PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
Diploma Engineering, Mid semester Examination

Semester: 5th Sem   **Date: (04/08/2022)**
Subject Code: (03608335)   **Time: (1hr: 30min)**
Subject Name: Optical Communication and Networking   **Total Marks: 40**

Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. English version is considered to be Authentic.

Q.1	**Answer any six out of Ten. (2 Marks Each)**	**(12)**
	1. What is Total Internal eflection?	
	2. Define Skew Ray.	
	3. Explain Group Velocity.	
	4. What is Normalzed Frequency?	
	5. Define: Core and Cladding	
	6. Draw the Helical Skew Ray path within a graded index fiber.	
	7. Define: Acceptance Angle.	
	8. A step index fiber has core refractive index is 1.44 and cladding refractive index is 1.40. Find NA for fiber.	
	9. A fiber with NA of 0.4 and operating at 1µm wavelength has a core with graded refractive profile having diameter of 40µm. Determine Normalized Frequency.	
	10. What is Phase Velocity.	
Q.2	A) Explain The Law of Reflection.	**(03)**
	OR	
	A) An optical fiber has a core refractive index of 1.5 and a cladding refractive index of 1.44. Determine i) NA for the fiber ii)Acceptance Angle in air for the fiber.	**(03)**
	B) Explain Snell's Law with diagram.	**(03)**
	OR	
	B) An optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.45 and a cladding refractive index of 1.40. Determine i)Critical Angle of Fiber ii) NA of Fiber iii)Øa in air for the fiber.	**(03)**
	C) A multimode step index fiber with a core diameter of 80µm and a relative index difference of 1.5% is operating at a wavelength of 0.85µm. If the core refractive index is 1.48, estimate (i) the normalized frequency for the fiber ii) the number of guided modes.	**(04)**
	OR	
	C) Derive the equation for Numerical Aperture.	**(04)**
	D) Draw the block diagram of Optical Fiber Communication and Explain it.	**(04)**
Q.3	A) Explain Ray Propagation in Step Index Fiber.	**(03)**
	OR	
	A) List out Advantages of Fiber Optic systems.	**(03)**
	B) Explain Multimode Step Index.	**(03)**
	OR	
	B) A graded index fiber has a core with a parabolic refractive index profile which has a diameter of 45µm. the fiber has a N.A. of 0.3. Estimate the total number of guided modes propagating in the fiber when it is operating at wavelength of 1.2µm.	**(03)**
	C) How Graded Index Fiber works? Explain it.	**(04)**
	OR	
	C) A multimode step index fiber has a relative refractive index difference of 1% and a core refractive index of 1.5. The number of modes propagating at a wavelength of 1.3µm is 1100. Estimate the diameter of the fiber core.	**(04)**
	D) Explain different types of Losses in optical fiber.	**(04)**