Section – A

1.(a) Two multimode step index fibers have numerical apertures 0.2 and 0.4, respectively, and both have the same core refractive Index of 1.48. Estimate the insertion loss at a joint in each fiber Caused by 5 degree angular misalignment of the fiber core axes. It may be assumed that the medium between the fibers is air.

(b) Discuss absorption loss in optical fibers, comparing and Contrasting the intrinsic and extrinsic absorption mechanism.

2. Write short notes on the following:
   a) Optical regeneration
   b) Coherent detection
   c) Parametric process
   d) Wavelength conversion.

3(a) A 6 km optical link consists of multimode step index fiber with a core refractive index difference of 1%, estimate
   i) the delay difference between the slowest and fastest mode at the fiber output.
   ii) The rms pulse broadening due to intermodal dispersion on the links.
   iii) The maximum bit rate that may be obtained without substantial errors on the link assuming only intermodal dispersion.

(b) Explain in detail intermodal and intra modal dispersion.

Section – B

4. A Germanium P-I-N photodiode with active dimensions of 100X50 micro meter has a quantum efficiency of 55% when operating at a wavelength of 1.3 micro meter. the measured dark current at this wavelength is 8 nm calculate the noise equivalent power and specify diversity for this device.

5. Write short notes on the following:
   a) WDM
   b) Optical coupler
   c) Diffraction grating
   d) Optical integrated circuit.

6. (a) Explain the working principal of intensity modulated sensors.

   (b) Explain in detail OFDM based techniques in PMD compensation.