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BTECH
(SEM III) THEORY EXAMINATION 2021-22
LASER SYSTEM & APPLICATION

*Time: 3 Hours**Total Marks: 70***Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief.****2 x 7 = 14**

a.	What is laser gain and loop gain?
b.	What are the advantages of four level lasers over three level laser system?
c.	Why the spectrum of black body could not be explained by the concept of classical mechanics?
d.	What is optical cavity and state its types
e.	What is the role of Helium in He- Ne laser?
f.	What are the characteristics of dye molecules?
g.	State two differences between photography and holography?

SECTION B**2. Attempt any three of the following:****7 x 3 = 21**

a.	Explain Bohr's atomic model and derive expression for the spectral Series of Hydrogen atom.
b.	What is wave function? Derive Schrodinger time dependent and independent wave equations
c.	What is dye laser? Discuss advantages, drawbacks and application of dye lasers
d.	Discuss various methods of Q- switching. How it is helpful in generating laser pulses?
e.	Explain four level laser with diagram and derive the rate equation for various levels in four level laser systems.

SECTION C**3. Attempt any one part of the following:****7 x 1 = 7**

(a)	Derive and expression for Energy Eigen Value and Eigen Function for a particle in an infinite deep potential well.
(b)	Calculate the population ratio of two states in He- Ne laser that produces light of wavelength 6000Å at 300K

4. Attempt any one part of the following:**7 x 1 = 7**

(a)	Describe Alexandrite laser and its characteristics. How tuning of laser wavelengths can be done in this laser?
(b)	Define Stimulated and Spontaneous Emission. Derive an expression for Einstein's coefficients

5. Attempt any one part of the following:**7 x 1 = 7**

(a)	Discuss the working of Excimer laser and state its properties and applications
(b)	Explain Construction and Working of Ruby Laser.

6. Attempt any one part of the following:**7 x 1 = 7**

(a)	Explain Construction and working of Argon ion laser. Write down different characteristics and applications of the ion lasers.
(b)	What is a mode -locked laser? Explain Active and Passive mode locking

7. Attempt any one part of the following:**7 x 1 = 7**

(a)	What is hologram? Explain the construction and reconstruction of a hologram with a suitable diagram.
(b)	Discuss the interaction mechanism between lasers and metals.