Printed Pages: 02 **Sub Code:EIC-011**

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B. TECH
(SEM-VI) THEORY EXAMINATION 2017-18
OPTO ELECTRONICS

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If you require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Differentiate between opto electronics and optical fiber communication.
b. What do you mean by Interferometers?
c. Compare the LED and Laser.
d. Define: Phase modulator.
e. What do you mean by fiber-optic-sensor?
f. Listed the advantages of optical sensors.
g. What do you mean by Numerical Aperture?
h. Define the term: Sensors.
i. Listed the features of Birefringent crystals.
j. What do you mean by Opto Electronics?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. (i) Calculate the numerical aperture and hence the acceptance angle for an optical fiber given that the refractive indices of the core and the cladding are 1.45 and 1.40 respectively.
(ii) Describe the light source materials that are used in manufacturing LEDs. Also explain their advantages.
b. How is parametric amplification obtained through no-linear effects of optical fibers?
c. What is a speckle phenomenon? Explain the operation of Laser Interferometer.
d. What are multimode FO sensors? Describe a fiber optic Gyroscope.
e. (i) What is homomorphic system and where it is used? Explain it with suitable example.
(ii) What is phase matching condition? Explain with it different applications.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) Distinguish between symmetric, asymmetric slab wave guides. What is a channel waveguide and explain its operating principle.
(b) (i) Discuss Laser action in semiconductors and derive its external quantum efficiency.
(ii) Discuss the working of p-i-n photodiode and compare it with Avalanche photo diode.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Discuss about the procedure for fabricating an electro-optic phase modulator in lithium niobate.

(b) What are non-linear effects of optical fibers? Explain Pockel's effect, harmonic generation, solitans and self phase modulation with reference to non-linear effects.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the principle of Holography. What is On-axis and Off axis Holography? Also explain how real time holographic interferometry can be useful?

(b) Discuss the working of integrated optical spectrum analyzer. Explain the application of any device depending on Faraday rotation effect.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Write a short note on:
   (i) Spatial Light Modulators.
   (ii) Intensity Modulated Sensors.

(b) Explain the principle of Micro-bend optical fiber sensors. By means of a configuration, show how a micro-bending fiber sensor could be used for monitoring structural deformation.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) (i) Subtract $(22)_{10}$ and $(15)_{10}$ in MSD arithmetic.
(ii) Discuss the working of Analog optical Adder.

(b) What do you mean by theta modulator devices shadow casting and symbolic substitution?