Seat No:_____

GANPAT UNIVERSITY

B. TECH SEM. VI ELECTRONICS & COMMUNICATION ENGINEERING

REGULAR EXAMINATION MAY-JUNE-2013

2EC 603 OPTICAL FIBER COMMUNICATION

TIME: 3 HOURS **TOTAL MARKS: 70**

INSTRUCTIONS:

1. Attempt all questions.
2. Answers to the two sections must be written in separate answer books.
3. Figures to the right indicate full marks.
4. Assume suitable data, if necessary.

SECTION-I

Que.-1 **(A)** A double – heterojunction InGaAsP LED emitting at a peak wavelength of 1350 nm has radiative and non – radiative recombination times of 40 ns and 110 ns respectively. The drive current is 35 mA. Find out bulk recombination lifetime, internal quantum efficiency and internal power. **6**

(B) Why multimode graded index fiber is better than multimode step index fiber? Discuss both in detail. **6**

OR

Que.-1 **(A)** What is carrier confinement and optical confinement ? Draw and explain edge-emitting double – heterojunction LED. **6**

(B) Why laser source is different in terms of emitted light than LED ? Describe the working principle of laser with necessary diagram. **6**

Que.-2 **(A)** Silica has an estimated fictive temperature of 1400 K with an isothermal compressibility of 7×10^{-11} m^2 N^{-1}. The refractive index and the photo elastic coefficient for silica are 1.46 and 0.286 respectively. Determine the attenuation in decibels per kilometer due to the fundamental Rayleigh scattering in silica at optical wavelengths of 0.63 μm, 1.00 μm and 1.30 μm. Boltzmann's constant is 1.381×10^{-23} J K^{-1}. **6**

(B) How Rayleigh scattering is different from Mie scattering? Give the details of both. **5**

OR

Que.-2 **(A)** Define following terms in detail. **6**

(1) Numerical Aperture (2) Normalized Frequency (3) Radiance

(B) Explain non linear scattering losses in optical fiber. **5**

Que.-3 **(A)** Draw an optical fiber transmission link and define usefulness of each element in link. **6**

(B) Describe Dispersion shifted fibers. **6**

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SECTION-II

Que.-4	(A)	Explain the functionality of an optical receiver with necessary diagram.	6
	(B)	Why photo detectors are operated in reverse bias condition? Explain p-i-n photodiode with necessary diagram.	6

OR

Que.-4	(A)	What is the significance of front end amplifiers ? Explain generic structures of high impedance amplifier and trans -impedance amplifier.	6
	(B)	An InGaAs p-i-n photodiode has the following parameters at a wavelength of 1550 nm : I_D = 4 nA, η = 0.90 , R_L = 1000 Ω and the surface leakage current is negligible. The incident optical power is 300 nW and the receiver bandwidth is 40 MHz. Find the various noise terms of the receiver.	6
Que.-5	(A)	What is the difference between TDM and WDM? Describe operational principles of WDM .	6
	(B)	Discuss various fiber end preparation methods.	5

OR

Que.-5	(A)	Write short-note on SONET / SDH.	6
	(B)	Discuss various fiber splicing methods and compare them.	5
Que.-6	(A)	Draw and explain Erbium doped fiber amplifier architecture.	6
	(B)	Explain different lensing schemes for coupling improvement.	6

End of Paper