

**B.TECH SEM – VII (2007 COURSE) (ELECTRONICS ENGG.) :**

**WINTER - 2017**

**SUBJECT: ELECTIVE I: OPTO ELECTRONICS**

**Day: Wednesday**

**Date: 24/01/2018**

**Time: 02.30 PM TO 05.30 PM**

**Max. Marks: 80**

**W-2017-2583**

**N.B:**

- 1) **Q.No.1 and Q.No.5 are COMPULSORY.** Out of the remaining attempt **ANY TWO** questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.
- 4) Assume suitable data if necessary.

**SECTION-I**

- Q.1**
- a) Describe method of modulation of Lasers. (05)
  - b) Describe working of IR Detector. (05)
  - c) Describe the principle of opto-isolator. (04)
- Q.2**
- a) What are characteristics of injection laser? Also calculate the ratio of the threshold current densities at 20°C and 80°C for AlGaAs injection laser with  $T_0 = 160$  k. (07)
  - b) Compare characteristics of surface and edge emitting LEDs. (06)
- Q.3**
- a) Explain the operation of P-I-N photodiode. Also compare it with APD. (07)
  - b) A photodiode with quantum efficiency 65% when photon of energy  $1.5 \times 10^{-10}$  J are incident upon it. Determine : (06)
    - i) at what wavelength photodiode is operating.
    - ii) Calculate incident optical power required to obtain a photocurrent of  $2.5 \mu A$
- Q.4**
- a) Describe in detail holographic techniques. (07)
  - b) Explain the following: (06)
    - i) Alphanumeric Display
    - ii) LCD

**SECTION-II**

- Q.5**
- a) List and explain various types of optical fibers. (05)
  - b) Explain the mechanical and fusion splicing techniques. (05)
  - c) Describe WDM with its types. (04)
- Q.6**
- a) A step index fiber has core reference index 1.5 and  $\Delta=1.3\%$  with core diameter of 100 micrometer. The operating wavelength is 820 nm. Calculate the following assuming the fiber is kept in air. (07)
    - i) NA of fiber
    - ii) Critical Angle
    - iii) Acceptance angle
  - b) Describe intermodal and intramodal dispersion. (06)
- Q.7**
- a) Explain the key elements considered while calculating optical power budget. Derive the relation for optical power budget. (07)
  - b) Draw and explain LED and LASER Drive circuits. (06)
- Q.8**
- a) Describe optical amplifiers and write its applications. (07)
  - b) Write a short note on Long Haul Link. (06)

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