

A-1312

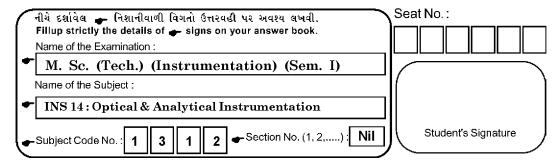
M. Sc. (Tech.) (Instrumentation) (Sem. I) Examination

March/April - 2015

INS 14: Optical & Analytical Instrumentation

Time: Hours] [Total Marks: 70

Instruction:



- 1 (a) Distinguish Between spontaneous and stimulated emission. 4
- (b) Define 10
 - (i) Step Index Fiber (2)
 - (ii) Graded Index Fiber (2)
 - (iii) Single Mode Fiber (2)
 - (iv) Multi Mode Fiber (2)
 - (v) W Profile Fiber (2)
- 2 Attempt any Two:

 $7 \times 2 = 14$

- (a) What is LASER? How does a laser light different from ordinary light? Mention three applications of laser.
- (b) Give construction and working of Semiconductor laser diode
- (c) Explain the Principle and working of Nd:YAG Laser.
- 3 Attempt any Two:

 $7 \times 2 = 14$

- (a) Discuss the advantages and disadvantages of optical fiber over conventional communication transmission media.
- (b) Explain how dispersion plays role in fiber communication which limits the transmission rate. What is Distance Bandwidth Product (BDP)?
- (c) State losses in fiber and fiber communication.

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4 Attempt any Two:

 $7 \times 2 = 14$

- (a) Explain construction and working of Scanning Electron Microscope (SEM) and Scanning Tunneling Microscope (STM).
- (b) Describe the principle of Laue's diffraction method. Explain the origin of Laue's spots. What is the utility of Laue's diffraction pattern?
- (c) Explain Auger Electron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS) & Secondary Ion Mass Spectrometer (SIMS) for surface analysis.

5 Attempt any Two:

 $7 \times 2 = 14$

- (a) Give Experimental arrangement of Nuclear Magnetic Resonance (NMR) Spectroscopy and its applications.
- (b) Explain principle and working of Electron Spin Resonance (ESR) Spectroscopy and give its applications.
- (c) Explain Hyperfine structure, Fine structure and Double Resonance in Electron Spin Resonance (ESR) spectra.