(i) Basing on the basic principle of operation, distinguishes between "Conventional electronic amplifier" and "Optical amplifier". 5

6. (a) What is meant by "Modulation of Intensity by Sources" and "Modulation of Intensity by transmission medium"? Explain. 5

(b) With a neat diagram, discuss a Mach-Zehnder Interferometer. 5

7. Describe "Distributed Fiber Optic sensors". Discuss the method used to measure pressures and temperatures using optical fiber. Draw suitable diagram to explain your answer. 10

8. Write notes on any *two* : 5×2

(a) LED structure

(b) APD photodiode

(c) Numerical Aperture.

Sixth Semester Examination – 2007

FIBER OPTIC INSTRUMENTATION

Full Marks – 70

Time – 3 Hours

Answer Question No. 1 which is compulsory and any five from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

(a) Write the functions of LED in a Fiber-Optic system. What is meant by "Modulation of LED" ?

(b) Explain the principle of "Total internal Reflection".

(c) Define "Quantum Efficiency". 1

(d) Write any two important functions of OTDR.

(e) Name any two applications of Fiber-Optic sensors.

(f) Distinguish between "Monomode" and "Multimode" fibers.

(g) Draw the equivalent circuit of a p-n photo detector.

(h) Write two functions of Semiconductor optical amplifier.

(i) What is meant by "Responsivity of a photodiode ?

(j) Draw the general block-diagram of a Fiber-Optic communication system.

2. (a) State the difference between "Coherent" and Non-coherent" sources. Explain how a LASER is used as an optical source in Fiber-optic instrumentation. State the difficulties faced in using LASER as a source. 5

(b) With adequate illustration, explain the operation and characteristics of "Injection LASERS". 5

3. (a) Distinguish between "Step-index" and "Graded-index" Optical fibers. Explain the method of Ray propagation in Step-index fibers. 5

(b) What is "modulation"? Discuss "Intensity modulation" with special reference to fiber-optic instrumentations. 5

4. (a) With a neat diagram, discuss the concept of source to Fiber power launching. What is coupling ? Discuss the reasons for coupling-loss. 5

(b) A Planar LED is fabricated from Gallium Arsenide has a refractive index of 3.6. Calculate the optical power emitted into air as percentage of the internal optical power for the device when the transmission factor at the crystal -air interface is 0.68. 5

5. (a) Discuss the various loss that take place in optical fiber. Draw suitable diagrams to explain your answer. 5