Reg. No.															

Question Paper Code	13427

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Seventh Semester

Electronics and Communication Engineering

20ECPC702 - OPTICAL COMMUNICATION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The fundamental mode of an optical fiber is _____ (a) HE_{11} (b) LP_{11} (c) LP_{10} d) LP_{02}	1	K1	CO1
2.	What is the numerical aperture of the fiber if the angle acceptance is 16^o? (a) 0.5 (b) 0.36 (c) 0.2 (d) 0.27	1	K2	CO1
3.	Which optical phenomenon causes the formation of a rainbow (splitting of white light into multiple colours)? (a) Total internal reflection (b) Refraction of light (c) Interference (d) Dispersion of light	1	K1	CO2
4.	Variation of refractive index of the core material as function of wavelength caused _____. (a) Polarization mode dispersion (b) Material dispersion (c) waveguide dispersion (d) Intermodal dispersion	1	K1	CO2
5.	The quantum efficiency of LED is defined as the ratio of_____. (a) Number of photons emitted out/ Number of photons injected in, (b) Number of photons injected out/ Number of photons emitted in (c) Number of photons emitted out*Number of photons injected in (d) None of the above	1	K1	CO3
6.	Which laser emits light in the visible region 400nm to 700nm? (a) Argon-ion (b) Nitrogen (c) Carbon-dioxide (d) Neodymium-YAG	1	K1	CO3
7.	A PIN diode consists of _____. (a) heavily doped p region, lightly doped n region separated by high resistivity material (b) lightly doped p region, heavily doped n region separated by low resistivity material (c) heavily doped p and n regions separated by high resistivity material (d) heavily doped p region, lightly doped n region separated by low resistivity material	1	K1	CO4
8.	In photo detectors, energy of incident photons must be _____ band gap energy. (a) less than (b) greater than (c) same as (d) negligible	1	K1	CO4
9.	In V-Groove mechanical splice technique, the prepared fiber ends are butted together in a _____. (a) Perpendicular groove (b) U-shaped groove (c) V-shaped groove (d) Parallel groove	1	K1	CO5
10.	All-optical networking leverages _____ to enable faster and more efficient data transmission. (a) WDM (b) TDM (c) FDM (d) QAM	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	State linearly polarized mode.	2	K1	CO1
12.	Distinguish meridional rays and skew rays.	2	K2	CO1
13.	Discuss about mode coupling. What causes it?	2	K1	CO2
14.	Define cut-off wavelength.	2	K1	CO2

15.	State the reason why direct band gap material is preferred for optical sources?	*2*	*K1*	*CO3*
16.	List any four required properties of light sources used in the optical communication.	*2*	*K1*	*CO3*
17.	State dark current noise.	*2*	*K1*	*CO4*
18.	List the various error sources in the optical receiver.	*2*	*K1*	*CO4*
19.	What are the different techniques for fiber diameter measurement?	*2*	*K1*	*CO5*
20.	Compare cutback technique and insertion loss method.	*2*	*K1*	*CO5*
21.	State the concepts of wavelength division multiplexing.	*2*	*K1*	*CO6*
22.	Distinguish SONET and SDH.	*2*	*K2*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain ray theory transmission in an optical communication; with neat diagram explain acceptance angle numerical aperture and total internal reflection using Snell's law with relevant figures and calculations.	*11*	*K2*	*CO1*
		OR			
	b)	With the help of the block diagram, explain the different components of an optical fiber link.	*11*	*K2*	*CO1*
24.	a)	Explain in detail with necessary mathematical expressions the various attenuation mechanisms in optical fiber.	*11*	*K2*	*CO2*
		OR			
	b)	Derive the expressions for material and waveguide dispersion and explain them.	*11*	*K2*	*CO2*
25.	a)	With a neat sketch, discuss the structure and working principle of surface emitting LED and Edge emitting LED.	*11*	*K2*	*CO3*
		OR			
	b)	Discuss about the mechanism behind lasing operation. Derive rate equation and obtain quantum efficiency of laser diode.	*11*	*K2*	*CO3*
26.	a)	Explain about the various types of preamplifiers available for optical networks. Explain any three of them with their circuit diagrams.	*11*	*K2*	*CO4*
		OR			
	b)	Draw the structures of Pin and APD photo detectors and explain their operations.	*11*	*K2*	*CO4*
27.	a)	Explain the various methods used for fiber attenuation measurements.	*11*	*K2*	*CO5*
		OR			
	b)	Explain the measurement technique used in the case of fiber cut-off wavelength and numerical aperture.	*11*	*K2*	*CO5*
28.	a)	Explain principles of Solitons and discuss the Soliton parameters with necessary expressions and diagrams.	*11*	*K2*	*CO6*
		OR			
	b)	Briefly explain the SONET frame structures and SONET rings with neat diagrams.	*11*	*K2*	*CO6*