate photography.
(3) Source of light should be monochromatic & Coherent.	(3) No special type of light source is needed.
(4) It has high information Capacity.	(4) It has less information capacity than holography.

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Ques-6- (i) What is used for fabrication of optical fibers that are used for communication?

Ans-6- (i) Modified chemical vapour deposition (MCVD) method is used to fabricate optical fibers.

(ii) List out two advantages of optical fiber communication.

→

(1) Greater bandwidth : It provide more bandwidth for carrying more data than Copper cables.

(2) Faster Speeds : Fiber optic cables have core that carries light to transmit data & allows fiber optic cables to carry signal at speeds.

(3) Thinner and Sturdier : These are thinner & lighter in weight & can withstand on more pull pressure.

(4) Longer distance - They can carry signal much farther than typical limitation for copper cables.

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Ques-7- What Equipiment is needed for fibre optic internet? What is the bandwidth of optical fibre?

Ans-7-

Fiber optic modem, fiber optic router, You we also need a fiber-ready router (often called a "residential gateway" by internet providers).

It has a bandwidth capacity almost 10 Gbps over long distances due to extremly low loss of specific wavelength Eg 3 um & 1.55 um.

{95 Mbps to 10 Gbps}.