

Code: ECMC1T2

**I M.Tech - I Semester-Regular/Supplementary Examinations  
January 2017**

**FIBER OPTIC COMPONENTS, MEASUREMENTS &  
NETWORKS  
(MICROWAVE & COMMUNICATION ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Answer any FIVE questions. All questions carry equal marks

1. a) Define the internal quantum efficiency of a LED. Derive the expression for the same. 7 M
- b) Discuss about modulation of Laser diodes. 7 M
2. a) What are the possible noise sources that contribute the photo detector noise. 7 M
- b) An InGaAs pin photodiode has the following parameters at a wavelength of 1300 nm,  $I_D=4$  nA,  $\eta=0.9$ ,  $R_L=1000$  ohms and the surface leakage current is negligible. The incident optical power is 300nw (- 35 dBm), and the receiver bandwidth is 20 MHz . Find the various noise terms of the receiver. 7 M

3. a) A step index fiber has a core refractive index of 1.5 and a core diameter of  $50\ \mu\text{m}$ . The fiber is jointed with a lateral misalignment between the core axes of  $5\ \mu\text{m}$ . Estimate the insertion loss at the joint due to the lateral misalignment assuming a uniform distribution of power between all guided modes when: 8 M
- (i) there is a small air gap at the joint;
  - (ii) the joint is considered index matched.
- b) Discuss in detail about Fusion splices with neat sketches. 6 M
4. a) Explain the different methods of three port couplers. 7 M
- b) Explain the forward and backward pumping capability associated with the fiber Raman amplifier. 7 M
5. a) Explain the strip waveguide phase modulator with neat sketches. 7 M
- b) Draw the hybrid integrated bistable optical device. Explain. 7 M
6. a) What is optical sensor? Explain intensity based optical sensor. 7 M

- b) Explain the principle of temperature measurement using fiber optic. 7 M
7. a) Explain the fiber optic receiver operation using a simple model and its equivalent circuit. 7 M
- b) Explain the wavelength division multiplexers and demultiplexers. 7 M
8. a) Draw and explain Broad cast and select network of fiber optic networks. 7 M
- b) Write short notes on wavelength routed networks. 7 M