



**SB-3766**

**M. Sc. (Tech.) in Instrumentation (Part-I) (Sem. I)  
(ATKT) Examination**

**March / April – 2011**

**Optical & Analytical Instrumentation : Paper-IV  
(Paper-INS-14) (New Course)**

Time : 3 Hours]

[Total Marks : 70

**Instructions :**

(1)

नीचे दृष्टावित $\leftarrow$ निशानीवाणी विगतो उत्तरवही पर अवश्य कभवी. Fillup strictly the details of $\leftarrow$ signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
$\leftarrow$ M. Sc. (Tech.) in Instrumentation (Part-I) (Sem. I) (ATKT)	<input type="text"/>
Name of the Subject :	<input type="text"/>
$\leftarrow$ Optical & Analytical Instrumentation : Paper-IV (Paper-INS-14) (New)	<input type="text"/>
$\leftarrow$ Subject Code No. : <input type="text" value="3"/> <input type="text" value="7"/> <input type="text" value="6"/> <input type="text" value="6"/> $\leftarrow$ Section No. (1, 2,.....) : <input type="text" value="Nil"/>	<input type="text"/>
	Student's Signature

- (2) All questions are compulsory.
- (3) Figure to the right indicate full marks.
- (4) Assume data if required.
- (5) All questions carry equal marks.

1 Answer the following questions (any eight)

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- (i) Define NMR.
- (ii) What is Ruby laser ?
- (iii) LASER stand for
- (iv) What is diffraction ?
- (v) Write advantage of optical fiber.
- (vi) Define double resonance in ESR.
- (vii) What is absorption and emission process ?
- (viii) Write main difference between spontaneous and stimulated emission.
- (ix) Write Bragg's equation for x-ray diffraction.
- (x) What is holography ?

- 2 Answer any three questions of the following : 18
- (i) Derive the Einstein's coefficient for the spontaneous and stimulated emission.
  - (ii) Derive Bragg's equation for x-ray diffraction from crystal.
  - (iii) Calculate the NA the acceptance angle of a fiber having core refractive index of 0.61 and cladding refractive index of 1.58.
  - (iv) Write short note on application of laser in holography.
- 3 Answer any three questions of the following : 18
- (i) A laser beam has a power of 10 MW. It has an aperture of 5mm and wave length of  $2500 \text{ \AA}$ . A beam is focussed with lens of focal length 5cm. Calculate the area of spread of the image.
  - (ii) Explain the working of NMR.
  - (iii) Explain in detail light propagation in optical fiber.
  - (iv) Explain construction and working of Nd: YAG laser.
- 4 Answer any three questions of the following : 18
- (i) Write short note on running scanning microscope.
  - (ii) Explain the basic component of laser in detail.
  - (iii) Write note on production of x-rays.
  - (iv) Discuss the types of the fiber in detail.
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