

**Eighth Semester B.Tech Examination**  
**13.803 OPTICAL INSTRUMENTATION (A)**  
**MODEL QUESTION PAPER**  
**Time:3Hrs**  
**Max Marks:100**

**PART A**

**Answer All Questions**

1. A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.5 and a cladding refractive index of 1.47. Determine the numerical aperture and acceptance angle in air for the fiber.
2. Mention the causes of intramodal dispersion.
3. Explain the block diagram of basic optical fiber sensor system.
4. What is meant by population inversion
5. What is holography? ( 5 x 4 = 20 marks)

**PART B**

**(Answer One Full Question Out Of The Two From Each Module, 20 marks each)**

**Module - I**

6. A) What are the different types of optical fibres and their characteristics.  
b) What type of materials are used for optical sources. What are the advantages of double hetero structure. Compare surface emitting and edge emitting LED structures

OR

7. Explain the various types of fibre optic losses in detail.

**Module - II**

8. a) Explain any two types of intrinsic fiber sensor.  
b) Explain the operation of
  - i) optical fluid level detector
  - ii) optical reflective type displacement sensor.

OR

9. Explain the construction and working of
- two arm single-mode fiber Interferometric sensor.
  - ring interferometer with multi turn fiber coil.

### **Module - III**

10. Explain about the operation of
- Q switching
  - mode hopping
  - cavity dumping in lasers

OR

11. a) Explain how laser is used for the measurement of distance, velocity, current and voltage.
- b) Explain how laser is used in material processing and also explain laser heating process and laser trimming of material.

### **Module - IV**

12. Describe any four medical applications of laser in detail.

OR

13. a) Explain Leith's and Upatneik's hologram technique
- b) Explain applications of holography in non-destructive testing.

**(4 x20 = 80 marks)**