

Code: EC7T1

**IV B.Tech - I Semester – Regular/Supplementary Examinations  
October - 2019**

**OPTICAL COMMUNICATIONS  
(ELECTRONICS & COMMUNICATION ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

**PART – A**

Answer *all* the questions. All questions carry equal marks

11 x 2 = 22

1.

- a) What are the various elements of an optical communication system?
- b) What are the advantages of Optical Communications?
- c) Define mode –field diameter.
- d) What are the causes to get attenuation of the Optical Signal?
- e) What are the techniques used in splicing?
- f) Discuss the concept of Spontaneous emission in LED.
- g) Define Population Inversion.
- h) Write the expression for the Responsivity.
- i) Give the advantages of PIN diode.
- j) Explain briefly about WDM.
- k) Define OTDR.

## PART – B

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

$$3 \times 16 = 48$$

2. a) With a neat diagram, explain the working principle of analog and digital optical Communication systems. 8 M
- b) Compute the V-number and number of modes supported by a fiber with  $n_1=1.48$ ,  $n_2=1.46$  and core radius  $25 \mu\text{m}$  and operating wavelength is  $1300 \text{ nm}$  for a Step index fibers. 8 M
3. a) Discuss about Material absorption losses in silica glass fibers. 8 M
- b) An optical fiber has a core refractive index of 1.5. Two lengths of the fiber with smooth and perpendicular end faces are butted together. Assuming the fiber axes are perfectly aligned, calculate the optical loss in decibels at the joint (due to Fresnel reflection).  
When there is a small air gap between the fiber end faces. 8 M
4. a) Draw the ideal light output against current characteristic curve and explain the operation of LASER. 8 M
- b) Explain Double-heterojunction LED. 8 M

5. a) Explain about APD with a neat sketch along with its construction and operation. 8 M
- b) Derive the expressions for quantum efficiency and LED power. 8 M
6. a) Explain about the Cut Back Method of Attenuation Measurement with a neat diagram. 8 M
- b) Draw and explain the architecture of single-hop broadcast - and – select network. 8 M