Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Applied Optics

Subject Code: 4SC04APO1 **Branch: B.Sc. (Chemistry, Physics)**

Semester: 4 **Date: 08/05/2018** **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) Define term Absorption of light.

b) Define optical Modes.

c) Write the formula for acceptance angle

d) What are advantages of optical fiber?

e) Which region has higher refractive index in optical fiber

f) Write any two applications of Laser.

g) Write the formula for NA.

h) Write the formula of rate of absorption transition.

i) Write the formula of rate of stimulated transition.

j) What is the difference between multimode and mono mode.

k) Write the formula of rate of spontaneous emission.

l) What is the separation of natural light with laser light?

m) In which process resulting emitted light is not monochromatic.

n) Give an example of gas laser.

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

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

(a) What is optical cavity? Explain how the standing wave forms in optical cavity. **7**

			7
	(b)	Explain the condition for stimulated emission to dominate spontaneous emission.	
Q-3		**Attempt all questions**	**(14)**
	(a)	Explain the pumping scheme for laser action	**8**
	(b)	Explain population inversion in the production of laser.	**6**
Q-4		**Attempt all questions**	**(14)**
	(a)	Explain the principle and working of a He-Ne laser.	**7**
	(b)	Explain the principle and working of Nd-YAG laser.	**7**
Q-5		**Attempt all questions**	**(14)**
	(a)	Explain the principle and cross sectional view of fiber optics. What is the proper diameter of all the three regions?	**8**
	(b)	What are the differences between step index and graded index fiber? Explain with suitable figure.	**6**
Q-6		**Attempt all questions**	**(14)**
	(a)	In an optical fiber, the core material has refractive index 1.1 of clad material is 1.3.what is the value of critical angle? Also calculate the value of angle of acceptance.	**7**
	(b)	Calculate the numerical aperture and acceptance angle of an optical fiber from the following data: n_1 (core)=1.55 and n_2(cladding) =1.50	**7**
Q-7		**Attempt all questions**	**(14)**
	(a)	Explain the spatial frequency filtering concept of Fourier optics.	**7**
	(b)	Explain the Fourier transforming property of a thin lens.	**7**
Q-8		**Attempt all questions**	**(14)**
	(a)	Explain operation and principle of Holography, briefly	**6**
	(b)	Explain the construction and formation of image by Holography technique	**8**