

M.E. First Semester (Electronics & Tele.) (Full Time) (C.G.S. - New)
13331 : Advanced Optical Communication : 1 ENTC 1

P. Pages : 2

Time : Three Hours



AU - 3457

Max. Marks : 80

- Notes :
1. Due credit will be given to neatness and adequate dimensions.
 2. Assume suitable data wherever necessary.
 3. Illustrate your answer necessary with the help of neat sketches.
 4. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) What are the different losses in fiber cable? Discuss the various techniques to reduce these losses. 8
- b) A multimode graded index fiber exhibits a total pulse broadening of $0.15 \mu\text{sec}$ over a distance of 20km. Estimate. 6
 - i) The maximum possible bandwidth on the link, assuming no intersymbol interference.
 - ii) The pulse duration per unit length.
 - iii) The bandwidth length product of the fiber.

OR

2. a) Show that the numerical aperture in optical fiber amplifier is given by $NA = n_1(2\Delta)^{1/2}$. 7
- b) A step index fiber has a acceptance angle in air of 0.115 radians and a relative refractive index difference 0.9%. Estimate the speed of light in the fiber core. 7
3. a) Explain the working principle of single quantum well & multiple quantum well laser. 7
- b) Explain the different techniques used to couple light source from LED into fiber. 6

OR

4. a) Explain in brief the coupling efficiency of LED. Show that the coupling efficiency of LED is given by $\eta_c = (NA)^2$. 9
- b) What are the various characteristics of LED? Explain any one in detail. 4
5. a) Explain detail different configurations of EDFA with neat diagram. 7
- b) What is gain clamping in optical fiber amplifier? Explain with the help of neat diagram. 6

OR

6. a) Explain the principle of operation of an optical isolator. 7
- b) Discuss in detail any one active component of WDM. 6
7. a) Discuss in detail the various design issues related to a long haul optical system. 8

- b) Discuss any one active WDM derive. 5

OR

8. a) Explain the different performance and compatibility requirements of detector. 7
b) The quantum efficiency of particular silicon RAPD is 80% for the detection of radiation at a wavelength of $0.9\mu\text{m}$ when the incident optical power is $0.5\mu\text{m}$ the o/p current from the device is $11\mu\text{A}$. Determine the multiplication factor of the photodiode under these conditions. 6
9. a) Explain with block schematic of DWDM system. 7
b) Explain bit error rate for what purpose is it calculated. 6

OR

10. a) Write in detail about angular dispersive devices. 6
b) Explain the principle of operation of 2×2 fused fiber coupler with the help of diagram. 7
11. a) Explain with neat diagram, the attenuation measurement using cut back technique. Discuss the drawbacks. 7
b) Discuss in detail with neat diagram time domain measurement for the fiber dispersion. 7

OR

12. a) Explain with neat diagram shadow method for fiber fiber outer diameter measurement. 7
b) Explain the near field scanning method for refractive index profile measurement of optical fiber. 7
