Subject Code: MTEC052

PAPER ID-411474

Roll No: | | | | | | | | | | | | | |

MTECH
(SEM II) THEORY EXAMINATION 2023-24
OPTOELECTRONIC DEVICES

TIME: 3 HRS **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.	What is a dielectric slab waveguide?
b.	Define radiation modes.
c.	Define the power efficiency of an LED.
d.	Explain the Burrus-type LED.
e.	What is a LASER?
f.	What is optical detection theory?
g.	What is the Kerr effect?

SECTION B

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

a.	Explain the difference between TE and TM polarizations in optical waveguides.
b.	Discuss the power and efficiency characteristics of Light Emitting Diodes (LEDs) and the factors affecting them.
c.	Explain black-body radiation and its relevance to laser technology.
d.	Explain quantum efficiency and its significance in the performance of photo detectors.
e.	Discuss the Kerr, Pockels, and Faraday effects and their applications in electro-optic devices.

SECTION C

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

a.	Explain the structure and function of a dielectric slab waveguide.
b.	Describe the types of non-linear scattering that can occur in optical fibers.

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

a.	Describe the working principle and applications of surface-emitting and edge-emitting LEDs.
b.	Explain the role of LEDs in high-speed communication systems and their performance requirements.

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

a.	Explain the threshold condition for laser oscillation and its importance in laser design.
b.	Explain the temperature effects on laser diodes and the techniques used to mitigate these effects.

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

a.	Explain the concept of Signal-to-Noise ratio (SNR) and how it is calculated for photo detectors
b.	Explain the working principle and applications of magneto-optic devices.

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

a.	Discuss the design and operation of optical A/D and D/A converters and their applications.
b.	Discuss the role and importance of optical isolators in fiber optic communication.