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BTECH
(SEM III) THEORY EXAMINATION 2023-24
LASER SYSTEM AND APPLICATIONS

TIME: 3HRS

M.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.	Define Spatial coherence.
b.	What do you men by Energy Level?
c.	Define Resonators.
d.	Define Loop gain.
e.	What is Semiconductor diode laser?
f.	Why pumping is necessary for laser action?
g.	List the safety consideration of Laser.

SECTION B

2. Attempt any *three* of the following:

7 x 3 = 21

a.	Differentiate between Longitudinal Coherence length, Transverse Coherence length
b.	What is optical cavity? Calculate the loop gain with and without losses for optical cavity.
c.	Differentiate between continuous wave laser and pulse laser. Discuss various pulsating technique for a laser.
d.	Give the advantage and disadvantage of laser in material processing.
e.	What are solid state lasers? Describe construction, working and application of alexandrite lasers. What is its advantage?

SECTION C

3. Attempt any *one* part of the following:

7 x 1 = 7

a.	Define Laser. Give the Properties, Advantages and Disadvantages of laser beams
b.	Define Spontaneous Emission and Stimulated emission processes with its characteristics.

4. Attempt any *one* part of the following:

7 x 1 = 7

a.	Define Two, three and four level pumping schemes.
b.	What is Gain in lasers? Also define Gain factor.

5. Attempt any *one* part of the following:

7 x 1 = 7

a.	What are the main components of laser? Briefly explain each component.
b.	What are the advantages of four level lasers over three level lasers? Derive an expression for threshold pumping power required to start laser action in three level laser systems.



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Subject Code: BOE312

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6. Attempt any *one* part of the following:

7 x 1 = 7

a.	Describe the construction and working of CO ₂ laser. A gas laser is generating a laser beam of 4 mW power. Calculate the number of photons emitted by the laser. The wave length of the emitted radiation is 680 nm.
b.	With suitable schematic diagram explain the working of dye laser. How dye lasers are tuned?

7. Attempt any *one* part of the following:

7 x 1 = 7

a.	How lasers are useful in drilling and cutting. Discuss applications of lasers in melting.
b.	Discuss the principle of holography. Explain construction and reconstruction of hologram.

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