

Module 1

1. Illustrate and analyze the five essential components of a data communication system, and explain their role in ensuring effective communication with suitable examples.
2. Demonstrate the different ways of representing data in computers and justify with suitable examples how each method is applied in real-time computing scenarios.
3. Examine the OSI reference model in detail, and demonstrate how the layered architecture supports reliable communication by explaining the role of each layer.
4. Analyze the process of encapsulation with the help of a neat diagram, and discuss how it enables communication across layers in a networked system.
5. Differentiate and analyze the characteristics of simplex, half-duplex, and full-duplex data flow, and illustrate with real-world examples where each is applied.
6. Compare and justify the differences between LAN, MAN, and WAN by citing one practical example for each type of network.
7. Examine peer-to-peer processes in the context of the OSI model, and demonstrate how communication is coordinated across layers.
8. Differentiate and evaluate the OSI model and the TCP/IP protocol suite, highlighting their similarities, differences, and practical applicability in networking.
9. Illustrate and analyze different physical network topologies, and explain the working of any two with neat diagrams and practical examples.
10. Define protocol and standard, and critically analyze how they are interrelated in networking with suitable examples.
11. Examine the seven layers of the OSI model, and demonstrate their role in achieving reliable communication through a short explanatory note.
12. Explain and differentiate the four types of addressing in networking with examples, and analyze how each is applied in real communication scenarios.

VTU Question Papers Questions:

1. What is data communication? What are its characteristics? Explain.

(6 Marks, Jan 2009, Jan 2010, July 2011, Dec 2011, June 2012, Jan 2013)

2. List and explain the five components of a data communication system, with examples.

(7 Marks, Jun 2010, Dec 2010)

3. What is a protocol? Briefly explain its key elements.

(5 Marks, Jan 2009, Jan 2010, Jan 2011, Jun 2012, Jan 2013)

4. Define Internet.

(2 Marks, Jan 2009)

5. Describe with neat diagram the functions of each layer in the OSI reference model and differentiate it with TCP/IP.

(10 Marks, Jan 2009, July 2009, Jan 2010, Dec 10, Dec 2011, Jun 2012, Jan 13)

6. What is a physical topology? Describe the four basic topologies with application of each.

(10Marks, July 2009, July 2011)

7. What are standards? Name any four standard organizations

(6 Marks, July 2009)

8. Give the comparison between LAN, MAN and WAN with an example.

(Dec 2011, Jun 2010)

9. Describe with neat diagram, the functionalities of each layer in the TCP/IP model.

(8 Marks, Jun 2010)

10. Assume that fifty devices are arranged in a mesh topology. How many links are needed?

How many ports are needed for each device?

(6 Marks, July 2011)

11. What are different modes of communication?

(4 Marks, Jan 2013)

12. Differentiate between:

i) ARP and RARP

ii) ICMP and IGMP

iii) UDP and TCP

(4 Marks, Jan 2010)

13. Write a short note on

- i. Addressing
- ii. Multiplexing and Demultiplexing
- iii. Encapsulation and Decapsulation of data

14. Compare OSI model with TCP/IP

Module 2

1. Differentiate between single-bit error and burst error by applying suitable examples, and analyze their impact on data communication reliability.
2. Apply the checksum technique step-by-step to demonstrate how errors are detected in a data frame, and analyze the effectiveness of this method.
3. Illustrate the concept of bit stuffing with an example, and analyze how this technique ensures proper frame synchronization in data transmission.
4. Examine the principle of FDMA with the help of a neat diagram, and evaluate how this technique allows multiple users to share the communication channel effectively.
5. Differentiate between error detection and error correction techniques, and analyze their significance in ensuring reliable data communication.
6. What is checksum, explain steps taken by sender and receiver to detect errors
7. Write a note on error detection method using 16 bit checksum used in internet. Calculate checksum for the text “Food” given ASCII values of F is 46, o is 6F and d is 64
8. What is hamming distance? Find hamming distance for code words 00000,01011,10101,11110
9. Apply the concept of simple parity check code to demonstrate how error detection works, and discuss its limitations with respect to burst errors.
10. Compute and illustrate the codeword $c(x)$ using CRC for the information sequence 1001 with generator 1011, and analyze the steps involved in the process.
11. Examine the principle of TDMA, and evaluate its main problem in the context of channel utilization.
12. Apply the concept of Hamming code and illustrate how syndrome bits are used to detect and correct errors in data transmission.
13. Given the dataword 101001111 and divisor 10111, compute and demonstrate the CRC codeword generation at the sender's site, explaining the steps clearly.
14. Illustrate the concept of byte stuffing with a suitable example, and analyze its role in maintaining data transparency during transmission.
15. Examine the principle of CDMA with neat diagrams, and evaluate its effectiveness in supporting multiple simultaneous users.
16. Find the code word $C(X)$ for the information $d(X)=x^3+1$ with generator polynomial $t(X)=x^3+x+1$

17. What is hamming code? With a structure of encoder and decoder for hamming code C (7,4) how it can detect the errors and correct the same.

Module 3

1. Analyze the IPv4 datagram format with a neat diagram, and demonstrate the significance of its fields in enabling packet transmission across networks.
2. Evaluate the IPv6 datagram format with a neat diagram, and explain how its fields improve addressing and performance compared to IPv4
3. Explain changes implemented in the IP V6 protocol or Advantages of IP V6 compared to IPV4
4. Explain Transition from IPV4 to IPV6 [**Three transition strategies-must write Header translation**]
5. Explain IPv6 Addressing- **Global Unicast Address, Special Address, Unique local Unicast ,link local and multicast Address**