Exam.Code:0930
Sub. Code: 33674

2055

B.E. (Electronics and Communication Engineering)

Sixth Semester

EC-602: Fiber Optic Communication System

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part. Use of scientific calculator is allowed.

x-x-x

I. Attempt the following:-

(a) Differentiate between repeater and optical amplifier. (1)
(b) What is DWDM? (1)
(c) What is the significance of V number in optical fiber? (1)
(d) Differentiate between loss-limited and dispersion-limited lightwave systems? (1)
(e) What is fiber grating? (1)
(f) Define dB and dBm. (1)
(g) Define modulation bandwidth of an LED in both electrical and optical terms. (2)
(h) What is Four Wave mixing? (2)

Part- A

II. (a) Explain advantages and disadvantages of optical fiber communication systems. (5)
(b) What is meant by graded index fiber? With the help of ray theory concept, discuss the transmission of light through fiber. Explain advantages of this type of fiber over step index fiber. (5)

III. (a) Explain self-phase modulation and cross phase modulation. (5)
(b) Describe fiber splice and fiber connector. Briefly describe splicing techniques. (5)

IV. (a) Explain the various dispersion mechanisms that affect data rate capability of optical fibers. How this effect is tackled in practical high speed optical fiber systems? (7)
(b) Find the numerical aperture of a step index fiber having a core refractive index of 1.5 and cladding refractive index of 1.47. Find the maximum angle at which light will enter the fiber, if the fiber is placed in air. (3)

Part-B

V. (a) How does the mechanism of optical feedback occur to provide oscillations and amplification within a laser? Show that this provides a distinctive spectral output from the device. (5)
(b) Explain advantages and disadvantages of LED compared with injection Laser for use as light source in optical fiber communication systems. (5)

VI. (a) Describe point-to-point fiber optic communication systems. (4)
(b) Briefly describe the basic applications & types of optical amplifiers. (6)

VII. (a) Explain free space optical communication in detail. (5)
(b) Define quantum efficiency and responsivity of a photodetector. A photodetector operating at 850 nm produces an output current of 75 μA for an incident light beam of power 750 μW. Calculate the quantum efficiency and responsivity of the photodetector. (Plank's constant, $h = 6.625 \times 10^{-34}$ J.s). (5)

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