



DE-1312
M. Sc. (Tech.) (Instrumentation) (Sem. I)
Examination
March / April - 2016
INS - 14 : Optical & Analytical Instrumentation

Time : Hours]

[Total Marks : 70

Instruction :

<p>नीचे दृष्टावित \leftarrow निशानीवाणी विगतो उत्तरवही पर अवश्य कपवी. Fillup strictly the details of \leftarrow signs on your answer book.</p> <p>Name of the Examination : M. SC. (TECH.) (INSTRUMENTATION) (SEM. I)</p> <p>Name of the Subject : INS - 14 : OPTICAL & ANALYTICAL INSTRUM.</p> <p>Subject Code No. : 1 3 1 2 \leftarrow Section No. (1, 2,.....) : Nil</p>	<p>Seat No. : <input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/></p> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; text-align: center; width: 100%;">Student's Signature</div>
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1 Define

- (i) Numerical Aperture (2)
- (ii) Acceptance Angle (2)
- (iii) Splicing (2)
- (iv) Connectors (2)
- (v) Matching Loss (2)
- (vi) Distance Bandwidth Product (2)
- (vii) Application of Fiber cables (2)

2 Attempt any Two

7x2=14

- (a) What are Einstein Coefficients? Show that the ratio of coefficients of spontaneous verses stipulated emission is proportional to third power of frequency of radiations?
- (b) A 10mW He-Ne laser has efficiency of 1%. Assume that all input energy is utilized in pumping the atoms from ground state to the excited state, which is 15eV above the ground state. How much atoms are promoted to the excited state? If diameter of beam is 1.5nm, what is the intensity of the light beam?
- (c) Give construction and working of RUBY Laser.

3 Attempt any Two

7x2=14

- (a) Discuss the advantages and disadvantages of optical fiber over conventional communication transmission media.
- (b) An optical cable fiber has core index 1.54 and clad index 1.51. Find Numerical Aperture, Acceptance Angle & Normalized Difference. Find intermodal dispersion for 20Km length of cable with multimode transmission.
- (c) Describe Splicing techniques and connectors in fiber communication.

4 Attempt any Two

7x2=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

7x2=14

- (a) What is Mossbauer Spectroscopy? Give application of Mossbauer Spectroscopy.
- (b) Give Experimental arrangement of Nuclear Magnetic Resonance (NMR) Spectroscopy and its applications.
- (c) Explain Hyperfine structure, Fine structure and Double Resonance in Electron Spin Resonance (ESR) spectra.
