GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VII EXAMINATION – WINTER 2025

Subject Code:3170314   **Date:01-12-2025**

Subject Name:LASER and Fiber Optics in Medical Technology

Time:10:30 AM TO 01:00 PM   **Total Marks:70**

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Discuss the characteristics of LASER light.	**03**
	(b)	The refractive index of the core of an optic fiber was 1.47 and that of the cladding was 1.44, Calculate Cone of acceptance.	**04**
	(c)	Describe the Operation of LASER with Proper Diagram.	**07**
Q.2	**(a)**	A light ray is traveling in a transparent material of refractive index 1.51 and approaches a second material of refractive index 1.46. Calculate the critical angle.	**03**
	(b)	What is the Cone of acceptance and Numerical Aperture? Write down the equations for calculating NA and Cone of acceptance.	**04**
	(c)	Write a Short Note on ND-YAG LASER.	**07**

<div align="center">OR</div>

	(c)	Write a short note on CO_2 LASER with necessary diagram.	**07**
Q.3	**(a)**	Give classification of LASER.	**03**
	(b)	Express 5 watts as a power level in decibels	**04**
	(c)	(a) Discuss: Losses in Fiber optics because of Rayleigh Scattering and Fresnel Reflection.	**03**
		(b) If light leaves a material of refractive index 1.45 and crosses an abrupt boundary into a material of refractive index 1.0, Calculate the Fresnel loss	04

<div align="center">OR</div>

Q.3	**(a)**	Enlist various types of Medical LASER with its major medical applications.	**03**
	(b)	A light source for a fiber optic system has an output power quoted as –14 dbm. Express this power in watts. (Consider Input Power 1mW).	**04**
	(c)	Describe snell's law and Total Internal Reflection with necessary diagram.	**07**
Q.4	**(a)**	Discuss Given Non-Thermal Interaction methods used for therapy : Photochemical Interaction & Photoablation	**03**
	(b)	Write a Short Note: Thermal interaction of LASER with Tissues	**04**
	(c)	Explain Components of Endoscopes in Detail.	**07**

<div align="center">OR</div>

Q.4	**(a)**	Discuss Given thermal Interaction methods used for therapy : Hyperthermia, Thermotherapy and Coagulation	**03**
	(b)	Write a Short Note: Non-Thermal interaction of LASER with Tissues	**04**

	(c)	Discuss various advance methods of endoscopic diagnosis.	**07**
Q.5	**(a)**	Describe: Laser Prostatectomy	**03**
	(b)	Write a Brief Note on: Angioscopy	**04**
	(c)	Explain Principle of Fiber Optic Biomedical Sensing System with necessary Diagram.	**07**

OR

Q.5	**(a)**	Write a brief Note on: Laparoscopic Laser Cholecystectomy	**03**
	(b)	Explain working principle of Fiber optic Indirect Pressure Sensor.	**04**
	(c)	Explain various Endoscopic LASER system components of Cardiology.	**07**

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