53 (IE 703) FOLI

2017

FIBRE OPTICS AND LASER INSTRUMENTS

Paper : IE 703

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* Draw the block diagram of an optical communication system. Explain each block. 8

   (b) Define the terms :

   Numerical aperture, Acceptance angle, Relative refractive index. 6

(c) The refractive indices of core and cladding of an optical fibre is 1·5 and 1·47 respectively.

Determine :

(i) Neumerical aperture

(ii) Relative refractive index

(iii) Acceptance angle. 6

2. (a) What are the different types of scattering losses in fibre ? Explain each. 10

(b) State the advantages of LED as a source for optical fibre communication system. 5

(c) Derive the expression for quantum efficiency of a photodiode. 5

3. (a) Define the terms : spontaneous emission and stimulated emission. 4

(b) What is population inversion ? Explain. 6

(c) With neat diagram explain the working of three level and four level Laser. 10

4. *(a)* Draw and explain the block diagram of a fibre optic instrumentation system. 6

(b) What is Sagnac interferometer? How angular velocity can be measured using sagnac interferometer? 6

(c) Explain the methods for measurement of water level and displacement by fibre optic cable. 8

5. *(a)* Explain the working of a gas laser. 10

(b) How distance can be measured using laser? Explain with neat diagram. 10

6. *(a)* What is holography? How holograms can be constructed? 10

(b) Explain the theory of holography. 10

7. Write short notes on : 5×4=20

(a) Fiber splices

(b) Medical application of lasers

(c) Mode locking

(d) PIN photodiode.