Code: EC7T1

**IV B.Tech - I Semester – Regular Examinations - November 2015**

# OPTICAL COMMUNICATIONS
## (ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours                                   Max. Marks: 70

Answer any **FIVE** questions.   All questions carry equal marks

1 a) Draw the general system diagram for optical communication system and describe the purpose of each component.                                          7 M

  b) Write the applications of optical communications.     7 M

2 a) Write about different types of fibers used in optical communications in terms of refractive index profile, cross sections and dimensions.                      7 M

  b) Derive wave equation for single mode fibre.          7 M

3 a) Calculate the number of modes at 820 nm in a graded index fiber having a parabolic index profile 1.90, of a 25 $\mu$ meters core radius, $n_1 = 1.48$ and $n_2 = 1.46$.  How does it compare to a step index fiber?                7 M

  b) Explain linear scattering loss in detail.            7 M

4 a) Derive the expression for wave guide dispersion and obtain the relation between V and $\beta$. 7 M

b) What are requirements of a good connector? Derive the expression for connector return loss in single mode fiber. 7 M

5 a) Explain internal quantum efficiency and internal power generate in LED with suitable expressions. 7 M

b) Write short notes on light source material and give the expression for peak emission wavelength. 7 M

6 a) Explain with neat diagram avalanche photo diode principle of operation. Derive the expression for multiplication M and responsively of avalanche photo diode. 7 M

b) For a wavelength range 1300 nm $< \lambda <$ 1600 nm, the quantum efficiency for InGaAs is around 90 percent. Find responsivity at wave lengths mentioned above. 7 M

7 a) Explain digital receiver performance of an optical fibre system. 7 M

b) Discuss the digital system planning considerations

7 M

8 a) With a neat sketch explain how attenuation in a fiber are measured using cut back methods. 7 M

b) Explain how to measure frequency domain intermodal dispersion. 7 M