Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name: Laser and Fiber optics

Subject Code: 4SC04PHC2 **Branch: B.Sc. (All)**

Semester: 4 **Date: 26/04/2017** **Time: 10:30 To 01:30** **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.

Q-1 **Attempt the following questions:** **(14)**

a) Give the full form of LASER.
b) What are the applications of Holography?
c) Which are the three main parts of an optical fiber?
d) What is Pumping?
e) Define Metastable state.
f) How does light travel in an optical fiber?
g) Which are the processes by which light interacts with matter?
h) Define fractional refractive index change.
i) What is Holography?
j) How is a hologram different from an ordinary photograph?
k) By which process is a hologram reconstructed?
l) Which are the two main types of an optical fiber?
m) Define the term resonant energy transfer.
n) Gives the Mode of propagation of optical fiber.

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

Q-2 **Attempt all questions** **(14)**

(a) Explain the concept of critical angle of propagation with appropriate diagrams. **(07)**
(b) Explain the process of absorption and spontaneous emission of light with figure. **(07)**

Q-3 **Attempt all questions** **(14)**

(a) Explain Nd-YAG Laser with diagram in details. **(06)**
(b) Which are the two types of pumping schemes? Explain three level pumping. **(04)**
(c) What is an optical fiber? Explain the principle on which it works. **(04)**

Q-4 **Attempt all questions** **(14)**

(a) Derive the Einstein relations and hence prove that the ratio of the coefficients of spontaneous to stimulated emission is proportional to the third power of the frequency of radiation. **(07)**
(b) Write a short note on population inversion. **(04)**
(c) Define stimulated emission. **(03)**

Q-5		**Attempt all questions**	**(14)**
	(a)	Explain the fiber optic communication system with a neat diagram.	**(07)**
	(b)	Explain the principle on which holography works. Explain the process of constructing a hologram with appropriate diagram.	**(07)**
Q-6		**Attempt all questions**	**(14)**
	(a)	Gives the application of optical fiber.	**(06)**
	(b)	Explain the principle, construction and working of a Ruby Laser with a neat diagram.	**(08)**
Q-7		**Attempt all questions**	**(14)**
	(a)	Give the difference between single mode and multimode fiber.	**(07)**
	(b)	Define a hologram. Explain the process of reconstruction of a hologram.	**(07)**
Q-8		**Attempt all questions**	**(14)**
	(a)	Explain the working of semiconductor Lasers.	**(07)**
	(b)	Derive the formula for acceptance angle with a neat diagram.	**(07)**