B.E. Electronics Engineering Eighth Semester EN8054 - Elective-II - Opto Electronics Devices and Communication

P. Pages : 2 Time : Three Hours			GUG/W/	
	Notes	5: 1. 2. 3. 4.	All questions carry equal marks. Due credit will be given to neatness and adequate dimensions. Illustrate your answers wherever necessary with the help of nea Use of slide rule, Logarithmic tables, Steam tables, Mollier's ch instruments, Thermodynamic tables for moist air, Psychrometri Refrigeration charts is permitted.	t sketches. art, Drawing c charts and
1.	a)	Define to the n	the relative refractive index difference for an optical fiber. Show umerical aperture for S1 fiber prove that $A = n_1 (2\Delta)^{1/2}$	how it is related 8
		where Λ Δ η_1	NA – Numerical aperture - relative refractive index differences - refractive index of core	
	b)	For S1 aperture	fiber $\eta_1 = 1.37$ and $\eta_2 = 1.35$ if the outer medium is air with $\eta_1 = 0.4$ e. Acceptance angle and critical angle.	= 1 find Numerical 8
			OR	
2.	a)	What is charact	optical fiber? Explain how you can classify optical fiber? Discuseristics features.	ss their 8
	b)	Prove the their us	hat for S1 fiber a mode remains guided when $\eta_2 K \le \beta \le \eta$, K whul ual meaning.	nere symbol have 8
3.	a)	What is dispersi	the significance of $1.3 \mu m$ wavelength? Derive the expression for on due to material dispersion effect.	or the total 8
	b)	Draw a	nd explain the schematic diagram of PCVD method for fabricatir	ng fiber. 8
			OR	
4.	a)	What an in detai	re the different types of attenuation losses in optical fibers? Disculs.	iss any two losses 8
	b)	What is	a fiber splice? What are the different splicing techniques? Expla	in in brief. 8
5.	a)	A lens Determ a forwa optical	coupled surface emitting LED launches 500μ W of optical powine the overall power efficiency if it is operating with a drive currard voltage of 1.5V. If the NA of fiber is 1.2. Estimate the coupl losses in dB.	ver into S. I. fiber. 8 rent of 100mA and ing efficiency and

b) What are direct bandgap materials? Explain why direct band gap materials are suitable for **8** manufacturing optical sources.

OR

6.	a)	Give the constructional details of surface emitter LED and state its advantages.				
	b)	Differentiate between LED and laser.				
	c)	Explain the phenomenon of population inversion in laser.				
7.	a)	 A photodiode has quantum efficiency of 65% when photons of energy 1.5×10⁻¹⁹ J are incident upon it. At what wavelength is the photodiode operating? Calculate the incident optical power required to obtained a photocurrent of 2.5µA when the photodiode is operating as describe above. 				
	 b) Draw the schematic diagram of a typical optical receiver and explain its working. the various noise sources in an optical receiver. 					
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8. a)		Explain the operation of the silicon RAPD and state the advantages of RAPD as a detector in optical fiber communications.				
	b)	Discuss the basic requirement of photodetector. Define quantum efficiency and responsivity of photodetectors and obtained relation between them.	8			
9.	a)	Explain OTDR method of fiber attenuation measurement. Discuss merits of this method.	8			
	b)	Discuss "eye pattern" which provides data handling ability in digital transmission system.	8			
OR						
10.		Write short notes on any three.	16			

- a) WDM
- b) Compare NRZ, RZ and Manchester codes
- c) SONET
- d) Active T-coupler.
