Subject: OPTOELECTRONICS AND COMMUN Code: AE75

AMIETE – ET

Time:	3	Hours
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DECEMBER 2012

Max. Marks: 100

 (2×10)

studentBounty.com PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Choose the correct or the best alternative in the following: **Q.1**

- a. An eye diagram is
 - (A) a multiplexing technique (**C**) a point to point link
- (B) method to study and analyse a signal

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- (**D**) an optical source
- b. Dispersion means _____

(A) Broadening of pulse (C) A channel

- (**B**) Attenuation of pulse
- (**D**) Fiber fabrication
- c. Multiplexing is _____
 - (A) Repeating the same signal
 - (B) Increasing the power of signal
 - (C) A technique by which several signals can be transmitted simultaneously
 - (**D**) Attenuating the signal
- d. CDMA is _____
 - (A) Carries division multiple access (B) Code division multiple access (C) Code diversion multiple access (D) Coding multiple access
- e. A photodetector
 - (A) converts light to electrical from (B) converts electrical energy to light (C) lights up a system
- f. Splicing is _____
 - (A) Breaking a fiber (C) Bending a fiber
- (B) joining two fibers smoothly
- (D) Fabricating a fiber

(**D**) sends light in a fiber

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2.5	g.	LASER stands for		Solls.		
		 (A) Light amplification by stimulated (B) Light amplification by spontaneo (C) Light attenuation by stimulated en (D) Light attenuation by spontaneous 	emission of radiation ous emission of radiation mission of radiation s emission of radiation	13.00		
	h.	n. Intermodal dispersion occurs in				
		(A) Single mode fiber(B) Multimode fiber(C) A channel(D) A receiver				
	i.	DWDM is				
		 (A) Density Wave Division Multiplex (B) Dense & Wide Division Multiplex (C) Dry Wavelength Division Multiplex (D) Dense Wavelength Division Multiplex 	xing xing lexing tiplexing			
	j.	. LED generally used material is				
		(A) Direct band gap material(C) Both (A) and (B)	(B) Indirect band gap material(D) None of these			
		Answer any FIVE Questions Each question car	out of EIGHT Questions. ries 16 marks.			
Q.2	a.	What is Snell's law? Show the rematerial boundary and explain what	efraction and reflection of a light r is critical angle of incidence.	ay at a (6)		
	b.	Compare step index fiber and graded	index fiber.	(4)		
	c.	A silica optical fiber with a core dia theory analysis has a core refractive of 1.47. Determine(i) The critical angle at core claddin(ii) The numerical aperture for the fi	meter large enough to be considered index of 1.5 and a cladding refractiv interface. ber.	by ray e index		
	(iii) The acceptance angle in air for the fiber.			(6)		

- Q.3 a. Explain signal distortion in single-mode optical fiber. (6)
 - b. Derive an expression for waveguide dispersion. (5)
 - c. Explain how information capacity of optical fiber is determined. (5)
- Q.4 a. Compare LED and LASER as a source of light. What is population inversion? (8)

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studentBour b. Draw the schematic representation of a reverse biased PIN-photodiod derive expression for primary photo current I_p.

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- a. With neat sketch, explain lensing-schemes used to improve optical source-to-Q.5 fiber coupling efficiency. (8)
 - b. Show that the axial misalignment of 'd' is small compared with the core radius 'a'. (8)
- a. Briefly explain the optical digital receivers performance. Q.6 (8)
 - b. Show the bit-error rate as a function of signal to noise ratio when the standard deviations are equal $(\sigma_{on} = \sigma_{off})$ and $b_{off} = 0$. (8)
- **Q.7** a. Describe basic elements of an analog-link and the major noise contributors. (8)
 - b. Explain various multichannel transmission techniques. (8)
- **Q.8** Why is line coding an important consideration within digital optical fiber a. system design? (8)
 - b. What are Block codes?
- Q.9 Write short notes of any TWO:-
 - (i) Ultra-high capacity networks
 - (ii) Scattering Matrix Representation
 - (iii) Star couplers

 (2×8)

(8)

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