

**Enrollment No:**

**LDRP INSTITUTE OF TECHNOLOGY AND RESEARCH**

**ELECTRONICS & COMMUNICATION DEPARTMENT**

**KSV MID SEMESTER EXAMINATION FEBRUARY 2015**

**Subject:** Optical Fiber Communication

**Code:** EC-604

**Date:** 03/03/2015

**Time:** 12:30 to 01:30

- Que. 1** (A) Define Following. (3)
- 1) Acceptance Angle
  - 2) Birefringence
  - 3) Skew Rays
- (B) Give the difference between Single Mode Fiber and Multimode Fiber. (2)
- (C) List the types of photo detector used in optical system and explain structure and operating principle of P-N Photodiode in detail. (5)

**OR**

- (C) Derive Numerical Aperture equation in terms of  $\Delta$ . (5)

- Que. 2** (A) Define signal attenuation and how is it mathematically expressed. (5)
- Explain the following:
- a. Scattering Losses.
  - b. Bending losses.
- (B) A photo diode has a quantum efficiency of 75% when photons of energy  $1.5 \times 10^{-19}$  J are incident upon it. (5)
- (i) At what wavelength is the diode operating?
  - (ii) Calculate the incident optical power required to obtain a photo current of  $3.5\mu\text{A}$

**OR**

- (A) Derive the expression for Lasing Threshold condition for LASER Diode. (5)
- (B) A manufacturer wishes to make a silica core step index fiber has N.A. = 0.30 to be used at 820 nm. If  $n_1 = 1.458$ , what should be the core size and cladding index to be. (5)

**Que.3 (A)** Define Quantum efficiency for detector & Derive equation for Responsivity. (5)

**(B)** The radiative and nonradiative recombination lifetimes of the minority charge carriers in the active region of a double heterojunction LED are 60 ns and 100 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is  $0.87 \mu\text{m}$  at a drive current of 40 mA. (5)

**OR**

**(A)** Derive the expression for Internal Quantum Efficiency and Internally generated power for LED. (5)

**(B)** Write short note on Chromatic Dispersion. (5)