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 2025-2026 (Even Semester)

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SUBJECT   : AD3463 - DATA COMMUNICATION AND NETWORKS
YEAR / SEM : II Year / IV Sem

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

16	Differentiate IMAP and POP.		BTL2	Understanding
17	What are the type of communication modes available?		BTL1	Remembering
18	What is the difference between MAC address and IP address ?		BTL1	Remembering
19	What are the functions 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	Interpret and evaluate the operation of File Transfer Protocol with schematic representation	(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

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

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	Mention 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 transition diagram. (ii)Describe in detail about reliable flooding.	(9) (7)	BTL3	Applying
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 in 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 are 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 11010111110101111100101111110110, 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	What is meant by "best-effort delivery" in the Internet Protocol?	BTL2	Understanding
10	What is DHCP ?Write down the disadvantages of DHCP.	BTL2	Understanding
11	What is the function of Internet Protocol?	BTL1	Remembering

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 sub netting with an example. How does it help manage IP addresses efficiently?	(16)	BTL4	Analyzing
4	Explain about IPv6. CompareIPv4 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

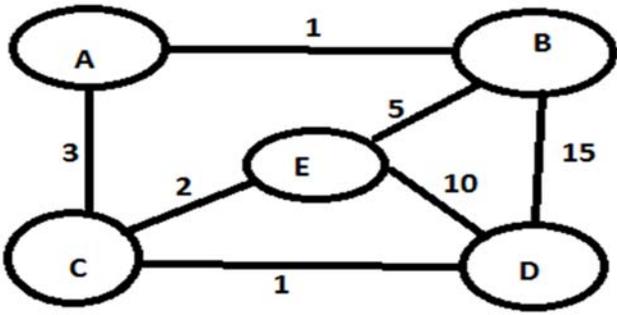| 11	Why subnetting is necessary? With suitable example, develop the concept of subnetting in class B network.	(16)	BTL6	Creating
12	Explain the Functions of ARP and RARP protocols with suitable example.	(16)	BTL4	Analyzing
13	Why do we need VLAN and explain how subnet can be used to form VLAN.	(16)	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	Differentiate between RIP and OSPF Routing protocols.	BTL2	Understanding
8	How can routing be classified?	BTL2	Understanding
9	Recommend the benefits of Open Shortest Path First (OSPF) protocol?	BTL2	Understanding

10	What is the role of periodic updates in distance vector routing?	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	(i)What is Internet multicasting? Explain in detail. (ii)Discuss in detail the various aspects of IPV6.	(10) (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
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 the 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
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	Define Framing.		BTL1	Remembering
9	Examine the access method used by wireless LAN?		BTL2	Understanding
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 protocols(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)	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. (ii) Discuss about flow control mechanism.	(8) (8)	BTL3	Applying

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)	BTL4	Analyzing
11	Explain briefly about different transmission medium available in computer network.	(16)	BTL3	Applying
12	Explain the Shielded twisted pair (STP) and Unshielded twisted pair (UTP).	(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