

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK



IV SEMESTER

AD3463 – Data Communication and Networks

Regulation – 2023

Academic Year 2024-2025 (Even Semester)

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SUBJECT : AD3463 - DATA COMMUNICATION AND NETWORKS

YEAR / SEM : II Year / IV Sem

UNIT I - INTRODUCTION AND APPLICATION LAYER

Data Communication - Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Introduction to Sockets - Application Layer protocols: HTTP – FTP – Email protocols (SMTP - POP3 - IMAP - MIME) – DNS – SNMP

PART-A

| Q.No | Questions | BT Level | Competence |
|------|---|----------|---------------|
| 1 | Define Data Communication | BTL1 | Remembering |
| 2 | Write down the seven layers of computer network | BTL1 | Remembering |
| 3 | Define a socket? | BTL1 | Remembering |
| 4 | Mention the types of HTTP messages | BTL2 | Remembering |
| 5 | How would you discover MIME types and subtypes? | BTL1 | Remembering |
| 6 | Why do we need the POP3 protocol? | BTL2 | Understanding |
| 7 | Mention the different levels in domain name space. | BTL2 | Understanding |
| 8 | Write down the uses of FTP and SMTP protocol | BTL1 | Remembering |
| 9 | Draw the diagram for ring and bus topology | BTL1 | Remembering |
| 10 | Identify the three basic pieces of MIME with example. | BTL2 | Understanding |
| 11 | What does the Protocol suite mean? | BTL2 | Understanding |
| 12 | Write down the advantages and disadvantages of layering of computer network | BTL1 | Remembering |
| 13 | Are there any security breaches present in the application layer? | BTL2 | Understanding |
| 14 | List out the protocols available in the application layer | BTL1 | Remembering |
| 15 | Outline the need of DNS? | BTL2 | Understanding |

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| 16 | Differentiate IMAP and POP. | | BTL2 | Understanding |
| 17 | What are the type of communication modes are available | | BTL1 | Remembering |
| 18 | What is the difference between MAC address and IP address ? | | BTL1 | Remembering |
| 19 | What are the function of SNMP protocol | | BTL1 | Remembering |
| 20 | What are the different types of network topology | | BTL1 | Remembering |
| 21 | Which layer implements the node to node channel connection in OSI layered architecture? | | BTL2 | Understanding |
| 22 | What is the similarity between transport layer and data link layer? | | BTL2 | Understanding |
| 23 | Differentiate IMAP and SMTP. | | BTL2 | Understanding |
| 24 | What is the use of SNMP protocol in a network? | | BTL1 | Remembering |
| PART – B (16 MARKS) | | | | |
| 1 | (i) Explain how to build network with OSI and TCP/IP reference model. (ii) Write short notes on a) Multiplexing and De-multiplexing. b) Framing | (8) (5) (3) | BTL1 | Remembering |
| 2 | Briefly explain the different types of network topologies. Write each of its advantages and disadvantages. | (16) | BTL3 | Applying |
| 3 | Explain in detail about TCP/IP protocol suite with neat diagram? | (16) | BTL3 | Applying |
| 4 | Interpret the major functions performed by the layers of the ISO - OSI Reference model. | (16) | BTL5 | Evaluating |
| 5 | Briefly explain the different types of network topologies. Write each of its advantages and disadvantages. | (16) | BTL4 | Analyzing |
| 6 | Interpret with relevant diagram the functions of physical and data link layer. | (16) | BTL5 | Evaluating |
| 7 | Discuss in detail about the functions of network layer and transport layers with necessary diagrams. | (16) | BTL5 | Evaluating |
| 8 | (i) Differentiate between a service port addressing, logical addressing and physical addressing. (ii) Name the services provided by application layer and explain. | (8) (8) | BTL3 | Applying |
| 9 | Discuss in detail about the various Email protocols | (16) | BTL4 | Analyzing |
| 10 | (i) Examine how SMTP transfers messages from one host to another with suitable illustration. (ii) Assess IMAP with its state transition diagram. | (8) (8) | BTL5 | Evaluating |
| 11 | Assess the importance of Simple Network Management Protocol (SNMP)? | (16) | BTL4 | Analyzing |

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| 12 | Analyze in detail about DNS operation. | (16) | BTL5 | Evaluating |
| 13 | Write short notes on : (i) IMAP (ii) MIME | (8) (8) | BTL2 | Understanding |
| 14 | (i).Tabulate the various HTTP request operations. (ii)Identify the comparison between SMTP, MIME and IMAP. | (8) (8) | BTL3 | Applying |
| 15 | Formulate the working of Email in detail. | (16) | BTL 4 | Analyzing |
| 16 | (i) Elaborate the message transfer using Simple Mail Transfer Protocol. (ii)Interpret the basics of POP3 and IMAP mail access protocols. | (8) (8) | BTL 5 | Evaluating |
| 17 | (i) Develop in detail about SNMP messages. (ii)Organize the role of POP3 in Electronic mail applications. | (8) (8) | BTL 4 | Analyzing |

UNIT II - TRANSPORT LAYER

Introduction - Transport-Layer Protocols: UDP – TCP: Connection Management – Flow control - Congestion Control - Congestion avoidance (DECbit, RED) – SCTP – Quality of Service.

PART-A

| Q.No | Questions | BT Level | Competence |
|------|---|----------|---------------|
| 1 | List the functions of Transport protocol | BTL1 | Remembering |
| 2 | Summarize IP addresses versus port numbers | BTL2 | Understanding |
| 3 | List the different phases used in TCP connection. | BTL1 | Remembering |
| 4 | Identify when an application can make use of UDP? | BTL2 | Understanding |
| 5 | Difference between UDP & TCP protocol | BTL2 | Understanding |
| 6 | List the various congestion control techniques in TCP. | BTL 2 | Understanding |
| 7 | Classify the advantages of connection oriented services over connectionless services. | BTL1 | Remembering |
| 8 | Justify that TCP is a reliable byte stream protocol? | BTL2 | Understanding |
| 9 | What is the meaning of conjunction avoidance? | BTL1 | Remembering |
| 10 | How can we measure the quality of Service in Transport layer | BTL2 | Understanding |
| 11 | What is meaning of handshake process in transport layer | BTL1 | Remembering |
| 12 | Write down the devices/software used in transport layer | BTL1 | Remembering |
| 16 | Are there any security breaches present in the transport layer? | BTL2 | Understanding |
| 14 | What do mean by slow start in TCP congestion? | BTL1 | Remembering |

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| 15 | Identify how a well-known port different from an ephemeral port? | | BTL2 | Understanding |
| 16 | What are the uses of DECbit and RED? | | BTL1 | Remembering |
| 17 | How does UDP address flow control mechanisms? | | BTL2 | Understanding |
| 18 | Classify the services provided by Transport layer protocol. | | BTL1 | Remembering |
| 19 | List the flag used in TCP header. | | BTL1 | Remembering |
| 20 | What is a socket address? | | BTL1 | Remembering |
| 21 | Explain the responsibility of URG and SYN flag. | | BTL2 | Understanding |
| 22 | Analyze on how RTT is computed? | | BTL2 | Understanding |
| 23 | What are the fields on which the UDP checksum is calculated? | | BTL2 | Understanding |
| 24 | What is meant by segmentation? | | BTL1 | Remembering |
| PART-B | | | | |
| 1 | (i) Draw a TCP state transition diagram for connection management. (ii) If IP provides connectionless service, how TCP supports connection oriented service? | (8) (8) | BTL3 | Applying |
| 2 | (i) Examine the Three Way Handshake protocol to establish the transport level connection. (ii) Analyze the various duties of Transport Layer. | (8) (8) | BTL4 | Analyzing |
| 3 | With a neat architecture, explain TCP in detail. | (16) | BTL1 | Remembering |
| 4 | (i) Define UDP and discuss the operations of UDP. (ii) Explain UDP checksum with one example. | (8) (8) | BTL3 | Applying |
| 5 | Discuss in detail the various congestion control mechanisms in TCP. | (16) | BTL4 | Analyzing |
| 6 | Explain the various fields of TCP header and the working of the TCP. Protocol. | (16) | BTL4 | Analyzing |
| 7 | Identify and explain the various functionalities of SCTP. | (16) | BTL3 | Applying |
| 8 | Write the comparison between of TCP segment and SCTP packet. | (16) | BTL3 | Applying |
| 9 | (i) Explain the operation of Go-Back-N protocol. (ii) With a diagram explain about TCP connection management. | (8) (8) | BTL4 | Analyzing |
| 10 | Discuss on (i) Position of TCP, UDP, SCTP in TCP/IP protocol suite. (ii) Ports in UDP. | (8) (8) | BTL6 | Creating |
| 11 | Describe in detail about Congestion avoidance mechanism with suitable example | (16) | BTL4 | Analyzing |
| 12 | Explain adaptive flow control and retransmission techniques used in TCP. | (16) | BTL3 | Applying |
| 13 | (i) Organize three ways of connection termination in TCP using state | | BTL3 | Applying |

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| | transition diagram. (ii) Describe in detail about reliable flooding. | (9) (7) | | |
| 14 | Explain the following (i) How the quality of Service can be achieved in Transport layer. (ii) Explain the need for DECbit and RED | (8) (8) | BTL4 | Analyzing |
| 15 | (i) Analyze how reliable and ordered delivery is achieved through TCP. (ii) Examine why does TCP uses an adaptive transmission and describe its mechanism | (8) (8) | BTL4 | Analyzing |
| 16 | Interpret a network that makes use of sliding window protocol and explain detail the protocol used. | (16) | BTL5 | Evaluating |
| 17 | Discuss the adaptive transmission mechanism and propose how it has evolved over time as the internet community has gained more Experience using TCP. | (16) | BTL6 | Creating |

UNIT III - NETWORK LAYER

Switching: Packet Switching - Internet protocol - IPV4 – IP Addressing – Sub netting - IPV6, ARP, RARP, ICMP, DHCP.

PART-A

| Q.No | Questions | BT Level | Competence |
|------|--|----------|---------------|
| 1 | Write down the list of protocol available in network layer | BTL1 | Remembering |
| 2 | List the devices used in network layer | BTL1 | Remembering |
| 3 | Define subnet | BTL1 | Remembering |
| 4 | Compare IPV4 and IPV6 addressing | BTL2 | Understanding |
| 5 | Define datagram and virtual circuit packet switching. | BTL1 | Remembering |
| 6 | What is the advantages of NAT | BTL2 | Understanding |
| 7 | Write the process of ARP and RARP protocol | BTL2 | Understanding |
| 8 | What is bit stuffing? Given the sequence of bits 1101011111010111110010111110110, how would you remove any stuffed bits to obtain the original frame? What errors might have been introduced into the frame during transmission? | BTL1 | Remembering |
| 9 | Is the ICMP protocol involved in the ARP process? How? | BTL2 | Understanding |
| 10 | What is DHCP and Write down the disadvantages of DHCP | BTL2 | Understanding |
| 11 | What is the function of Internet Protocol | BTL1 | Remembering |

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| 12 | What are the different class of IP address give its range | | BTL1 | Remembering |
| 13 | What is the default gateway? Why is it important? | | BTL2 | Understanding |
| 14 | Find the class of the following IP address: (a) 110.34.56.45 (b) 212.208.63.23 | | BTL2 | Understanding |
| 15 | Write the functions of Router and Switch. | | BTL1 | Remembering |
| 16 | What is the use of a port in a switch? | | BTL2 | Understanding |
| 17 | Compare Manual IP addressing and DHCP IP addressing | | BTL2 | Understanding |
| 18 | What is the importance of Subnet Mask? | | BTL2 | Understanding |
| 19 | What are the metrics used by routing protocols? | | BTL1 | Remembering |
| 20 | Define Classful and Classless IP addressing. | | BTL1 | Remembering |
| 21 | Describe the importance of the Time-to-Live (TTL) field in an IP packet. | | BTL2 | Understanding |
| 22 | What is the purpose of ARP? | | BTL2 | Understanding |
| 23 | Explain the concept of subnetting in IP networks. | | BTL1 | Remembering |
| 24 | Describe whether 192.168.1.10 belongs to the subnet 192.168.1.0/24. | | BTL1 | Remembering |
| PART-B | | | | |
| 1 | Explain packet switching and analyze its types (datagram and virtual circuit). Compare it with circuit switching in terms of efficiency and reliability. | (16) | BTL4 | Analyzing |
| 2 | Summarize about the ARP packet and encapsulation of ARP. | (16) | BTL4 | Analyzing |
| 3 | Examine the concept of subnetting with an example. How does it help manage IP addresses efficiently? | (16) | BTL4 | Analyzing |
| 4 | Explain about IPv6. Compare IPv4 and IPv6. | (16) | BTL4 | Analyzing |
| 5 | Examine the role of packet switching in the development of modern communication protocols like TCP/IP. | (16) | BTL4 | Analyzing |
| 6 | Given an IP address of 192.168.1.0/24, divide it into four subnets. Calculate the subnet mask, network ID, broadcast address, and host range for each subnet. | (16) | BTL3 | Applying |
| 7 | Illustrate how ICMP echo requests and replies (Ping) work in a real-world network setup. | (16) | BTL3 | Applying |
| 8 | Illustrate the process of configuring both static and dynamic IP addresses on a network device. | (16) | BTL3 | Applying |
| 9 | Explain the operation of RARP with an example, and analyze its limitations compared to modern protocols like DHCP. | (16) | BTL4 | Analyzing |
| 10 | Evaluate and Explain the error reporting messages in ICMP. | (16) | BTL5 | Evaluating |

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| 11 | Why subnetting is necessary? With suitable example, develop the concept of subnetting in class B network. | (16) | BTL6 | Creating |
| 12 | Explain the Functions of ARP and RARP protocols with suitable example. | (16) | BTL4 | Analyzing |
| 13 | Why do we need VLAN and explain how subnet can be used to form VLAN. | (16) | BTL3 | Applying |
| 14 | Assess and explain about the transition from IPv4 to IPv6. | (16) | BTL5 | Evaluating |
| 15 | Analyze the advantages of using DHCP over manual IP address configuration in a large-scale network. | (16) | BTL4 | Analyzing |
| 16 | Find the class of each IP address. Give suitable explanation. (i) 227.12.14.87 (ii) 193.14.56.22 (iii) 14.23.120.8 (iv) 252.5.15.111 (v) 134.11.78.56 | (3) (3) (3) (3) (4) | BTL5 | Evaluating |
| 17 | (i) Draw the IPv4 packet header format. (ii) Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the values in the various fields in the IP datagram(s) generated related to fragmentation? | (8) (8) | BTL6 | Creating |

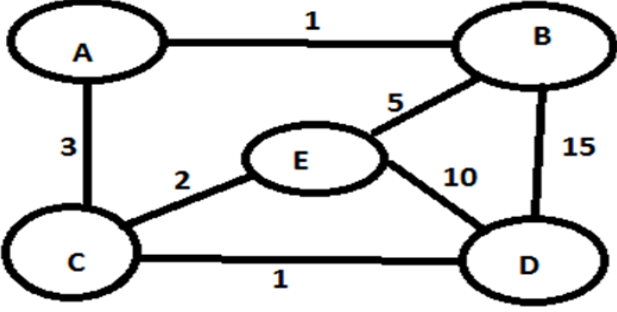
UNIT IV - ROUTING

Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing – OSPF – Path-vector routing - BGP - Multicast Routing: DVMRP – PIM

PART-A

| Q.No | Questions | BT Level | Competence |
|------|---|----------|---------------|
| 1 | Compare unicast and multicast addressing. | BTL2 | Understanding |
| 2 | What are the metrics used by routing protocols? | BTL1 | Remembering |
| 3 | What is the Border Gateway Protocol (BGP). | BTL1 | Remembering |
| 4 | Write the BGP Message types. | BTL2 | Understanding |
| 5 | Differentiate between forwarding table and routing table | BTL2 | Understanding |
| 6 | Define routing. | BTL2 | Understanding |
| 7 | Identify all the metrics used by routing protocols? | BTL1 | Remembering |
| 8 | How can the routing be classified? | BTL2 | Understanding |
| 9 | Recommend the benefits of Open Shortest Path First (OSPF) protocol? | BTL2 | Understanding |

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|---------------|--|-----------------|------|---------------|
| 10 | Illustrate about all the metrics used by routing protocols. | | BTL1 | Remembering |
| 11 | Analyze how routers differentiate the incoming unicast, multicast and broadcast IP packets. | | BTL2 | Understanding |
| 12 | What is multicast routing? | | BTL2 | Understanding |
| 13 | What is meant by hop count? | | BTL1 | Remembering |
| 14 | How the routers get the information about neighbor in Link State Routing? | | BTL2 | Understanding |
| 15 | Show the need for a network layer. | | BTL1 | Remembering |
| 16 | Why is the Routing algorithm required? | | BTL1 | Remembering |
| 17 | What is link state routing? | | BTL1 | Remembering |
| 18 | Discover the OSPF header format. | | BTL1 | Remembering |
| 19 | Differentiate Link state and distance vector routing protocols. | | BTL2 | Understanding |
| 20 | Define Reliable flooding. | | BTL2 | Understanding |
| 21 | What are the features in OSPF? | | BTL1 | Remembering |
| 22 | What is the role of a default gateway in a network? | | BTL2 | Understanding |
| 23 | What is Protocol Independent Multicast (PIM), and how does it work? | | BTL1 | Remembering |
| 24 | How does PIM interact with other unicast routing protocols like OSPF or BGP? | | BTL2 | Understanding |
| PART-B | | | | |
| 1 | Explain in detail the operation of OSPF protocol by considering a suitable network. | (16) | BTL4 | Analyzing |
| 2 | Explain the Distance Vector routing algorithm. Analyze its limitations compared with other routing algorithms. | (16) | BTL4 | Analyzing |
| 3 | Describe the multicast routing in detail. | (16) | BTL3 | Applying |
| 4 | What is Internet multicasting? Explain in detail. Discuss in detail the various aspects of IPV6. | (10) (5) (6) | BTL3 | Applying |
| 5 | With an example network scenario explain the mechanism of Routing Information Protocol and specify the routing table contents. | (16) | BTL4 | Analyzing |
| 6 | Compare and contrast between OFPF and BGP protocols. | (16) | BTL4 | Analyzing |
| 7 | (i) Describe in detail about reliable flooding. (ii) Explain Link State Packet in detail. | (8) (8) | BTL3 | Applying |
| 8 | Examine the function of the Border Gateway Protocol used for Inter domain routing in internetwork. | (16) | BTL3 | Applying |
| 9 | Explain the working of Link - state Routing in detail. | (16) | BTL4 | Analyzing |

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|----|--|-------------------|------|------------|
| 10 | Why Multicast routing? Explain in details about its types | (16) | BTL4 | Analyzing |
| 11 | Explain the following protocols with suitable diagram: (i) DVMRP (ii) PIM | (8) (8) | BTL3 | Applying |
| 12 | (i) Analyze the Link State algorithm in detail. (ii) Consider the network given and compute the shortest path from C to all other Nodes using Link-State algorithm. (iii) Also update the forwarding table of node C.  | (4) (6) (6) | BTL4 | Analyzing |
| 13 | What are devices used for routing packets? illustrate with one simple routing protocol. | (16) | BTL5 | Evaluating |
| 14 | What is RIP? How is the RIP protocol functioning? Give an example. | (16) | BTL6 | Creating |
| 15 | What is the difference between Interior Gateway Protocols (IGP) and Exterior Gateway Protocols (EGP)? | (16) | BTL4 | Analyzing |
| 16 | How does the OSPF protocol handle route aggregation, and what are the benefits of route summarization? | (16) | BTL4 | Analyzing |
| 17 | Describe in detail about PIM. | (16) | BTL3 | Applying |

UNIT V-DATA LINK AND PHYSICAL LAYERS

Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11) - Physical Layer: Data and Signals - Performance – Transmission media- Switching – Circuit Switching.

PART-A

| Q.No | Questions | BT Level | Competence |
|------|--|----------|---------------|
| 1 | What do you understand about the CSMA protocol? | BTL1 | Remembering |
| 2 | What is HDLC? | BTL2 | Understanding |
| 3 | Outline the services provided by the Data link layer | BTL2 | Understanding |
| 4 | What is flow control and error control? | BTL1 | Remembering |

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|---------------|---|------------|------|---------------|
| 5 | What are the three different configurations supported by HDLC? | | BTL1 | Remembering |
| 6 | Relate persistent CSMA with non-persistent CSMA. | | BTL1 | Remembering |
| 7 | Examine the term Piggybacking. | | BTL2 | Understanding |
| 8 | Why 802.0 and List out the other standard? | | BTL2 | Understanding |
| 9 | Examine the access method used by wireless LAN? | | BTL5 | Evaluating |
| 10 | What is the purpose of a MAC Address? | | BTL2 | Understanding |
| 11 | Write about the Hubs and switches. | | BTL2 | Understanding |
| 12 | Why VLAN Required? | | BTL2 | Understanding |
| 13 | What are the parameters used to measure performance in transmission media? | | BTL1 | Remembering |
| 14 | What is the purpose of ethernet? | | BTL2 | Understanding |
| 15 | What are the different transmission mediums available? | | BTL2 | Understanding |
| 16 | List out the devices used in Data Link Layer | | BTL1 | Remembering |
| 17 | What are the performance parameters used in the Physical Layer? | | BTL2 | Understanding |
| 18 | Differentiate MAC and IP address and its format? | | BTL2 | Understanding |
| 19 | What is CSMA / CD? | | BTL1 | Remembering |
| 20 | Write the advantages of Fiber optic cable | | BTL2 | Understanding |
| 21 | List the various of network topology | | BTL1 | Remembering |
| 22 | Write down various wireless standard protocol(802.X) | | BTL1 | Remembering |
| 23 | Write the advantages of Star and Ring network topology | | BTL1 | Remembering |
| 24 | Expand LAN,WAN,MAN,WWW | | BTL1 | Remembering |
| PART-B | | | | |
| 1 | Illustrate the working of CSMA / CD and CSMA/CA protocol. (16) | (16) | BTL3 | Applying |
| 2 | Explain in detail about the Point to point Protocol (PPP) with neat sketch. | (16) | BTL3 | Applying |
| 3 | (i) Analyze the flow and error control in DLC. (ii) Examine the various issues in the Data link layer. | (8) (8) | BTL4 | Analyzing |
| 4 | Discuss about the evolution of Ethernet and explain the frame format. | (16) | BTL4 | Analyzing |
| 5 | Explain Go-Back-N automatic repeat request design and algorithm. | (16) | BTL4 | Evaluating |
| 6 | Explain the working principle of Switches, Hub and Routers. | (16) | BTL4 | Analyzing |
| 7 | Write short notes on: (i) NAV in CSMA/CA, Bridges. | (8) | BTL3 | Applying |

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| | (ii) Discuss about flow control mechanism. | (8) | | |
| 8 | Classify in detail about High-level Data Link Control and the types of frames. | (16) | BTL4 | Analyzing |
| 9 | (i) Interpret your understanding of bit oriented protocol namely HDLC (ii) Assess briefly about CSMA. | (12) (4) | BTL5 | Evaluating |
| 10 | Explain in details about VLAN with suitable example(16) | (16) | BTL4 | Analyzing |
| 11 | Explain briefly about different transmission medium available in computer network(16) | (16) | BTL3 | Applying |
| 12 | Why do we go for VLAN? explain with example | (16) | BTL3 | Applying |
| 13 | Explain the various Wireless LAN protocols | (16) | BTL4 | Analyzing |
| 14 | Explain the following (i) Framing & packet switching. (ii) PPP. | (10) (6) | BTL4 | Analyzing |
| 15 | Analyze the architecture of IEEE 802.11. | (16) | BTL4 | Analyzing |
| 16 | Illustrate and discuss the algorithm for sender site and receiver site stop and wait protocol. | (16) | BTL3 | Applying |
| 17 | Explain detail about circuit switching. | (16) | BTL3 | Applying |