

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD
M.SC (PHYSICS) SEM-IV EXAMINATION
PHOTONICS (PH- 510) (Reappear)

Time: 3 Hours

Max. Marks:60

- Note:*
1. It is compulsory to answer the questions of Part -A. Limit your answers within 20-40 words in this part.
 2. Answer any four questions from Part -B in detail.
 3. Different parts of the same question are to be attempted adjacent to each other.

PART -A

- Q1 (a) Define acceptance cone and critical angle in optical fibres. (2)
- (b) Enlist four requirements of an optical detector. (2)
- (c) Compare LASER and LED as an optical source. (2)
- (d) Determine the normalized frequency of a step index fibre in air if N.A. is 0.16, core refractive index is 1.45 and core diameter is 60 μm . (2)
- (e) Light emitting diode works in forward bias or reverse bias? Explain. (2)
- (f) Calculate the momentum and energy of a photon of a laser beam of wavelength 6328 \AA . (2)
- (g) What do you understand by the bending losses in optical fibers? (2)
- (h) Define Rayleigh Scattering. (2)
- (i) What are non-linear losses? (2)
- (j) What is a Stokes photon? (2)

PART - B

- Q2 (a) How can SiO_2 be used in making both core and cladding? (5)
- (b) What are Graded Index (GI) fibres? Which refractive index profile produces best results for optical propagation? (5)
- Q3 (a) What are Photodetectors? Explain the working of a PIN Photodiode as a photodetector? (5)
- (b) Name any two methods of fabricating multimode and single mode fibers. Explain any one method in detail. (5)
- Q4 (a) What do you mean by Modes in a Planar wave guide? Hence find the group velocity of the wave in terms of group index of a planar waveguide. (5)
- (b) What are Directional Couplers? Find the scattering matrix for a 2x2 coupler. (5)
- Q5 (a) What are photonic crystal fibres? How are they classified into two classes? (5)
- (b) How can SiO_2 be used in making both core and cladding? (5)
- Q6 (a) Compare Stimulated Raman Scattering (SRS) and Stimulated Brillouin Scattering (SBS). (5)
- (b) Define a sensor. What are the different types of modulation schemes in Fiber optic Sensors? (5)
- Q7 Write short notes on:
- (a) He-Ne Laser (b) Solitons (5x2)