Exam No._____

GANPAT UNIVERSITY

B. TECH SEM. VI ELECTRONICS & COMMUNICATION ENGINEERING

CBCS REGULAR EXAMINATION APRIL-JUNE 2017

(2EC602) OPTICAL FIBER COMMUNICATION

TIME: 3 HOURS **TOTAL MARKS: 60**

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

Q-1	**(A)**	Define following terms in detail: (1) Numerical Aperture (2) Normalized Frequency	**4**
	(B)	Explain in detail about material absorption losses in optical fibers.	**5**
	(C)	Define phase velocity.	**1**
		OR	
Q-1	**(A)**	Define following terms in detail: (1) Critical Angle (2) Acceptance Angle	**4**
	(B)	Explain in detail about linear scattering losses in optical fibers.	**5**
	(C)	Define group velocity.	**1**
Q-2	**(A)**	Why multimode graded index fiber is better than multimode step index fiber? Give the detail of graded index fiber with necessary diagram.	**5**
	(B)	A single-mode step index fiber has a core diameter of 10 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%.	**5**
		OR	
Q-2	**(A)**	What are the advantages of optical fiber communication? Explain in detail.	**5**
	(B)	A graded index fiber with a parabolic index profile supports the propagation of 560 guided modes. The fiber has a numerical aperture in air of 0.3 and a core diameter of 65 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.	**5**
Q-3	**(A)**	Draw optical fiber communication transmission link and explain about each component used in it?	**5**
	(B)	Explain following in detail: (i) Intramodal dispersion (ii) Intermodal dispersion	**5**

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SECTION-II

Q-4	(A)	Describe unidirectional path switched SONET / SDH Rings.	5
	(B)	Explain in detail about general applications of optical amplifiers.	5

OR

Q-4	(A)	Describe bidirectional line switched SONET / SDH Rings.	5
	(B)	Draw and explain Erbium doped fiber amplifier architectures.	5
Q-5	(A)	Draw and explain edge-emitting double – heterojunction LED.	4
	(B)	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 respectively. The drive current is 40 mA. Find out bulk recombination lifetime and internal quantum efficiency.	4
	(C)	Define responsivity of photo detector.	2

OR

Q-5	(A)	What is stimulated emission? Explain about fabry-perot resonator cavity for a LASER diode.	4
	(B)	A silicon avalanche photodiode has a quantum efficiency of 65% at a wavelength of 900 nm. Optical power of 0.5 μW produces a multiplied photocurrent of 10 μA. Find out the multiplication M.	4
	(C)	Define quantum efficiency of photo detector.	2
Q-6	(A)	Discuss about Wavelength division multiplexing optical communication system.	5
	(B)	Explain in detail about p-i-n Photodiode.	5

END OF PAPER