



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 132651

Roll No.

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B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15
OPTO ELECTRONICS

Time : 2 Hours]

[Total Marks : 50

Note : Attempt All Questions. Each questions carry equal marks.

1 Attempt any four parts of the following : $3\frac{1}{2} \times 4 = 14$

- (a) A symmetric Step Index(SI) planar wave guide is made of glass with $n_1 = 1.5$ and $n_2 = 1.49$. The thickness of the guide layer is $9.82 \mu\text{m}$ and the guide is excited by a source of wavelength $\lambda = 0.85 \mu\text{m}$. What is the range of propagation constants? What is the maximum number of mode supported by the guide?
- (b) Derive Modulation Response of an LED.
- (c) Discuss Laser Action in semiconductors and derive its external quantum efficiency.

- (d) Discuss the working of p-i-n photodiode and compare it with Avalanche photo diode.
- (e) With suitable diagram explain the working of displacement sensors using optical fiber.
- (f) Review various laws of optics used in optical communication.

2 Attempt any TWO parts of the following: **6x2=12**

- (a) With the help of suitable diagram and mathematics explain the working of Longitudinal Electro optic Phase Modulator.
- (b) Discuss the Salient features of Birefringent crystals. Name four materials which shows birefringence. Calculate the thickness of quarter wave plate made of Calcite and to be used with sodium light ($\lambda = 0.589 \mu\text{m}$). It is mentioned that for calcite n_o and n_e are 1.658 and 1.486, respectively.
- (c) Discuss the working of Electro optic Intensity Modulators. Design TE to TM convertor based on electro optic effect in GaAs.

3 Attempt any TWO parts of the following: **6x2=12**

- (a) With the help of suitable diagram explain the working of Integrated Optical spectrum Analyzer.
- (b) How Holography is important in three dimensional imaging. What is Sagnac effect and how it is used in designing fiber Optic Gyroscope.
- (c) With Mathematical support discuss how thin lens can be used fo fourier transformation of optical Image .

4 Attempt any FOUR parts of the following : **3×4=12**

- (a) With the help of figures discuss the working of Spatial light Modulator.
- (b) Subtract $(28)_{10}$ and $(7)_{10}$ in MSD arithmetic.
- (c) Perform $46+12$ using residue arithmetic with the bases 2,5,7.
- (d) Discuss the working of Analog optical Adder.
- (e) What is Homomorphic system and where it is used ? Explain it with suitable example.
- (f) Discuss substitution rules for MSD addition.
