



A-1312

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

Examination

March/April – 2015

INS 14 : Optical & Analytical Instrumentation

Time : Hours]

[Total Marks : 70

Instruction :

नीचे दशांशके निशानीवाणी विगतो उत्तरवही पर अवश्य लपवी.
Fillup strictly the details of signs on your answer book.

Seat No. :

Name of the Examination :

Name of the Subject :

Subject Code No. : Section No. (1, 2,.....) :

Student's Signature

- 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 : 7×2=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 : 7×2=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.

- 4 Attempt any Two : **7×2=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 : **7×2=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.
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