

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name: Applied Optics

Subject Code: 4SC04APO1

Branch: B.Sc. (All)

Semester: 4

Date: 01/05/2019

Time: 02:30 To 05:30

Marks : 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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Q-1 Attempt the following questions: (14)

- a) What are the major ions in Ruby laser?
- b) Give one example of Gas laser.
- c) One example of solid state laser.
- d) What are advantages of optical fiber?
- e) What is refractive index?
- f) What is monochromatic?
- g) Define light.
- h) What is critical angle?
- i) What is TIR?
- j) What material use to make the optical fiber.
- k) What is sensor?
- l) What is attenuation?
- m) What is dispersion?
- n) What is FBG?

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions (14)
(a) What is stimulated emission? Explain how excitement of atom takes place. **8**



	(b)	Explain the condition for spontaneous emission.	6
Q-3		Attempt all questions	(14)
	(a)	Explain the meta stable state in semiconductor.	8
	(b)	Explain population inversion for production of photons.	6
Q-4		Attempt all questions	(14)
	(a)	Explain the principle and working of a PN junction laser.	7
	(b)	Explain the principle and working of Nd-YAG laser.	7
Q-5		Attempt all questions	(14)
	(a)	Explain the principle of light communication through fiber.	6
	(b)	What is the difference between single mode and multi mode fiber? Explain with suitable figure.	8
Q-6		Attempt all questions	(14)
	(a)	In an optical fiber, the core material has refractive index is 1.43 and refractive index of clad material is 1.4. Find the propagation angle.	7
	(b)	Calculate the numerical aperture of an optical fiber from the following data: n_1 (core)=1.546 and n_2 (cladding) =1.378	7
Q-7		Attempt all questions	(14)
	(a)	Prove: $B_{21}=B_{12}= \frac{c^3}{8\Omega h^3 \mu^3} A_{21}$	7
	(b)	Explain the Fourier transforming property of a thin lens.	7
Q-8		Attempt all questions	(14)
	(a)	What is holography? Show with figure.	6
	(b)	Explain the working principle of holography.	8

