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Code No: **RT4104A** **R13** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, February/March - 2018

OPTICAL COMMUNICATION

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) Mention the four advantages of OFC. [4]
   b) Write about micro bending and macro bending losses. [4]
   c) Differentiate the splicer and connector. [3]
   d) Discuss the concept of spontaneous emission in LED. [3]
   e) Write a brief notes on equilibrium numerical aperture. [4]
   f) What is WDM and explain its significance. [4]

PART–B *(3x16 = 48 Marks)*

2. a) A multimode step index fiber has a relative refractive index difference of 1% and core refractive index of 1.5. The number of modes operating at a wavelengthof1.3μmeteris 1100. Estimate the diameter of the fiber core. [8]
   b) Explain group delay and mode delay factor with reference to single mode fibers showing the relevant graph. [8]

3. a) Explain the scattering and bending losses in optical fibers. [8]
   b) Give an account of cut off wavelength for single mode and multi mode fibers and discuss its dependence on fiber length. [8]

4. a) Describe the connector return loss in an optical fiber. [8]
   b) Explain the following briefly (i) Single mode fiber joint (ii) Multimode fiber joint [8]

5. a) Sketch and explain the fabry-petrot resonator cavity of a laser diode. [8]
   b) A GaAs laser operating at 850 nm and 450μm length and refractive index η =3.5. What are the frequency and wavelength spacing? If the half power point, λ-λo=2.5nm, what is the spectral width σ of the gain? [8]

6. a) With a schematic diagram explain the working of optical receiver. [8]
   b) Discuss the possible sources of noise in optical receivers. [8]

7. a) Explain the significance of power budget and system margin. [8]
   b) Following are the parameters of a point-to-point optical link: (i) Optical power launched: + 5dBm (ii) sensitivity of detector : -30dBm (iii) Source/detector connector loss : 1dB (iv) Length of optical cable : 55km (v) Cable attenuation : 0.3 dB/km (vi) Jumper cable loss : 2.5 dB (vii) Connector loss at each fiber joint : 1dB Assume two jumper cables and two cable joints. Compute the power margin of the line [8]

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