2025

Computer Networks

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Why do we need a DNS system when we can directly use an IP address? Explain the different types of DNS used in the internet.	2+6=8
	b)	Explain with a neat diagram, connection establishment in TCP using three-way handshaking. What is SYN flooding attack?	6+2=8
	c)	In a 4-Mbps token ring network, how long does it take for a station to produce the 3-byte long token. Take the speed of propagation in the cable as 60% of the speed of light.	2
	d)	A bit string 0111101111101111110 needs to be transmitted at the data link layer. What is the string actually transmitted after bit stuffing?	2
2.	a)	Discuss classful addressing and classless addressing in IPv4? What are the flaws in classful addressing?	5+2=7
	b)	Find the first address, last address and the block size of the following block- 123.56.77.32/29. Write the address lines in the block.	7
	c)	The following character encoding is used in a data	6

		link protocol: A- 01000111; B- 11100011; FLAG-01111110; ESC- 11100000. Write the bit sequences transmitted in binary for the four-character frame <u>A B ESC FLAG</u> using i) character count, ii) flag bytes with byte stuffing, c) starting and ending flag bytes with bit stuffing.	
3.	a)	Draw the IPv4 datagram header format. Explain any three important fields of the header format.	8
	b)	A host sending 100 datagrams to another host. If the identification number of the first datagram is 1024, what is the identification number of the last?	2
	c)	Data link protocols almost always put the CRC in a trailer rather than in a header. Why?	2
	d)	What do you mean by congestion control? Name some open-loop and closed-loop congestion control techniques. Discuss any two of these techniques	8
4.	a)	Describe a general architecture of Electronic Mail.	6
	b)	Explain binary exponential backoff algorithm with the help of an example.	4
	c)	What is ATM switching? Explain the ATM architecture. What are the various ATM layers? What are their responsibilities?	2+3+5= 10
5.	a)	Suppose the length of a 10Base5 cable is 2300m. If the speed of propagation in a thick coaxial cable is 2×10^8 m/sec, how long does it take for a bit to travel from the beginning to the end of the network? Assume there is 8μsec delay in the equipment.	4
	b)	In a system using Stop-and-Wait ARQ protocol, each	4

		packet carries 1000 bits of data, how long does it take to send 10,000 bits of data if the distance between the sender and the receiver is 5000km and the propagation speed is 2×10^8 m/sec. Ignore any delay.	
	c)	Why there is no need for CSMA/CD on a full-duplex Ethernet LAN?	2
	d)	Describe World Wide Web (WWW) as a client/server architecture. Discuss HTML, HTTP and URL in this context.	4+6=10
6.	a)	i) An IPv4 fragment has arrived with an offset value of 100. How many bytes of data were originally sent by the source before the data in this fragment?	2
		ii) Calculate the HLEN value in IPv4 if the total length is 1200 bytes. Consider 1176 bytes of data coming from the upper layer.	2
	b)	What is maximum transfer unit (MTU). Write the MTU values of various commonly implemented network technologies. How fragmentation at the source is related to the MTU?	5
	c)	Describe the send window of Go-Back-N ARQ.	5
	d)	What is resolution? Elaborate recursive resolution and iterative resolution with relevant diagram.	1+5=6
7.		Write short notes on -i) HDLC frames, ii) point-to-point versus broadcast links, iii) p-persistent CSMA, iv) Stop-and-wait ARQ.	5*4=20

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