



OR

- 6 a. Explain the construction and working of CO<sub>2</sub> Laser with the help of energy level diagram. (07 Marks)
- b. What is Holography? With a neat diagram, explain the recording and reconstruction process of a Hologram. (06 Marks)
- c. Define : i) Numerical Aperture ii) Angle of Acceptance iii) Attenuation. (03 Marks)
- d. Find the ratio of the populations of the two states in a material that produces light of wavelength 6328 Å at 27°C. (04 Marks)

Module-4

- 7 a. What are Miller Indices? Derive an expression for Interplanar distances in terms of Miller Indices. (07 Marks)
- b. Explain Bragg's X-ray Spectrometer. (06 Marks)
- c. Define : i) Unit cell ii) Bravais Lattice iii) Primitive cell. (03 Marks)
- d. Draw the following planes in a cubic unit cell :  
i) (1 1 1) ii) (0 2 0) iii) (1  $\bar{1}$  2) iv) (3 0 1). (04 Marks)

OR

- 8 a. Explain in brief the Seven Crystal systems, with neat diagrams. (07 Marks)
- b. Explain the crystal structure of diamond. (05 Marks)
- c. Calculate APF for BCC and FCC structures. (04 Marks)
- d. X-rays are diffracted in the first order from (1 1 0) plane of cubic crystal with lattice constant 3.036 Å at a glancing angle 9.6°. Calculate the wavelength of X-rays. (04 Marks)

Module-5

- 9 a. What are Shock waves? Explain the construction and working of Reddy Shock tube. (07 Marks)
- b. What are Nano materials? Explain the Sol-gel method of synthesis of nano materials. (06 Marks)
- c. Mention four applications of shock waves. (04 Marks)
- d. Calculate the wavelength of an electron accelerated under a potential difference of 100V in SEM. (03 Marks)

OR

- 10 a. Explain the principle, construction and working of Scanning Electron Microscope. (07 Marks)
- b. Define Carbon Nanotubes (CNTs). Discuss pyrolysis method of obtaining CNTs. (06 Marks)
- c. Mention three applications of CNTs. (03 Marks)
- d. Distinguish between Acoustic, Ultrasonic, Subsonic and Supersonic waves. (04 Marks)

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