

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)

