Seat No:_____

GANPAT UNIVERSITY

B. TECH SEM. VI ELECTRONICS & COMMUNICATION ENGINEERING

CBCS REGULAR EXAMINATION April - June 2015

(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)	What is the fundamental difference between optical amplifier and LASER? Describe basic applications of optical amplifiers.	6
	(B)	What is the wavelength range emitted by InGaAsP LED? A double – heterojunction InGaAsP LED emitting at a peak wavelength of 1310 nm has radiative and non – radiative recombination times of 30 ns and 100 ns respectly. The drive current is 40 mA. Find out bulk recombination lifetime, internal quantum efficiency and internal power.	6
		OR	
Que.-1	(A)	Describe different Erbium doped fiber amplifier architectures.	6
	(B)	An InGaAs p-i-n photodiode has the following parameters at a wavelength of 1550 nm: $I_D = 8$ nA, $\eta = 0.85$, $R_L = 1200\ \Omega$ and the surface leakage current is negligible. The incident optical power is 400 nW and the receiver bandwidth is 30 MHz. Find the various noise terms of the receiver.	6
Que.-2	(A)	Define optical confinement and carrier confinement. Draw and explain edge-emitting double – heterojunction LED.	6
	(B)	A silicon avalanche photodiode has a quantum efficiency of 65% at a wavelength of 900 nm. Suppose 0.5 μW of optical power produces a multiplied photocurrent of 10 μA. Find out the multiplication M.	5
		OR	
Que.-2	(A)	How data can be protected in BLSR SONET / SDH Rings.	6
	(B)	Describe any two methods for attenuation measurement.	5
Que.-3	(A)	Write short note on WDM Technology.	6
	(B)	Why reverse bias is applied to photo detector? Explain Avalanche Photodiode.	6

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SECTION-II

Que.-4	(A)	What is the meaning of attenuation in optical fiber? Define material absorption losses in silica glass fibers.	6
	(B)	A graded index fiber with a parabolic index profile supports the propagation of 742 guided modes. The fiber has a numerical aperture in air of 0.3 and a core diameter of 70 μm. Determine the wavelength of the light propagating in the fiber. Further estimate the maximum diameter of the fiber which gives single-mode operation at the same wavelength.	6

OR

Que.-4	(A)	Define functionality of optical add-drop multiplexer. Describe the construction of add-drop multiplexer with use of isolators and bragg grating concept.	6
	(B)	A single-mode step index fiber has a core diameter of 7 μm and a core refractive index of 1.49. Estimate the shortest wavelength of light which allows single-mode operation when the relative refractive index difference for the fiber is 1%.	6
Que.-5	(A)	Explain different types of optical fiber connectors.	6
	(B)	Draw optical fiber transmission link and explain each element in brief.	5

OR

Que.-5	(A)	Explain in brief about different types of optical fiber splices techniques.	6
	(B)	State differences between multimode step index fiber and single mode step index fiber. Why single mode fiber is used for long distance optical communication?	5
Que.-6	(A)	What is Dispersion? Describe Dispersion shifted fibers.	6
	(B)	Write short notes on: 1. Waveguide dispersion 2. Material dispersion	6

End of Paper