ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024
INFORMATION TECHNOLOGY
Fifth Semester
IT5551 COMPUTER NETWORKS
(Regulation 2019)

Time: 3hrs   Max. Marks: 100

CO 1	Highlight the significance of the functions of each layer in the network
CO 2	Identify the devices and protocols to design a network and implement it
CO 3	To visualize the end-to-end flow of information.
CO 4	Build network applications using the right set of protocols and estimate their performances
CO 5	Trace packet flows and interpret packet formats
CO 6	Explain media access and communication techniques

BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	Let the URL of the ITU's home page be http://www.itu.org/home/index.html. List down the steps involved in displaying the steps by the browser.	2	1	3
2	How long does it take a packet of length 'L' to propagate over a link distance of 'd', propagation speed of 's' and the transmission rate 'R, bps? Given data: L=1000 bytes, d=2500 km, s=2.5*108, R=2Mbps. Compute the time taken for propagation over a link.	2	2	3
3	What is a Transport Layer Service Access Point (TSAP)?	2	3	1
4	Both congestion control and flow control throttle the sender. Then how are they different?	2	3	2
5	Host 'H1' is configured with an address of 128.96.34.15 and a subnet mask of 255.255.255.128. Express the result of ANDing these two in dotted decimal notation.	2	4	3
6	Write short notes on Network address Translation.	2	4	1
7	In a routing algorithm, a router informs the details of the routers it has gathered to its neighbours. Is it Distance Vector Routing Algorithm or Link State Routing Algorithm? Justify your answer.	2	5	2
8	What is the need for migrating from IPv4 to IPv6?	2	5	2
9	What is the need for framing in data link layer?	2	6	1
10	Draw the waveform of the differential Manchester encoding for the bit sequence 10000101111.	2	6	3

PART- B (5 x 13 = 65 Marks)
(Restrict to a maximum of 2 subdivisions)

Q. No	Questions	Marks	CO	BL
11 (a) (i)	Draw the mesh topology for a network with 4 nodes. Derive the expression for the number of links (edges) in a network with 'n' nodes.	7	1	3
(ii)	Explain the advantages and disadvantages of mesh topology over other network topologies.	6	2	1
	OR			
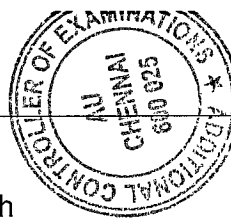
11 (b) (i)	Consider the following two cases: a. 2 LANs are connected with a hub b. 2 LANs are connected with a bridge/switch What is the impact of the above two arrangements over broadcast domain and collision domain?	7	1	3
(ii)	Explain the operation of routers and gateways.	6	2	1
12 (a) (i)	If the TCP round trip time, RTT, is currently 30 msec and thefollowing acknowledgements come in after 26, 32, and 24 msec respectively. What is the new RTT estimate? Assume that alpha=0.9.	7	3	3
(ii)	Explain the 3 way handshake protocol for establishing connection in the transport layer.	6	3	1
OR
12 (b) (i)	Consider sending a large file from a host over a TCP connection that has no loss. Suppose TCP uses AIMD for its congestion control without slow start. Assuming the congestion window increases by 1 MSS every time a batch of ACKs is received and assuming approximately constant round trip times, how long does it take for the congestion window increase from 6 MSS to 12 MSS (assuming no loss events)?	7	3	3
(ii)	Explain the process of multiplexing and demultiplexing in the transport layer.	6	3	1
13 (a) (i)	A router has the following CIDR entries in its routing table 	Address/ mask	Next hop
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135.46.56.0/22	Interface 0
135.46.60.0/22	Interface 1
92.53.40.0/23	Router 1
Default	Router 2 | For the following IP addresses, what does the router do if a packet with that address arrives? 135.46.63.10, 135.56.57.14,192.53.40.7, 192.53.56.7	7	4	3
(ii)	Explain the class based addressing of IPv4	6	4	2
OR
13 (b) (i)	Consider a subnet with prefix 192.168.56.128/26. Give an example of one IP address of the form w.x.y.z (dotted decimal notation). Suppose an ISP owns the block of IP addresses of the form 192.168.56.32/26. Suppose it wants to create 4 subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?	7	4	3
(ii)	Compare and contrast circuit switched networks and packet switched networks.	6	4	2
14 (a) (i)	Consider the following network. There are 6 nodes: A, B, C, D, E and F. A is connected to B (weight 4), A is connected to E (weight 5), B is connected to C (weight 2), B is connected to F (weight 6), C is connected to E (weight 1), C is connected to D (weight 3), D is connected to F (weight 7) and E is connected to F (weight 8). Draw the network. Apply the link state routing algorithm over the network.	7	5	3
(ii)	Explain the distance vector routing algorithm with a sample network.	6	5	2
OR
14 (b) (i)	Suppose datagrams are limited to 1200 bytes (including header) between source host A and destination host B. Assuming a 20 byte IP header, how many datagrams would be required to send an MP3 consisting of 4 million bytes?	7	5	3
(ii)	Explain the ICMP protocol with important control messages	6	5	2
15 (a)	Explain the CSMA/CD protocol.	13	6	2

	OR				
15 (b)	Explain the various encoding schemes followed by the physical layer.	**13**	**6**	**2**	

PART- C (1 x 15 = 15 Marks)

Q. No	Questions	Marks	CO	BL
16.	Assume that a large financial corporation that has its headquarters in Mumbai and has branches all over India wants to create a data network for it. The organization wants to organize its network in a hierarchical way: core network, access network and edge network. Discuss the various decisions to be made to implement this network. Explain the various issues to be considered at the application layer, transport layer, network layer and data link layer to make the network scalable, reliable and secure.	**15**	2,3,4,5,6	L4, L5

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