Question Paper Code : X60464

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020

Seventh Semester

Electronics and Communication Engineering

EC 2402/EC 72/10144 EC 702 – OPTICAL COMMUNICATION AND NETWORKING

(Regulations 2008/2010)

(Common to PTEC 2402 – Optical Communication and Networking for B.E. (Part-Time) Sixth Semester – Electronics and Communication Engineering – (Regulations 2009))

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   **(10×2=20 Marks)**

1. For $n_1 = 1.55$ and $n_2 = 1.52$, calculate the critical angle and numerical aperture.

2. What is a Linearly polarized mode ?

3. Define signal attenuation.

4. What are bending losses? Name any two types.

5. Write two differences between a Laser diode and a LED.

6. For a photodiode define quantum efficiency – η and responsivity – R.

7. For a pin photo diode having operating wavelength of 1300 nm, the quantum efficiency is around 90%. Calculate the responsivity of the photo diode.

8. Define Quantum Limit.

9. What is optical CDMA ?

10. Distinguish SONET and SDH.

PART – B   **(5×16=80 Marks)**

11. a) i) Derive the mode equations for a circular fibre using Maxwell's equations. **(8)**

     ii) Calculate the Numerical Apertures of a fibre having $n_1 = 1.6$ and $n_2 = 1.49$ and another fibre having $n_1 = 1.458$ and $n_2 = 1.405$. Which fibre has greater Acceptance angle ? **(8)**

(OR)

   b) i) Explain the ray theory of a fibre with a special mention about TIR, Acceptance angle and NA. **(8)**

     ii) Describe Single mode fibres and their mode - field diameter. What are the propagation modes in them ? **(8)**

12. a) What are the loss or signal attenuation mechanisms in a fiber ? Explain. **(16)**

(OR)

   b) i) Discuss in detail about fiber splicing. **(10)**

     ii) What are the primary requirements of a good fiber connector design ? **(6)**

13. a) i) Explain the working of n hetero structure LED. **(10)**

     ii) Define Internal quantum efficiency of a LED. Deduce the expression for the same. **(6)**

(OR)

   b) i) What do you understand by optical-wave-confinement and current confinement in LASER diode ? Explain with suitable structures. **(10)**

     ii) Briefly explain the different noise sources of a photo detector. **(6)**

14. a) i) Explain in detail with necessary circuit diagram and advantages of Trans impedance amplifier. **(10)**

     ii) Consider a digital fiber optic link operating at a bit rate of 622 Mbps at 1550 nm. The InGaAs pin detector has a quantum efficiency of 0.8. Find the minimum number of photons in a pulse required for a BER of 10^{-9}. Find the corresponding minimum incident power. **(6)**

(OR)

   b) Explain any two methods used for measurement of refractive index profile of the fiber. **(16)**

15. a) Explain SONET layers and frame structure with diagram. **(16)**

(OR)

   b) Discuss the performance improvement of WDM and EDFA systems. **(16)**

––––––––––––