

UNIT I INTRODUCTION TO PHYSICAL LAYER**9**

Overview: Data Communication - Network Types - Internet History - TCP/IP Protocol Suite -
The OSI Model - Digital Signals - Data rate limits - Performance - Line Coding - Block Coding -
Transmission Media: Guided Media - Unguided Media – Switching.

PART-A

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	Are Protocols needed for Data Communication? Justify your answer.	02	CO1- K4	2.2.3
2.	Analyze the criteria of Networks.	02	CO1- K4	2.2.3
3.	What are the three criteria necessary for an effective and efficient network?	02	CO1- K1	1.3.1
4.	What are the advantages of a multipoint connection over a point-to-point connection?	02	CO1- K2	1.3.1
5.	Name the four basic network topologies, and cite an advantage of each type.	02	CO1- K2	1.3.1
6.	For n devices in a network, what is the number of cable links required for a mesh, ring, bus, and star topology?	02	CO1- K3	2.1.3
7.	What are some of the factors that determine whether a communication system is a LAN or WAN?	02	CO1- K2	1.3.1
8.	Analyze which layer is concerned with the format of data exchanged between peers? Justify your answer with example.	02	CO1- K4	2.2.3
9.	In what way would you analyze Packet switched and	02	CO1- K4	2.2.3

	Circuit Switched networks?			
10.	What are the advantages of a multipoint connection over a point-to-point connection?	02	CO1- K2	1.3.1
11.	Analyze the problems with mesh topology.	02	CO1- K4	2.2.3
12.	Which network topology is easy to set up? Justify your answer.	02	CO1- K4	2.2.3
13.	Analyze the uses of various Physical media.	02	CO1- K4	2.2.3
14.	What is the purpose of line coding?	02	CO1- K2	1.3.1
15.	Which layer implements a node to node channel connection in OSI layered architecture?	02	CO1- K2	1.3.1
16.	Assume six devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?	02	CO1- K3	1.3.1
17.	When a party makes a local telephone call to another party, is this a point-to-point or multipoint connection? Explain your answer.	02	CO1- K4	2.2.3
18.	Compare the telephone network and the Internet. What are the similarities? What are the differences?	02	CO1- K2	1.3.1
19.	You have two computers connected by an Ethernet hub at home. Is this a LAN, a MAN, or a WAN? Justify your answer.	02	CO1- K3	2.1.3
20.	Consider a noiseless channel with a bandwidth of 3000 Hz transmitting a signal with two signal levels. Compute the maximum bit rate.	02	CO1- K3	2.1.3

21.	We need to send 265 kbps over a noiseless channel with a bandwidth of 20 kHz. How many signal levels do we need?	02	CO1- K3	2.1.3
22.	A telephone line normally has a bandwidth of 3000. The signal-to-noise ratio is usually 3162. For this channel, compute the capacity.	02	CO1- K3	2.1.3
23.	We have a channel with a 1-MHz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal level?	02	CO1- K3	2.1.3
24.	A network with bandwidth of 10 Mbps can pass only an average of 12,000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughput of this network?	02	CO1- K3	2.1.3
25.	What is the propagation time if the distance between the two points is 12,000 km? Assume the propagation speed to be 2.4×10^8 m/s in cable.	02	CO1- K3	2.1.3
26.	What are the propagation time and the transmission time for a 2.5-kbyte message (an e-mail) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s.	02	CO1- K3	2.1.3
27.	What are the propagation time and the transmission time for a 5-Mbyte message (an image) if the bandwidth of the network is 1 Mbps? Assume that the	02	CO1- K3	2.1.3

	distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s.			
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PART-B

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	Illustrate the architecture of TCP/IP protocol stack in detail.	13	CO1- K2	1.3.1
2.	Illustrate the concept of various types of networks in detail.	13	CO1- K2	1.3.1
3.	Analyze the working concept of various types of Switching in detail with diagrams.	13	CO1- K2	1.3.1
4.	For each of the following four networks, discuss the consequences if a connection fails. a. Five devices arranged in a mesh topology b. Five devices arranged in a star topology (not counting the hub) c. Five devices arranged in a bus topology d. Five devices arranged in a ring topology	8	CO1- K4	2.2.3
5.	Illustrate the Layered architecture of OSI model in detail.	13	CO1- K2	1.3.1
6.	Discuss in detail about guided media and unguided media for transmission.	13	CO1- K2	1.3.1
7.	Draw a hybrid topology with a star backbone and three ring networks.	5	CO1- K3	2.1.3

8.	Draw a hybrid topology with a ring backbone and two bus networks.	5	CO1- K3	2.1.3
9.	<p>Performance is inversely related to delay. When you use the Internet, which of the following applications are more sensitive to delay?</p> <p>a. Sending an e-mail</p> <p>b. Copying a file</p> <p>c. Surfing the Internet</p>	6	CO1- K4	2.2.3
10.	Illustrate the concept of Line coding techniques and block coding with suitable examples.	15	CO1-K2	1.3.1
11.	Give some advantages and disadvantages of combining the session, presentation and application layer in the OSI model into one single application layer in the internet model.	13	CO1-K4	2.2.4
12.	<p>Dialog control and synchronization are two responsibilities of the session layer in the OSI model.</p> <p>Which layer do you think that it is responsible for these duties in the internet model?</p>	13	CO1-K4	2.2.3

UNIT II DATA LINK LAYER**9**

Link Layer Addressing - ARP - Error Detection and Correction - Data Link Control Services - Data Link Layer Protocols - HDLC - PPP - Media Access Control - Ethernet - Wireless LANs: IEEE 802.11, Bluetooth - Connecting Devices.

PART-A

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	What are the responsibilities of data link layer?	2	CO2-K2	1.3.1
2.	What is the purpose of hamming code?	2	CO2-K2	1.3.1
3.	Write short notes on ARP and RARP.	2	CO2-K2	1.3.1
4.	List out the sublayers of DLL and also define the purpose of it.	2	CO2-K1	2.2.4
5	Define Bluetooth.	2	CO2-K1	1.3.1
6	Compare the data rates for Standard Ethernet, Fast Ethernet, Gigabit Ethernet, and Ten-Gigabit Ethernet.	2	CO2-K2	2.2.4
7	Analyze the Connecting devices used in computer network.	2	CO2-K2	2.2.4
8.	Compare and contrast byte-stuffing and bit-stuffing.	2	CO2-K2	2.2.4
9.	What are unicast, multicast and broadcast addresses?	2	CO2-K1	1.3.1
10.	Give the ARP Packet format for mapping IP addresses to Ethernet addresses.	2	CO2-K1	2.2.4
11.	Compare and contrast byte-oriented and bit-oriented protocols. Which category has been popular in the past (explain the reason)? Which category is popular now (explain the reason)?	2	CO2-K4	2.2.3
12.	Draw Piconet and Scatternet.	2	CO2-K1	1.3.1
13.	What is the purpose of MAC? Also list its protocols.	2	CO2-K2	1.3.1
14.	How does a given bridge learn whether it should forward a multicast frame over a given port?	2	CO2-K4	2.2.3
15.	Differentiate Switch and Bridge.	2	CO2-K2	2.2.4
16.	Why should Ethernet frame should be 512 bytes long?	2	CO2-K4	2.2.4

17.	What are the ways to address the framing problem?	2	CO2-K2	1.3.1
18.	How does a single-bit error differ from a burst error?	2	CO2-K2	2.2.3
19.	Discuss the concept of redundancy in error detection and correction.	2	CO2-K2	1.3.1
20.	Distinguish between forward error correction versus error correction by retransmission.	2	CO2-K2	2.2.4
21.	Can the value of a checksum be all 0s (in binary)? Defend your answer. Can the value be all 1s (in binary)? Defend your answer.	2	CO2-K4	2.2.3
22.	Analyze the reason for moving from the Stop-and-Wait ARQ Protocol to the Go-Back-N ARQ Protocol.	2	CO2-K4	2.2.3
23.	Define piggybacking and its usefulness.	2	CO2-K2	1.3.1
24.	Do we need a multiple access protocol when we use the localloop of the telephone company to access the Internet? Why?	2	CO2-K4	2.2.3
25.	Analyze why collision is an issue in a random access protocol but not in controlled access or channelizing protocols.	2	CO2-K4	2.2.3
26.	Define the type of the following destination addresses: a. 4A:30:10:21:10:1A b. 47:20:1B:2E:08:EE c. FF:FF:FF:FF:FF:FF	2	CO2-K3	2.2.3
27.	What is the hexadecimal equivalent of the following Ethernet address? 01011010 00010001 01010101 00011000 10101010 00001111	2	CO2-K3	2.2.3
28	What is the difference between a BSS and an ESS?	2	CO2-K2	2.2.4

PART-B & C

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	What is the Hamming distance for each of the following codewords: a. d (10000, 00000) b. d (10101, 10000) c. d (11111, 11111) d. d (000, 000)	8	CO2-K3	2.2.3
2.	Assuming even parity, find the parity bit for each of the following data units. a. 1001011	8	CO2-K3	2.2.3

	b. 0001100 c. 1000000 d. 1110111			
3	(i). Define three types of addresses. (ii). Explain about ARP operations.	13	CO2-K2	1.3.1
4	Analyze “Bluetooth used for Short range communication or long range communication”.	13	CO2-K4	2.2.3
5	Describe in detail about the general protocol that can be used for both point-to-point and multipoint configurations.	13	CO2-K2	1.3.1
6	Describe the design procedure for simple, stop and wait, Go-back-N, Selective Repeat .	13	CO2-K2	2.2.4
7	Use IEEE 802.3 and IEEE 802.11 to generalize the differences between wired and wireless LANS.	15	CO2-K2	2.2.4
8	Suppose we want to transmission the message 1011 0010 0111 and protect it from errors using the CRC polynomial X^4+X^2+1 . Use polynomial long division to determine the message that should be transmitted. Suppose the leftmost bit of message is inverted due to noise on the transmission link. What is the result of the receiver’s CRC calculation? How does the receiver know that an error has occurred?	15	CO2-K3	2.2.4
9	Explain the IEEE 802.11 wireless LAN architecture in detail with diagram.	13	CO2-K2	1.3.1
10	Describe in detail about the general protocol that can be used for only point-to-point configuration.	13	CO2-K2	1.3.1

UNIT III NETWORK LAYER**9**

Network layer Services - Packet switching - Performance - IPV4 addresses - Forwarding of packets - Internet Protocol - ICMPV4 - Mobile IP - Routing algorithms - Routing Protocols - IPV6 addressing - IPV6 protocol -Transition from IPV4 to IPV6.

PART-A

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	Change the following IPv4 addresses from binary notation to dotted-decimal notation. a. 10000001 00001011 00001011 11101111 b. 11000001 10000011 00011011 11111111	2	CO3-K3	2.2.3
2.	Change the following IPv4 addresses from dotted-decimal notation to binary notation. a. 111.56.45.78 b. 221.34.7.82	2	CO3-K3	2.2.3
3.	What is the number of bits in an IPv4 address? What is the number of bits in an IPv6 address?	2	CO3-K1	1.3.1
4.	What are the differences between classful addressing and classless addressing in IPv4?	2	CO3-K2	1.3.1
5.	Explain why most of the addresses in class A are wasted. Explain why a medium-size or large-size corporation does not want a block of class C addresses.	2	CO3-K4	2.2.4
6	Define subnetting and supemetting.	2	CO3-K2	1.3.1
7	In a block of addresses, we know the IP address of one host is 182.44.82.16/26. What is the first address (network address) and the last address (limited broadcast address) in this block?	2	CO3-K3	2.2.3
8	What is the difference between the delivery of a frame in the data link layer and the delivery of a packet in the network layer?	2	CO3-K2	2.2.4
9	What is the difference between connectionless and connection-oriented services? Which type of service is provided by IPv4? Which type of service is provided by IPv6?	2	CO3-K4	2.2.4
10	Define fragmentation and explain why the IPv4 and IPv6 protocols need to fragment some packets. Is there any difference between the two protocols in this matter?	2	CO3-K4	2.2.4
11	List three transition strategies to move from IPv4 to IPv6.	2	CO3-K1	1.3.1

12	What is the purpose of including the IPv4 header and the first 8 bytes of datagram data in the error-reporting ICMPv4 messages?	2	CO3-K2	2.2.4
13	List the advantages of IPv6 over IPv4.	2	CO3-K2	1.3.1
14	The extension headers in IPv6 are equivalent to what in IPv4.	2	CO3-K2	2.2.4
15	What are the metrics used in determining the best path for a routing protocol?	2	CO3-K2	2.2.4
16	What is OSPF? List its features.	2	CO3-K2	2.2.4
17	What do you mean by reliable flooding?	2	CO3-K2	2.2.4

PART-B

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	Find the error, if any, in the following IPv4 addresses. a. 111.56.045.78 b. 221.34.7.8.20 c. 75.45.301.14 d. 11100010.23.14.67	8	CO3-K3	2.2.3
2.	Find the class of each address. a. 00000001 00001011 00001011 11101111 b. 11000001 10000011 00011011 11111111 c. 14.23.120.8 d. 252.5.15.111	8	CO3-K3	2.2.3
3.	An organization is granted the block 211.17.180.0/24. The administrator wants to create 32 subnets. a. Find the subnet mask. b. Find the number of addresses in each subnet. c. Find the first and last addresses in subnet 1. d. Find the first and last addresses in subnet 32	13	CO3-K4	2.2.3
4.	An IPv4 datagram has arrived with the following information in the header (in hexadecimal): 0x45 00 00 54 00 03 58 50 20 06 00 00 7C 4E 03 02 B4 OE OF 02 a. Is the packet corrupted? b. Are there any options? c. Is the packet fragmented? d. What is the size of the data? e. How many more routers can the packet travel to? f. What is the identification number of the packet? g. What is the type of service?	15	CO3-K4	2.2.3
5.	Describe the process of transition from IPv4 to IPv6.	13	CO3-K2	1.3.1

6.	List the deficiencies of IPv4. Describe how to overcome it.	13	CO3-K2	1.3.1
7.	Explain the datagram format of IPv4.	13	CO3-K2	1.3.1
8.	List three transition strategies to move from IPv4 to IPv6. Explain the difference between tunneling and dual stack strategies during the transition period. When is each strategy used?	13	CO3-K4	2.2.4
9.	Is RIP an interdomain or intradomain routing protocol? Explain.	13	CO3-K4	2.2.2
10.	Analyze the various unicast routing algorithms and explain the routing that is not based on least-cost routing.	13	CO3-K4	2.2.4
11.	Describe in detail about ICMP.	13	CO3-K2	1.3.1

UNIT IV **TRANSPORT LAYER**

9

Transport Layer Services - Protocols - UDP - TCP: Transition Diagram, Flow Control, Error Control, Congestion Control - SCTP - QoS: Flow Control to improve QoS - Integrated Services - Differentiated Services - Client Server Programming.

PART-A

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	UDP is a message-oriented protocol. TCP is a byte-oriented protocol. If an application needs to protect the boundaries of its message, which protocol should be used, UDP or TCP?	2	CO4-K4	2.2.4
2.	Compare the TCP header and the UDP header. List the fields in the TCP header that are missing from UDP header. Give the reason for their absence.	2	CO4-K2	1.3.1
3.	Are both UDP and IP unreliable to the same degree? Why or why not?	2	CO4-K4	2.2.4
4.	What are the advantages of using UDP over TCP?	2	CO4-K2	1.3.1
5.	What do you mean by QoS? Also infer how to improve QoS.	2	CO4-K2	1.3.1
6.	Differentiate Connectionless and Connection-Oriented Services of transport layer protocols.	2	CO4-K2	1.3.1
7.	What is the major difference between Integrated Services and Differentiated Services?	2	CO4-K2	1.3.1
8.	What is traffic shaping? Name two methods to shape traffic.	2	CO4-K2	1.3.1

9.	Suppose a TCP connection is transferring a file of 5000 bytes. The first byte is numbered 10001. What are the sequence numbers for each segment if data is sent in five segments, each carrying 1000 bytes?	2	CO4-K3	2.2.3
10.	List the services of end to end services.	2	CO4-K2	1.3.1

PART-B

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	Define UDP. Discuss the operation and checksum of UDP with example.	13	CO4-K2	1.3.1
2.	Discuss in detail the various congestion control mechanisms in TCP.	13	CO4-K2	1.3.1
3.	Explain in detail about TCP protocol with its operations.	13	CO4-K2	1.3.1
4.	Identify and explain the various functionalities of SCTP.	13	CO4-K2	1.3.1
5.	Explain in detail about the three way handshake protocol for connection establishment in TCP.	13	CO4-K2	1.3.1
6.	Explain how flow control and error control can be achieved in TCP.	13	CO4-K2	1.3.1
7.	Explain how to improve QoS.	13	CO4-K2	1.3.1
8.	Is TCP connection oriented or connection-less protocol? Justify your answer.	13	CO4-K4	2.2.4
9.	Analyze the problems with Integrated services. Also Explain how to overcome these shortcomings.	13	CO4-K4	2.2.4

UNIT V APPLICATION LAYER AND SECURITY

9

World Wide Web and HTTP – FTP – Electronic Mail – Telnet – Secure Shell – Domain Name System – Cryptographic Algorithms – Authentication Protocols – Message Integrity Protocols – Public Key Distribution(X.509) – Network Layer Security – Transport Layer Security – Application Layer Security – Firewalls.

PART-A

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	Classify the types of WWW documents.	2	CO5-K2	2.2.3
2.	What are the parts of a browser?	2	CO5-K2	2.2.3

3.	Write short notes on SSL.	2	CO5-K2	2.2.3
4.	How is HTTP related to WWW?	2	CO5-K2	2.2.3
5.	What is a proxy server? Infer how it is related to HTTP.	2	CO5-K2	2.2.3
6.	Define the term CRL.	2	CO5-K2	2.2.3
7.	Define Persistent and Non-persistent connections.	2	CO5-K2	2.2.3
8.	Write short notes on the protocols used for email security.	2	CO5-K2	2.2.3
9.	Define DNS.	2	CO5-K2	2.2.3
10.	Analyze the requirements of Cryptographic algorithms.	2	CO5-K4	2.2.4

PART-B

Q.No	Question	Max. Marks	CO-K Level	PO- PI Code
1.	Analyze the message format and the message transfer and the underlying protocol involved in the working of electronic mail.	13	CO5-K4	2.2.4
2.	Create a Transport Layer Security using TLS, SSL and HTTPS.	13	CO4-K3	2.2.3
3.	Write brief notes on WWW architecture and also describe how HTTP is related to WWW.	13	CO4-K2	1.3.1
4.	What do you mean by firewall. How the firewall works in computer networks and explain how it protect the network from unauthorized access by the intruder.	13	CO4-K2	1.3.1
5.	Describe Public Key distribution in detail	13	CO4-K2	1.3.1
6.	Explain in detail about Domain Name System.	13	CO4-K2	1.3.1
7.	Some application programs, such as FTP, need more than one connection when using TCP. Find how the multistream service of SCTP can help these applications establish only one association with several streams.	13	CO5-K4	2.2.4