(2)

(h) Laser fusion

(i) Fiber amplifier

(j) Spatial frequency.

2. What are the different components of any laser system ? Explain briefly the working of three level laser system. Calculate coherence length assuming that we chop continuous perfectly monochromatic beam of wavelength 6328 Angstrom in 10^{-10} seconds using some sort of shutter.   10

3. Name three laser systems along with their wavelength. A three level laser emits a light of wavelength of 5500 Å. What will be the ratio of population of upper level (E_2) to the lower energy level (E_1) if the optical pumping mechanism is shut off (Assume $T = 300$ K). At what temperature for the conditions of (a) would the ratio of populations be 1/2 ?   10

4. What is the difference between photograph and hologram ? How does recording and

(3)

reconstruction of image happen in holography ? Briefly describe the different applications of holography ?   10

5. What is the difference between dispersion and attenuation in optical fiber ? Using block diagram, make a fiber optic communication system. A signal of power 5 μW exists just inside the entrance of 0.1 km long fiber. Calculate the absorption coefficient of the fiber, if the power inside the fiber is 1 μW.   10

6. What are optical fiber sensors ? Briefly explain the various techniques used for sensing. Using one of the technique, briefly explain the procedure for detection of given glucose concentration. What are the advantages of fiber optic sensors ?   10

7. Write the full form of word LASER. Derive the expressions for Einstein Coefficients and conclude. Why it is difficult to make X-rays lasers ? Explain with proper reasoning.   10