B.E. (Electronics Engineering / Elect.& Telecommunication / Elect.& Communication Engineering)
Seventh Semester (C.B.S.)

Optical Communication

P. Pages : 2 **NRT/KS/19/3529/3537**

Time : Three Hours * 0 2 4 1 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Diagrams and chemical equations should be given whenever necessary.
11. Illustrate your answers whenever necessary with the help of neat sketches.
12. Use of non programmable calculator is permitted.

1. a) Draw the block diagram of optical communication system. Explain function of each block. **5**

b) Explain advantages and disadvantages of optical fiber communication over coaxial cable. **5**

c) Explain numerical aperture and relative refractive index difference. **4**

OR

2. a) Explain the classification of optical fiber and compare with respect to their advantages and disadvantages. **8**

b) A step index fiber $n_1 = 1.49$ and $n_2 = 1.45$. Calculate the acceptance angle, critical angle and N.A. **6**

3. a) Explain different losses occurs in optical fiber communication. Explain bending losses in detail. **8**

b) A continuous 12 km long optical link has a loss of 1.5 dB/km **6**
i) What is the minimum optical power level that must be launched in to the fiber to maintain an optical power level of 0.3 ww at the receiving end ?
ii) What is the required input power if the fiber has a loss of 2.5 dB/km ?

OR

4. a) Explain MCVD process. **6**

b) Explain fiber drawing process. **7**

5. a) What is splicing ? Explain the basic splicing techniques use for fiber joint. **7**

b) Explain different types of coupler. **6**

OR

6. a) A lens coupled surface emitting LED launches 500 ww of optical power into a step index fiber. Determine the overall power conversion efficiency if it is operating with a drive current of 100 mA, a forward voltage of 1.5V and NA of fiber is 1.2 Estimate coupling efficiency and optical loss in dB. **6**

b) Compare LED and LASER. **4**

c) Explain principle of LASER action. **3**

7. a) Discuss the basic requirement and different characteristics of photodetector. Derive an expression for the responsivity in terms of quantum efficiency. **7**

b) A photo diode has quantum efficiency of 65% when photon of energy 1.5×10^{-9} J are incident upon it. Calculate : **6**

i) At what wavelength is the photo diode operating.
ii) Responsivity of photodiode.
iii) Calculate the incident optical power require to obtain a photocurrent of 2.5 mA. When the photodiode is operating as above.

OR

8. a) Draw the block diagram of typical optical receiver and explain its working in detail. **5**

b) Explain the working and construction of an Avalanche photodiode. **5**

c) Compare 3dB electrical and 3dB optical bandwidth. **3**

9. a) Explain the block diagram of basic element of analog link. Explain different noise distubuler at each level. **6**

b) What are the different system considerations for designing a digital link ? **7**

OR

10. Write short notes on following.

a) Point to point link. **4**

b) Carrier to Noise Ratio in analog link. **4**

c) Multichannel transmission techniques in analog link. **5**

11. a) With the help of neat block diagram, explain the working of WDM system. **6**

b) Explain EDFA. **7**

OR

12. a) Explain OTDR method and compare with cut-back method for measuring loss in fiber link. **6**

b) Discuss the eye pattern technique for measuring the data handling ability in digital transmission system. **7**

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