Paper Code: OE-033	Roll No.									

B.TECH

THIRD SEMESTER EXAMINATIONS, 2016-17

LASER SYSTEM & APPLICATION

[Time: 3 Hours] [Max. Marks: 100]

Note: Attempt all questions. All questions carry equal marks.

1. Attempt any *two* parts of the following:- **(10x2 = 20)**

(a) Write a note on Heisenberg's uncertainty principle and explain that the electron can't reside inside the nucleus.
(b) Drive the time-independent Schrodinger wave equation and state the conditions that must be satisfied by the solution of the above wave equation.
(c) For an ordinary source, the coherence time $t_c=10^{-10}$ sec, obtain the degree of non-mono-chromaticity for wavelength λ_o=5400Å

2. Attempt any *two* parts of the following:- **(10x2 = 20)**

(a) Explain the concept of temporal and spatial coherence.
(b) What are Einstein's coefficients A and B? Derive the relation between them.
(c) What is pumping process in Laser? Explain any two types of pumping in detail with example.

3. Attempt any *two* parts of the following:- **(10x2 = 20)**

(a) What is the principle of laser action? Describe the main components of a laser.
(b) Describe the working process of a four level laser with proper energy level diagram. Why four level laser is advantageous over three level laser?
(c) What do you mean by Q-switching? Describe two methods of Q-switching.

4. Attempt any *two* parts of the following:- **(10x2 = 20)**

(a) Draw energy level diagram of Nd-YAG laser and explain their pumping and lasing transitions.
(b) Explain the working process of the He : Ne laser with a proper energy level diagram and state the role of (He) atom in He : Ne laser.
(c) Explain the construction and working process of a CO_2 laser with a neat energy level diagram.

5. Attempt any *two* parts of the following:- **(10x2 = 20)**

(a) Explain in brief the applications of laser in materials processing.
(b) What are the applications of laser in medical field?
(c) What is LIDAR technology? How it is different from a microwave RADAR.