Term End External Examination 4th Semester (Session- July 2024)

Subject: Information Technology

Course No and Title: BITC3422M/ Data Communication and Networking

Time: 2.15 hours Max Marks:100 Min. Marks:40

Section A: Objective Type Questions

Q1. Choose the appropriate Answer: (8x1.5=12)

i. Which mode is used in traditional telephones for voice communication?

A Simplex **B** Half Duplex

C Full Duplex **D** Both (B) and (C)

ii. According to Nyquist's theorem, what is the maximum data rate for a noiseless channel with a bandwidth of 10 kHz and 16 signal levels?

A 20 kbps **B** 40 kbps

C 80 kbps **D** 160 kbps

iii. Which factor primarily determines the bandwidth and data carrying capacity of a multimode fiber?

A The numerical aperture of the fiber. **B** The refractive index of the cladding.

C The core diameter and the refractive index profile of the core. **D** The wavelength of the light used for transmission

iv. Which of the following is a characteristic of Ethernet?

A FDDI **B** CSMA/CD

C VLAN **D** All the above

v. If the bandwidth of a noiseless channel is doubled, what happens to the maximum data rate according to Nyquist's theorem?

A It remains the same **B** It is halved

C It is doubled **D** It is quadrupled

vi. In a hybrid network topology that combines star and bus topologies, what is the primary advantage of this design?

A Increased network speed **B** Scalability and fault isolation

C Simplified cabling requirements **D** Reduced maintenance costs

vii. Which of the following protocols is an example of a connection-oriented protocol?

A UDP **B** ICMP

C IP **D** TCP

viii. Which layer of the OSI model is responsible for data encryption and decryption to ensure secure data transmission?

A Physical layer **B** Data Link layer

C Presentation layer **D** Transport layer

Section-B: Descriptive Type Questions (Short Type)

Q2: Answer all the Questions (8 x 4 =32)

i. Define data communication. Enlist the components of a data communication system.

ii. What is the difference between simplex and full duplex communication modes? Give examples.

iii. What are the differences between guided and unguided transmission media?

iv. What is the main function of the OSI reference model?

v. Explain the advantages of optical fibre cables in data communication.

vi. Discuss Virtual Local Area Network in detail.

vii. Define the concept of packet switching.

viii. How does Wavelength Division Multiplexing (WDM) work in fiber optic communications?

Section – C: Descriptive Type Questions (Medium Type)

Answer all the questions: (4 x 7=28)

Q 3. Discuss the characteristics of signals with respect to amplitude and frequency.

OR

Explain the significance of Shannon's law for a noisy channel.

Q 4. Explain in detail different types of optical fibre cable variants?

OR

Compare and contrast different types of guided transmission media

Q 5. Compare and contrast LAN, MAN, and WAN.

OR

Describe the process and importance of CSMA/CD in Ethernet technology.

Q6. Explain the differences between circuit switching and packet switching.

OR

Discuss the main differences between the OSI and TCP/IP models.

Section – D: Descriptive Type Questions (Long Type)

Answer any two of the following: (2 x 14=28)

Q 7. Explain in detail the Nyquist law for noiseless channel and its significance in data communication.

Q 8. Describe the various network topologies and discuss the advantages and disadvantages of each.

Q 9. What is CSMA/CD, and how does it work in Ethernet technology? Provide detailed examples.

Q 10. Compare the connection-oriented and connectionless approaches in network communication, providing real-world examples.