Exam No: _____

GANPAT UNIVERSITY

M. TECH SEM- I (EC) REGULAR EXAMINATION– NOV-DEC-2014

3EC104 - OPTICAL COMMUNICATION SYSTEMS

TIME: 3 HRS MAX. MARKS: 60

Instructions: (1) This Question paper has two sections. Attempt each section in separate answer book.
(2) Figures on right indicate marks.
(3) Be precise and to the point in answering the descriptive questions.

SECTION: I

Q.1 (A)	A silicon avalanche photodiode has a quantum efficiency of 65% at a wavelength of 850 nm. Suppose 0.7 μW of optical power produces a multiplied photocurrent of 12 μA. Find out the multiplication M.	5
Q.1 (B)	Express the threshold condition of Lasing with the plot of injection current vs. normalized optical output power plot.	5
	OR	
Q. 1 (A)	Discuss about optical power loss model for point to point optical link.	5
Q.1 (B)	What is Four wave mixing? Why Four wave mixing is important to consider in WDM optical communication system?	5
Q.2 (A)	How Equalizer is used for dispersion compensation in optical link? Discuss in detail.	4
Q.2 (B)	What is single mode LASER? Give details of Distributed feedback LASER.	4
Q.2 (C)	Define Polarization mode dispersion.	2
	OR	
Q.2 (A)	How dispersion and non-linearity is controlled with optical phase conjugation (OPC)?	4
Q.2 (B)	Discuss different photo detector noise and define signal to noise ratio (SNR) at the output of an optical receiver.	4
Q.2 (C)	Define Coupler performance parameters.	2
Q.3 (A)	Discuss four channel wavelength multiplexer using Mach-Zehnder Interferometer.	6
Q.3 (B)	Give the idea of designing add-drop multiplexer with fiber bragg grating.	4

SECTION: II

Q.4 (A)	Design 32 channel WDM optical system set-up in pre-compensation configuration. What are the different problems occur at long distance for 40 Gbps data rate in individual channel?	7
Q.4 (B)	Discuss basic concept of Raman Amplification.	3

OR

Q.4 (A)	Design 32 channel WDM optical system set-up in post-compensation configuration. What are the different problems occur at long distance for 40 Gbps data rate in individual channel?	7
Q.4 (B)	Compare direct detection with coherent detection.	3
Q.5 (A)	Explain phase-diversity homodyne receiver. Derive expression for in-phase and quadrature-phase current components.	5
Q.5 (B)	Design 8x8 star coupler with 2x2 star couplers. Define Excess loss and splitting loss.	5

OR

Q.5 (A)	Explain phase and polarization-diversity homodyne receiver. Derive expression for x and y polarization components.	5
Q.5 (B)	Design 32x32 star coupler with 2x2 star couplers. Define Excess loss and splitting loss.	5
Q.6(A)	An InGaAs p-i-n photodiode has the following parameters at a wavelength of 1300 nm : I_D – 4 nA, η – 0.90 , R_L – 1500 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.	5
Q.6(B)	What is chirp fiber bragg grating? Discuss dispersion compensation with Fiber Bragg Grating (FBG). How it is useful in WDM optical systems?	5

----------END OF PAPER----------