Practice Set
End Semester Examination, Spring- 2026

Program: Diploma CSE
Semester: IV
Course: Data Communication and Computer Networking
Course Code: 3DPCC205

SECTION-A

10 Marks Questions

1. Explain the components of a data communication system. Describe each component with suitable examples and explain how they work together in communication.

2. Discuss the classification of networks based on geographical scope. Compare them in terms of coverage area, speed, cost, and real-world applications.

3. Discuss different types of data flow modes. Explain each with diagrams and suitable examples.

4. Explain parallel and serial transmission. Define their advantages, disadvantages, and real-world applications.

5. Differentiate between analog and digital signals. Explain their characteristics, data representation, and transmission with suitable examples.

6. Describe the primary function of a transmission channel in a communication model.

7. List and briefly explain two common types of data compression techniques.

8. Explain the concept of layering in computer networks. Discuss its importance and how it simplifies network communication with examples.

9. Define protocols, interfaces, and services in networking. Explain their roles and interrelationship in a layered architecture.

10. Describe the TCP/IP model and explain the functions of each layer.

11. Explain different types of network topologies with their advantages, disadvantages, and applications using suitable diagrams.

12. Define the performance of a computer network. A user downloads a 15 MB file in 2 seconds. Calculate the throughput and interpret the result.

13. Explain guided and unguided transmission media in detail, including their structure, advantages, and applications.

14. Describe wireless transmission techniques. Explain the working principles of radio waves, microwaves, and infrared transmission with suitable examples.

15. Define circuit switching and packet switching. Discuss their phases and compare them based on efficiency, delay, and reliability.

16. Explain the functions of the Physical Layer in the OSI model and its role in data transmission.

17. Define bit rate and bit length. Explain their relationship with data transmission speed using suitable examples.

18. Explain transmission impairments and discuss the effects of attenuation, distortion, and noise on signal quality with suitable examples.

19. Derive the Nyquist formula for data rate limits and explain how it differs from the Shannon capacity formula.

20. Describe Frequency Division Multiplexing (FDM) and Time Division Multiplexing (TDM). Compare their working principles and applications.

21. Explain the need for the Data Link Layer. Discuss flow control and error control mechanisms, including techniques for error detection and correction.

22. List and describe the types of noise that affect data transmission. How can noise be mitigated?

23. Define attenuation and explain its impact on signal transmission in communication systems.

24. Explain the multiplexing in data communication. Illustrate their working principles, advantages, disadvantages, and applications.

25. Explain the concept of switching in data communication. Describe packet switching in detail its working mechanism, phases, advantages, disadvantages, and applications, with suitable diagrams.

26. Explain the various types of network topologies with appropriate diagrams and analyze their suitability for real-world applications.

27. Explain the characteristics of effective data communication. Discuss their importance with suitable examples.

28. Describe the structure of a data frame. Explain the significance of different fields header, payload, and trailer in ensuring reliable data transmission.

29. Explain the need for error detection and correction in data communication systems. Discuss the working of different error detection techniques with suitable examples.

30. Discuss various communication tasks involved in data transmission. Explain how these tasks ensure reliable communication.

SECTION-B

20 Marks Questions

1. Explain the Data Communication Model in detail. Discuss all its components and communication tasks involved in transmitting data. Illustrate the transmission models and transmission channels with suitable diagrams and examples.

2. Explain the OSI model, describing the functions of all seven layers. Provide examples of protocols and devices associated with each layer.

3. Define the OSI Model and TCP/IP Model. Explain their structures and compare their key differences and similarities. Also discuss their advantages, limitations, and real-world applications.

4. Explain the concept of Network Topology and its importance in network design. Describe different types of topologies with diagrams and justify their use in real-world scenarios.

5. Discuss various transmission media. Explain the working, advantages, disadvantages, and applications of guided and unguided media.

6. Explain switching techniques in data communication. Describe circuit switching and packet switching with diagrams, phases, advantages, disadvantages, and applications.

7. Explain transmission impairments and data rate limitations using Nyquist and Shannon theorems with suitable examples. Discuss their practical impact on communication systems.

8. Explain the concept and types of multiplexing in data communication. Compare their working principles, advantages, disadvantages, and applications.

9. Explain the working principles of parallel and serial transmission techniques. Compare both methods in terms of their features, advantages, limitations, and real-world applications.

10. Explain the concept of data rate limits in communication systems. Discuss the Nyquist formula and Shannon capacity theorem.

Solve the following:

(a) A noiseless channel has a bandwidth of 4 kHz and uses 8 signal levels. Calculate the maximum data rate using the Nyquist formula.
(b) A communication channel has a bandwidth of 3 kHz and a signal-to-noise ratio of 30 dB. Determine the channel capacity using the Shannon formula.

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Disclaimer: - This is a Model Paper. The Question in End term examination will differ from the Model Paper. This Model paper is meant for practice only.