CBCS SCHEME

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21EC72

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Optical and Wireless Communication

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Briefly explain with a neat figure the propagation mechanism of meridional rays in an ideal step index optical waveguide. **(08 Marks)**

b. Define the term attenuation in optical fibers. Explain the different attenuation mechanisms in optical fibers. **(12 Marks)**

OR

2 a. Define Dispersion. Briefly explain intermodal and intramodal dispersion effects in optical waveguide. **(10 Marks)**

b. With neat figures, discuss the structure of single mode and multimode step-index and graded index optical fibers. **(06 Marks)**

c. A multimode fiber has a core refractive index of 1.480 and a core cladding index difference of 2.0 percent. Find the numerical aperture and critical angle at the core cladding interface. **(04 Marks)**

Module-2

3 a. What are the characteristic requirements of an optical source? With the help of neat diagram, explain the constructional features and emission pattern of surface emitting LED. **(10 Marks)**

b. Define optical isolator. With a neat figure, explain the design and operation of a polarization independent isolator. **(06 Marks)**

c. A given silicon avalanche photodiode has a quantum efficiency of 65 percent at a wavelength of 900 nm. If 0.5 μw of optical power produces a multiplied photocurrent of 10 μA. What is the multiplication M? **(04 Marks)**

OR

4 a. Discuss the operation of pin photodiode with a neat circuit and energy band diagram. **(10 Marks)**

b. What is Diffraction gratings? Discuss briefly Diffraction grating techniques. **(10 Marks)**

Module-3

5 a. Explain briefly the different propagation mechanisms that influence the signal propagation in a mobile communication environment. **(10 Marks)**

b. A cellular communication service area is covered with 12 clusters having 7 cells in each cluster and 16 channels assigned in each cell. Find the number of channels per cluster and the system capacity. **(03 Marks)**

c. Explain how the concept of frequency reuse increases the spectrum efficiency that inturn increases the cellular communication system capacity. **(07 Marks)**

OR

6 a. Briefly discuss the generations of wireless communication network technology. **(08 Marks)**

b. Discuss the effects of co-channel interference in wireless communication in reducing the system capacity. **(05 Marks)**

c. Discuss the concept of multipath fading in mobile communication system. **(07 Marks)**

Module-4

7 a. With a neat block diagram, explain the operation of basic TDMA link. **(10 Marks)**

b. Explain the basic cellular system with necessary block diagram. **(10 Marks)**

OR

8 a. Discuss with a neat figure the call processing in a cellular system for mobile-originated calls. **(12 Marks)**

b. List the advantages of CDMA over TDMA and FDMA. **(08 Marks)**

Module-5

9 a. What is Hand off in GSM networks? Explain briefly the different handoff procedure in GSM. **(10 Marks)**

b. Explain the functions of data bases HLR and VLR at MSC in GSM network architecture and also explain how it is helpful in location updation in GSM networks. **(10 Marks)**

OR

10 a. Briefly explain the three major subsystems in GSM network architecture with a neat block diagram. **(10 Marks)**

b. Explain briefly the following identifiers in GSM system:
(i) SIM
(ii) Mobile system ISDN with frame format
(iii) Location Area Identify **(10 Marks)**

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