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May, 2019

M.Sc. (Physics) IV SEMESTER

PHOTONICS (PHL. 401-A)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) How refractive index varies in step and graded index fibers? Only diagram. (1.5)

(b) What are essential conditions for total internal reflection? (1.5)

(c) Which letter in 'LASER' is not appropriate and why? (1.5)

(d) What will be wavelength of light when an electron loses 2 eV energy? (1.5)

(e) What are liquid crystals? (1.5)

(f) What is population inversion? Why it is essential for obtaining laser. (1.5)

(g) How optical detectors are different from thermal detectors? (1.5)

(h) What are required properties of optical fiber materials? (1.5)

(i) How optical fiber can measure temperature? (1.5)

(j) What are fiber couplers? (1.5)

PART–B

2. (a) Explain Electromagnetic mode theory of transmission of light in optical fiber. (10)

(b) What you understand by modes in a planar wave guide? Discuss briefly. (5)

3. (a) What are important parameters of an optical detector? (5)

(b) Give the construction and working of a semiconductor laser. (10)

4. Discuss in detail stimulated Brillouin scattering & Compare it with stimulated Raman scattering. (15)

5. (a) How optical fibers are fabricated? Explain any one technique. (5)

(b) What are photonic crystal fibers? Explain construction and modes of operation. (10)

6. (a) What are PIN photodiode? Discuss briefly. (7½)

(b) What are optical amplifiers? Discuss briefly. (7½)

7. Discuss in detail the various types of losses in optical fibers. (15)