SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

QUESTION BANK

IV SEMESTER

1922402 - Data Communication and Networks

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Prepared by

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SUBJECT : DATA COMMUNICATION AND NETWORKS

SEM / YEAR: IV Sem / II Year

UNIT I - INTRODUCTION			
Networks – Network Types – TCP/IP Protocol suite – OSI Model – Transmission media – Line Configuration – Topology – Transmission Modes – Analog Communication Systems			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	List the different network criteria.	BTL 1	Remembering
2.	Define Simplex, Half-Duplex and Full-Duplex.	BTL 1	Remembering
3.	Examine the two types of line configuration.	BTL 4	Analyzing
4.	What is the purpose of dialog controller?	BTL 1	Remembering
5.	Analyze all the parameters used to measure network performance.	BTL 4	Analyzing
6.	Define computer Networks.	BTL 1	Remembering
7.	Can you list the five components of data communication system?	BTL 1	Remembering
8.	Generalize LAN, WAN and MAN.	BTL 3	Applying
9.	What is the similarity between transport layer and data link layer?	BTL 1	Remembering
10.	In what way you can summarize the purpose of layering.	BTL 2	Understanding
11.	How do guided media differ from unguided media?	BTL 6	Creating
12.	Assume 10 devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?	BTL 3	Applying
13.	Why are protocols needed?	BTL 3	Applying
14.	List out the advantages of star topology.	BTL 2	Understanding
15.	Which layer implements the node to node channel connection in OSI layered architecture?	BTL 4	Analyzing
16.	Can you discriminate bandwidth and latency? Justify	BTL 6	Creating
17.	Define Analog Communication.	BTL 1	Remembering
18.	Identify the components of Analog Communication system.	BTL 1	Remembering
19.	Compare Analog and Digital Communication.	BTL 2	Understanding
20.	How Time period and Frequency can be related?	BTL 3	Applying
PART-B			
1.	(i) Explain how to build network with OSI and TCP/IP reference model.(6) (ii)Write short notes on (a) Multiplexing and Demultiplexing. (4) (b) Framing (3)	BTL 1	Remembering
2.	Explain fiber optic communication in detail. (13)	BTL 1	Remembering

3.	Draw the OSI network architecture and explain the functionalities of every layer in detail. (13)	BTL 1	Remembering
4.	Briefly explain the different types of network topologies. Write each of its advantages and disadvantages. (13)	BTL 1	Remembering
5.	(i) Explain the types of transmission modes. (7) (ii) What are the different types of networks? Explain in detail. (6)	BTL 2	Understanding
6.	Explain the Shielded twisted pair (STP) and Unshielded twisted pair (UTP). (13)	BTL 4	Analyzing
7.	Explain in detail about TCP/IP protocol suite with neat diagram? (13)	BTL 3	Applying
8.	Formulate and discuss the various types of transmission media, highlighting their merits and demerits. (13)	BTL 6	Creating
9.	Discuss in detail about the functions of network layer and transport layers With necessary diagrams. (13)	BTL 5	Evaluating
10.	(i) Explain the various network performance parameters in detail. (6) (ii) Explain the purpose of cladding in an optical fiber. (7)	BTL 3	Applying
11.	Explain the components and functioning of Analog Communication System. (13)	BTL 2	Understanding
12.	(i) Analyze the advantages of optical fiber over twisted pair and coaxial cable. (6) (ii) Explain the major component of a packet switch and their functions. (7)	BTL 4	Analyzing
13.	Explain the characteristics of Analog Communication Signals (13)	BTL 2	Understanding
14.	(i) Explain in detail about network dependent and network independent layers of OSI reference model. (10) (ii) List out the approaches of switching? (3)	BTL 4	Analyzing
	PART – C		
1.	(i) List the requirements in building a computer networks. (5) (ii) Estimate your idea on how guided media differ from unguided media? Briefly explain any three methods used for data communication using guided media and two methods used for data communication using unguided media. (10)	BTL 6	Creating
2.	Interpret with relevant diagram the functions of physical and data link layer. (15)	BTL 5	Evaluating
3.	Analyze the operation of Analog Communication System and mention its merits and demerits. (15)	BTL 4	Analyzing
4.	Interpret the major functions performed by the layers of the ISO - OSI Reference model. (15)	BTL 5	Evaluating

UNIT II - DATA COMMUNICATION

Analog Signals – Time and Frequency Domain – Digital Signals – Digital to Digital Conversions – Analog to Digital Conversions – Digital to Analog Conversions – Analog to Analog Conversions

PART – A

Q.No	Questions	BT Level	Competence
1.	Examine the representation of Analog and Digital Signal.	BTL 4	Analyzing
2.	Define Data Communication.	BTL 1	Remembering
3.	How the frequency of a signal is measured?	BTL 6	Creating

4.	Interpret the relationship between Time Period and Frequency.	BTL 5	Evaluating
5.	How would you define and calculate Bandwidth?	BTL 3	Applying
6.	Analyze the representation of a signal in Time and Frequency domain.	BTL 4	Analyzing
7.	What is Composite signal?	BTL 1	Remembering
8.	Identify the need for MODEM in Data Communication.	BTL 2	Understanding
9.	Define Bit Rate and Bit Length.	BTL 1	Remembering
10.	List out the causes for Transmission Impairment.	BTL 2	Understanding
11.	Describe Nyquist Bit Rate and Shannon Capacity to determine the highest data rate.	BTL 1	Remembering
12.	List the three techniques of digital-to-digital conversion.	BTL 2	Understanding
13.	Distinguish between data rate and signal rate.	BTL 2	Understanding
14.	Analyze the need Line and Block Coding.	BTL 4	Analyzing
15.	Enlist the categories of Line Coding.	BTL 2	Understanding
16.	Compare and contrast PCM and DM.	BTL 2	Understanding
17.	Define carrier signal and discover its role in analog transmission.	BTL 3	Applying
18.	Which of the four digital-to-analog conversion techniques (ASK, FSK, PSK or QAM) is the most susceptible to noise? Defend your answer.	BTL 5	Evaluating
19.	What are the techniques used in digital to analog conversion?	BTL 1	Remembering
20.	Define constellation diagram and explain its role in analog transmission.	BTL 2	Understanding
	PART-B		
1.	How the Digital Data can be Converted into to Digital Signal? What are the Coding methods available for encoding the Digital Data? (13)	BTL 3	Applying
2.	Write short notes on (a) Pulse Code Modulation (PCM) (7) (b) Delta Modulation (DM) (6)	BTL 1	Remembering
3.	Briefly explain the different Data transmission modes. (13)	BTL 2	Understanding
4.	List out the characteristics of Analog Signals and explain them with necessary diagrammatic representations. (13)	BTL 1	Remembering
5.	Discover and Discuss the various causes for Transmission Impairment. (13)	BTL 4	Analyzing
6.	Enlist and describe in detail about the different categories of Block Coding methods. (13)	BTL 1	Remembering
7.	List out the characteristics of Digital Signals and explain them with necessary diagrammatic representations. (13)	BTL 1	Remembering
8.	Analyze the working of the below given modulation techniques (i) Amplitude Modulation (7) (ii) Frequency Modulation (6)	BTL 4	Analyzing
9.	Discuss the importance of the following techniques (i) Non-Return-to-Zero (NRZ) (7) (ii) Return-to-Zero (RZ) (6)	BTL 2	Understanding
10.	Interpret the role of the following methods involved in the process of Digital-to-analog conversion. (i) Amplitude Shift Keying (7) (ii) Phase Shift Keying (6)	BTL 5	Evaluating
11.	Classify the different Data Transmission Modes available for transmission of data from one device to another. (13)	BTL 4	Analyzing
12.	Examine the working of 2B1Q, 8B6T, 4D-PAM5 and MLT-3 Line coding methods. (13)	BTL 3	Applying

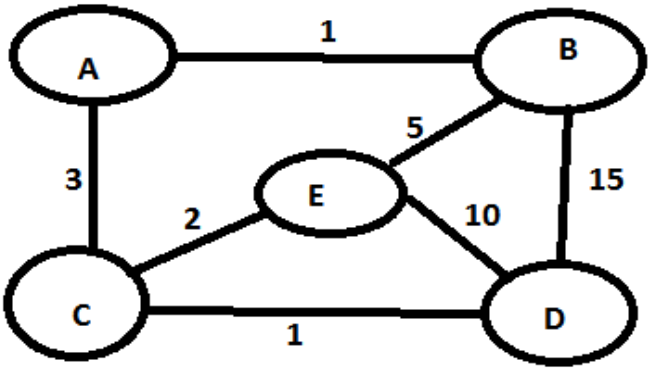
13.	Examine your understanding on Manchester and Differential Manchester Encoding schemes. (13)	BTL 4	Analyzing
14.	Identify the working principle of 4B/5B and 8B/10B coding techniques. (13)	BTL 3	Applying
	PART-C		
1.	Analyze the characteristics of Analog and Digital Signals in detail. (15)	BTL 4	Analyzing
2.	Interpret the Unipolar, Polar and Bipolar Line Coding techniques with suitable examples. (15)	BTL 5	Evaluating
3.	Exemplify the use of PCM and DM Techniques for converting Analog signals to Digital form. (15)	BTL 3	Applying
4.	Analyze the following methods involved in the process of Digital-to-analog conversion. (i) Frequency Shift Keying (8) (ii) Quadrature Amplitude Modulation (QAM) (7)	BTL 4	Analyzing

UNIT III – DATA-LINK LAYER & MEDIA ACCESS			
Introduction – DLC Services – HDLC – PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs: IEEE 802.11, Bluetooth – Connecting Devices: Hubs, Switches- Routers.			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	What do you understand by CSMA protocol?	BTL 1	Remembering
2.	Assess about Nodes and Links	BTL 5	Evaluating
3.	What is HDLC?	BTL 2	Understanding
4.	Outline the services provided by the Data link layer	BTL 2	Understanding
5.	What is flow control and error control	BTL 1	Remembering
6.	Infer why the data link layer is subdivided into two sub layers.	BTL 4	Analyzing
7.	Suppose the following sequence of bits arrives over a link 1101011111010111110010111110110. Show the resulting frame after any stuffed bits have been removed .Indicates any errors that might have been introduced into the frame.	BTL 6	Creating
8.	What are the three different configuration supported by HDLC?	BTL 1	Remembering
9.	Define framing	BTL 1	Remembering
10.	Relate persistent CSMA with non-persistent CSMA.	BTL 3	Applying
11.	Compose your view on why fragmentation is recommended in a wireless LAN?	BTL 6	Creating
12.	Analyze the role of 802.11	BTL 4	Analyzing
13.	What is meant by bit stuffing? Give an example	BTL 1	Remembering
14.	Assess the four types of S frames.	BTL 5	Evaluating
15.	Examine the access method used by wireless LAN?	BTL 4	Analyzing
16.	Identify the hidden node problem	BTL 3	Applying
17.	Organize the role of error control?	BTL 3	Applying
18.	Show the Ethernet frame format	BTL 2	Understanding
19.	Compare Bit oriented versus Byte oriented protocol.	BTL 2	Understanding
20.	Write about the Hubs and switches.	BTL 1	Remembering

PART-B			
1.	(i) Explain the physical properties of Ethernet 802.3 with necessary diagram of Ethernet transceiver and adaptor. (6) (ii) Assess and explain the Ethernet frame format (7)	BTL 5	Evaluating
2.	Construct the comparison between different wireless technologies? Enumerate 802.11 protocol stacks in detail. (13)	BTL 6	Creating
3.	Analyze the architecture of IEEE 802.11. (13)	BTL 4	Analyzing
4.	Illustrate the working of CSMA / CD and CSMA/CA protocol.(13)	BTL 2	Understanding
5.	Explain in detail about the Point to point Protocol (PPP) with neat sketch. (13)	BTL 1	Remembering
6.	(i) Analyze the flow and error control in DLC (7) (ii) Examine the various issues in the Data link layer. (6)	BTL 4	Analyzing
7.	What is the need for error detection? Explain with typical examples. Explain methods used for error detection and error correction. (13)	BTL 1	Remembering
8.	(i). Summarize Cyclic Redundancy Check. Show an example of a CRC code. (7) (ii). Explain and solve CRC division using polynomials. (6)	BTL 2	Understanding
9.	Discuss the different ways to address the framing problem. (13)	BTL 2	Understanding
10.	Write short notes on: (i) NAV in CSMA/CA, Bridges. (7) (ii) How does a Bridge come to learn on which port the various hosts reside? Explain with examples. (6)	BTL 1	Remembering
11.	Construct the working principle of Switches, Hub and Routers (13)	BTL 3	Applying
12.	Identify the working principle of Bluetooth and develop a neat sketch to depict its architecture. (13)	BTL 3	Applying
13.	Classify in detail about High-level Data Link Control and the types of frames. (13)	BTL 4	Analyzing
14.	Explain in detail about the error detecting techniques (i) Checksum (7) (ii) Forward error correction (6)	BTL 1	Remembering
PART-C			
1.	Analyze the various types of error .Discuss the various types of detection and correction (15)	BTL4	Analyzing
2.	(i) Interpret your understanding of bit oriented protocol namely HDLC. (11) (ii)Assess briefly about CSMA. (4)	BTL 5	Evaluating
3.	Use IEEE 802.3 and IEEE 802.11 to build three differences between wired and wireless LANS. (15)	BTL6	Creating
4.	Explain Cyclic Redundancy Check? Suppose we want to transmit the message 11001001 and protect it from errors using the CRC polynomial $x^3 + 1$. Use polynomial long division to determine the message that should be transmitted. (15)	BTL5	Evaluating

UNIT-IV NETWORK LAYER			
Network Layer Services – Packet switching – IPV4 Addresses: Classful addressing- classless addressing – Network Layer Protocol: Internet Protocol (IP) – Routing Algorithms: Distance vector routing- Link State routing- Unicast routing algorithm: OSPF– Multicasting Basics – IPV6 Addressing – IPV6 Protocol			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Identify when the forwarding table used.	BTL 3	Applying
2.	What are the metrics used by routing protocols?	BTL 1	Remembering
3.	Choose the class of the following IP address: (a) 110.34.56.45 (b) 212.208.63.23	BTL 6	Creating
4.	How would you design Class A, Class B and Class C of IP?	BTL 1	Remembering
5.	Define routing.	BTL 1	Remembering
6.	Draw the sketch of IPv4 packet header.	BTL 1	Remembering
7.	What is Border Gateway Protocol (BGP).	BTL 1	Remembering
8.	Discover the network address in a class A subnet with the IP address of one of the hosts as 25.34.12.56 and mask 255.255.0.0?	BTL 4	Analyzing
9.	Demonstrate the need for sub netting?	BTL 2	Understanding
10.	Explain packetizing.	BTL 2	Understanding
11.	What is the need for fragmentation?	BTL 1	Remembering
12.	Analyze how routers differentiate the incoming unicast, multicast and broadcast IP packets.	BTL 4	Analyzing
13.	What is multicast routing?	BTL 2	Understanding
14.	Can you relate the two different classes of routing protocol?	BTL 3	Applying
15.	Differentiate between forwarding table and routing table	BTL 2	Understanding
16.	Discover the OSPF header format	BTL 4	Analyzing
17.	Recommend the benefits of Open Shortest Path First (OSPF) protocol?	BTL 5	Evaluating
18.	Determine the two major mechanisms defined to help transition	BTL 5	Evaluating
19.	Test whether the following IPv6 address notations are correct. (a) ::0F53:6382:AB00:67DB:BB27:7332 (b) 7803:42F2:::88EC:D4BA:B75D:11CD	BTL 6	Creating
20.	Identify all the metrics used by routing protocols?	BTL 3	Applying

PART-B			
1.	Explain in detail the operation of OSPF protocol by considering a suitable network. (13)	BTL 1	Remembering
2.	Explain the Distance Vector routing algorithm. Analyze its limitations comparing with other routing algorithms. (13)	BTL 4	Analyzing
3.	Describe the multicast routing in detail. (13)	BTL 2	Understanding
4.	Explain about IPv6? Compare IPv4and IPv6. (13)	BTL 2	Understanding
5.	(i) What is Internet multicasting? Explain in detail. (8) (ii) Discuss in detail the various aspects of IPV6. (5)	BTL 2	Understanding
6.	With an example network scenario explain the mechanism of Routing Information Protocol and specify the routing table contents. (13)	BTL 1	Remembering
7.	Develop in detail the datagram approach: Connectionless services (13)	BTL 3	Applying
8.	(i) Analyze the Link State algorithm in detail. (5) (ii) Consider the network shown in Fig 1. Computer the shortest path from C to all other nodes using Link-State algorithm.		

	Also update the forwarding table of node C. (8)  Fig. 1	BTL 4	Analyzing
9.	(i) Describe in detail about reliable flooding. (6) (ii) Explain Link State Packet in detail (7)	BTL 6	Creating
10.	Discuss in detail about open source shortest path routing with neat diagrams. (13)	BTL 1	Remembering
11.	Examine the function of the Border Gateway Protocol used for Inter domain routing in internetwork (13)	BTL 3	Applying
12.	Describe in detail the operation of Virtual-Circuit Approach: Connection-Oriented Service (13)	BTL 4	Analyzing
13.	Compare Classful Addressing and Classless Addressing. (13)	BTL 5	Evaluating
14.	Explain the working of Link -state Routing in detail. (13)	BTL 1	Remembering

	PART-C		
1.	Find the class of each IP address. Give suitable explanation. i) 227.12.14.87 (3) ii) 193.14.56.22 (3) iii) 14.23.120.18 (3) iv) 252.5.15.111 (3) v) 134.11.78.56 (3)	BTL 5	Evaluating
2.	Why subnetting is necessary? With suitable example, develop the concept of subnetting in class-B network. (15)	BTL 6	Creating
3.	(i) Interpret the function of Routing Information Protocol(RIP).(8) (ii) Draw the IPv6 packet header format. (7)	BTL 5	Evaluating
4.	(i) 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? (5) (ii) Discuss the fundamentals and advantages of Open Shortest Path First protocol. (10)	BTL 6	Creating

UNIT V TRANSPORT LAYER AND APPLICATION LAYER			
Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP). WWW and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP			
PART-A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Discover the services provided by Transport layer protocol?	BTL 4	Analyzing
2.	What is a socket address?	BTL 1	Remembering
3.	Summarize IP addresses versus port numbers	BTL 2	Understanding
4.	List the different phases used in TCP connection.	BTL 1	Remembering
5.	Identify when can an application make use of UDP?	BTL 3	Applying
6.	Differentiate between TCP and UDP	BTL 2	Understanding
7.	Classify the advantages of connection oriented services over Connection less services.	BTL 4	Analyzing
8.	Formulate what will happen if Congestion Control is not implemented in a network?	BTL 6	Creating
9.	List the various congestion control techniques in TCP.	BTL 2	Understanding
10.	Conclude what would you infer from the term RTT?	BTL 5	Evaluating
11.	Define SMTP.	BTL 1	Remembering
12.	Relate WWW and Internet.	BTL 4	Analyzing
13.	Mention the types of HTTP messages	BTL 1	Remembering
14.	What is the purpose of FTP?	BTL 1	Remembering
15.	Outline the need of DNS?	BTL 2	Understanding
16.	Interpret the use of Hyper Text Transfer Protocol (HTTP).	BTL 2	Understanding
17.	Differentiate IMAP and POP.	BTL 2	Understanding
18.	What is the use of TELNET in a network?	BTL 2	Understanding
19.	Interpret the design of a MIB for a simple SNMP?	BTL 5	Evaluating
20.	Draw and construct the scenario of Electronic mail.	BTL 6	Creating
PART-B			
1.	(i) Examine the Three Way Handshake protocol to establish the transport level connection. (7) (ii) Analyze the various services of Transport Layer. (6)	BTL 4	Analyzing
2.	Define UDP. Discuss the operations of UDP. Explain UDP Check sum with one example. (13)	BTL 1	Remembering
3.	(i) Organize three ways of connection termination in TCP using state transition diagram. (8) (ii) Describe in detail about reliable flooding. (5)	BTL 3	Applying
4.	Discuss in detail the various congestion control mechanisms in TCP. (13)	BTL 2	Understanding
5.	With a neat architecture, explain TCP in detail. (13)	BTL 1	Remembering
6.	(i) Formulate how would you differentiate UDP and TCP? (7) (ii) Will you state or interpret in your own words about flow control in TCP and UDP with an example. (6)	BTL 6	Creating
7.	Explain adaptive flow control and retransmission techniques used in TCP. (13)	BTL 1	Remembering
8.	Explain the operation of WWW in detail. (13)	BTL 1	Remembering
9.	(i) Examine how SMTP transfers message from one host to another with suitable illustration. (6) (ii) Assess IMAP with its state transition diagram. (7)	BTL 4	Analyzing

10.	Explain in detail about HTTP operation, Request Message and Response Message types. (13)	BTL 2	Understanding
11.	Examine your understanding on File Transfer Protocol. (13)	BTL 4	Analyzing
12.	Write short notes on : (i) Role of SSH (7) (ii) Operation of DNS (6)	BTL 1	Remembering
13.	Assess the importance of Simple Network Management Protocol (SNMP)? (13)	BTL 5	Evaluating
14.	Formulate the working of Email in detail. (13)	BTL 6	Creating
	PART-C		
1.	Explain the various fields of TCP header and the working of the TCP protocol. (15)	BTL 5	Evaluating
2.	Develop with examples the three mechanisms by which congestion control is achieved in TCP. Differentiate these mechanisms. (15)	BTL6	Creating
3.	Elaborate on client/server application program TELNET. (15)	BTL 6	Creating
4.	Interpret and assess how SMTP protocol is used in E-mail applications. (15)	BTL 5	Evaluating