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5585

Reg. No. : .....

Name : .....

**Seventh Semester B.Tech. Degree Examination, October 2014**  
**(2008 Scheme)**

**08.735 Elective – III : OPTOELECTRONIC DEVICES (TA)**

Time : 3 Hours

Max. Marks : 100

**PART – A**

Answer **all** questions. **Each** question carries **4** marks.

1. Distinguish between absorption and radiation in semiconductor devices. How it is related to energy band structures ?
2. What is responsivity of a optical detector diode ? Give expression.
3. Draw V-I characteristics of a solar cell. Explain briefly.
4. What is a Quantum Well (QW) structure ? What is the merit of QW structure ?
5. Explain the working principle of FP Laser.
6. Compare APD and PIN detectors.
7. A LED fabricated from Ga As draws a current of  $20 \mu A$ . It is supplied with 5 Watts of electrical power and it delivers  $50 \mu W$  optical power. If refractive index of material used is 3.6, Calculate the conversion efficiency.
8. Give two merits of coherent detection.
9. Explain the working principle of an acousto-optic modulator.
10. What is population inversion in a lasing medium? How it is affected by temperature ?



P.T.O.



## PART – B

Answer **any two** questions from **each** Module. **Each** question carries **10** marks.

**Module – I**

11. Explain with neat sketches, the working of a PIN Diode. Calculate responsivity at 1300 nm if 600 electrons are generated for every 800 photons. Also calculate number of photons/bit required for binary detection for bit error probability of  $10^{-9}$ , if dark current is zero.
12. What are the features of hetero junction structures ? Distinguish between carrier confinement and optical confinement in hetero junction structures. Use neat sketches.
13. Explain in detail, classification of semiconductors based on band gap structures. Explain why a direct gap semiconductor is preferred to indirect gap semiconductor for fabricating LEDs.

**Module – II**

14. Explain V – I characteristics and spectral response of a solar cell. Give its design considerations.
15. Explain the working of acousto optic modulator, using neat diagrams.
16. Explain structure, principle of operation and frequency response of a LED.

**Module – III**

17. Deduce expression for gain in a two level lasing medium.
  18. What are QW Lasers ? Explain its the constructional features.
  19. Write short notes on :
    - a) Mode locking in semiconductor lasers.
    - b) DFB laser
    - c) Rare earth doped lasers.
    - d) FP laser.
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