Mid Semester Question and Sample Scheme of Evaluation

KIIT Deemed to be University
Online Mid Semester Examination (Autumn Semester-2020)

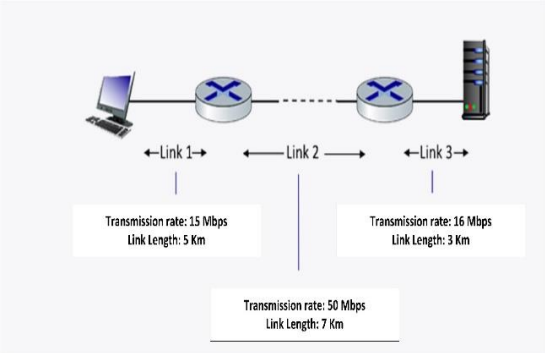
Subject Name & Code: Computer Networks, IT-3005,
Applicable to Courses: B. Tech, 5th Semester (CSE, IT, CSSE, CSCE)

Full Marks=20 **Time:1 Hour**

SECTION-A (Answer All Questions. All questions carry 2 Marks)

Time:20 Minutes **(5×2=10 Marks)**

Question No	Question Type (MCQ/SAT)	Question	Answer Key(if MCQ)	Marks (2 marks each)
Q.No:1(a)	MCQ	The transport layer protocols used for file transfer, real time multimedia, DNS and email, respectively are: (a) TCP, UDP, TCP and TCP (b) UDP, TCP, UDP and TCP (c) TCP, TCP, UDP and TCP (d) TCP, UDP, UDP and TCP	(d)	
	MCQ	Suppose two hosts use a TCP connection to transfer a large file. Which of the following statements is/are **False** with respect to the TCP connection? (i) If the sequence number of a segment is m, then the sequence number of the subsequent segment is always m+1. (ii) If the estimated round-trip time (RTT) at any given point of time is t sec, the value of the retransmission timeout is always set to greater than or equal to t sec. (iii) The size of the advertised window never changes during the course of the TCP connection. (iv) The number of unacknowledged bytes at the sender is always less than or equal to the advertised window. (a) iii only (b) i and iii only (c) i and iv only (d) ii and iv only	(b)	
	MCQ	The value of HLEN in TCP header is 1011 in binary. How many bytes of options are being carried by this packet? (a) 11 (b) 20 (c) 24 (d) 34	(c)	
	MCQ	Which of the following statement is incorrect related to flow control? (i) Opening, closing and shrinking of the send window is controlled by receiver TCP (ii) Opening, closing and shrinking of the receiver window is controlled by sender TCP	(b)	

		(iii) When (new ackNo+new rwnd>last ackNo+last rwnd) window shrinks at sender TCP (iv) When (new ackNo+new rwnd<last ackNo+last rwnd) window shrinks and sender TCP (a) i and ii only (b) ii and iii only (c) iii and iv only (d) I and iv only		
Q.No:1(b)	**MCQ**	Consider the figure below, with three links, each with the specified transmission rate and link length. The length of a packet is 50000 bits. The speed of light propagation delay on each link is 2.5x10^8 m/sec.  In the transfer of file between PC and server, if the transmission rates along the path is 15Mbps, 50Mbps, and 16Mbps. The throughput is usually _____ (In case of no other traffic in the network). (a) 15Mbps (b) 50 Mbps (c) 16 Mbps (d) 27 Mbps	(a)	
	MCQ	How long does it take a packet of length 1000 bytes to propagate over a link of distance 2500km, propagation speed 2.5x10^8 m/s, and transmission rate 2 Mbps? (a) 10 ms (b) 100 ms (c) 0.1 ms **(d)** 10 s	(a)	
	MCQ	Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rate R1=1500Kbps, R2=2Mbps, and R3=1Mbps. Assuming no other traffic in the network, what is the throughput for the file transfer? Suppose the file is 4 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B? (a) 1 Mbps, 64 sec (b) 2 Mbps, 16 sec (c) 1500 Kbps, 48 sec (d) 1 Mbps, 32 sec	(d)	
	MCQ	Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rate R1=500kbps, R2=100Kbps, and R3=1Mbps. Assuming no other traffic in the network, what is the	(a)	

		throughput for the file transfer? Suppose the file is 8 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B? (a) 100 Kbps, 620 sec (b) 2 Mbps, 16 sec (c) 500 Kbps, 48 sec (d) 100 Kbps, 320 sec		
Q.No:1(c)	**MCQ**	Which of the following layers is an addition to OSI model when compared with TCP IP model? (a) Application layer (b) Presentation layer (c) Session layer (d) Session and Presentation layer	(d)	
		The default connection type used by HTTP is _____ (a) Persistent (b) Non-persistent (c) Can be either persistent or non-persistent depending on connection request (d) None of the mentioned	(a)	
	MCQ	DNS database contains _____ (a) Name server records (b) Hostname-to-address records (c) Hostname aliases (d) All of the mentioned	(d)	
	MCQ	The value of acknowledgement field in a segment defines _____ (a) sequence number of the byte received previously (b) total number of bytes to receive (c) sequence number of the next byte to be received (d) sequence of zeros and ones	(c)	
Q.No: 1(d)	**MCQ**	What is the maximum size of data that the application layer can pass on to the TCP layer below? (a) 1500 bytes (b) 2^16 bytes - size of TCP header (c) Any size (d) 2^16 bytes	(c)	
	MCQ	Which one of the following statements is NOT correct about HTTP cookies? (a) A cookie gains entry to the user's work area through an HTTP header (b) A cookie has an expiry date and time (c) A cookies is a piece of code that has the potential to compromise the security of an Internet user (d) Cookies can be used to track the browsing pattern of a user at a particular site	(a)	
	MCQ	Identify the correct sequence in which the following packets are transmitted on the network by a host when a browser requests a webpage from a remote server, assuming that the host has just been restarted. (a) DNS query, TCP SYN, HTTP GET request (b) TCP SYN, DNS query, HTTP GET request (c) HTTP GET request, DNS query, TCP SYN (d) DNS query, HTTP GET request, TCP SYN	(a)	
	MCQ	Let the size of congestion window of a TCP connection be	(b)	

		32 KB when a timeout occurs. The round-trip time of the connection is 100 msec and the maximum segment size used is 2 KB. The time taken (in msec) by the TCP connection to get back to 32 KB congestion window is ___. (a) 800 to 1000 (b) 1100 to 1300 (c) 1500 to 1700 (d) 1400 to 1600		
Q.No:1(e)	**MCQ**	During the teardown of a TCP connection, which entity enters into the TIME_WAIT state. (a) TCP client (b) TCP server (c) who initiates the teardown process (d) who receives the initial teardown request	(c)	
	MCQ	In case of UDP, the "total length" field is set with a value of 500. What is the length of the application data present in the given segment? (a) 500 bytes (b) 492 bytes (c) 492 bits (d) 500 bits	(b)	
	MCQ	In a data transfer using TCP, the complete data is sent as one segment which is of 200 bytes and the sequence number of the first byte is 1000. What is the value of the sequence number field in the segment during transit? (a) 1000 (b) 1001 (c) 1200 (d) 1201	(a)	
	MCQ	The contents of a UDP header send by the client in hexadecimal format is BD050035101A0000. What type of service the client is requesting? (a) Daytime (b) DNS (c) Web (d) DHCP	(b)	

SECTION-B(Answer Any One Question. Each Question carries 10 Marks)

Time: 30 Minutes **(1×10=10 Marks)**

Evaluation scheme: Six marks for theoretical descriptions and 4 marks for solving the problems. Step marking can be given in case of incomplete answer or partial answer.

Question No	Question	Marking Schemes
Q.No:2	Briefly describe role of user agent(UA), mail transfer agent(MTA), multipurpose internet mail extension(MIME) and post office protocol (POP) in E-mail system. In Go-back-N protocol with m=6, the sending machine is in the ready state with Sf=10 and Sn=15, An ACK with ACKNo =13 arrives, what are the next values of Sf, Sn and Rn?	6+4
	For UA, MTA, MIME and POP ref Text book. The next values are: Sf=13 and Sn=15, Rn=13 (supposing all outstanding packets were acknowledged)	
Q.No:3	Discuss the role of DNS during communication in a computer network? Compare and contrast iterative and recursive query with a suitable diagram. In a TCP connection, the initial sequence number at the client site is 2,171. The client opens the connection, sends three segments, the second of which carries 1,000 bytes of data, and closes the connection. What is the value of the sequence number in each of the following segments send by the client? a. The SYN segment b. The data segment c. The FIN segment	6+4
	To open a connection client needs to send 1 segment. with SYN. now we know SYN consume one sequence number but no data. **So, the sequence number of SYN segment: 2171.** Now 1000-byte data is sent, seq number=2171+1000=3171, **So, Sequence No. of Data Segment:3171** Now connection termination (FIN) consumes no sequence it can be sent with data. So final sequence number 3172, **So, Sequence No. of FIN Segment: 3172**	
Q.No:4	What is HTTP persistent and nonpersistent connections. Briefly describes the different methods used in HTTP request message with examples. Explain the three-way handshaking mechanism in TCP. What is the value of the receiver window (rwnd) for host A if the receiver, host B, has a buffer size of 5000 bytes and 1000 bytes of received and unprocessed data?	3+4+3
	The value of receiver window(rwnd) for host A depends on the its free buffer capacity at that instant. This values to be advertise by A for B. *However, send buffer to be set as 4,000 bytes for A as B advertises this value in its next segment to A. The rwnd value of B computed as= 5,000 − 1,000 = 4,000.*	
Q.No:5	Explain how Go-Back-N-ARQ is different than Selective repeat ARQ with diagrams? Why the window of Go-Back-N is selected as less than 2^m, explain with the value of m=4. Assume that, in a Stop-and-Wait system, the bandwidth of the line is 1 Mbps, and 1 bit takes 20 milliseconds to make a round trip. If the system data packets are 1,000 bits in length, what is the utilization percentage of the link?	6+4
	The bandwidth-delay product is $1 \times 10^6 \times 20 \times 10^{-3} = 20{,}000$ bits The system can send 20,000 bits during the time it takes for the data to go from the sender to the receiver and then back again. However, the system sends only 1000 bits. We can say that the link utilization is only 1000/20,000, or 5%. For this reason, for a link with high bandwidth or long delay, use of Stop-and-Wait ARQ wastes the capacity of the link.	
Q.No:6	Explain the different between packet switched network and circuit switched networks? Explain the different types of packet delays in a network and how they affect network parameters. In a packet switch network having Hops= 4, transfer 20 packets from A to B given packet size is L bits. Bandwidth to transfer data is R Mbps and speed of propagation is S meter/sec. Assume processing delay= P seconds and distance between two point is D meters. Find total time required for 10 packets to reach A from B. A---R1---R2---R3---B	3+3+4

Types of delays

1. Transmission Delay
2. Propagation Delay
3. Queuing Delay
4. Processing Delay

Transmission Delay:
Time taken to put a packet onto link. In other words, it is simply time required to put data bits on the wire/communication medium. It depends on length of packet and bandwidth of network.

Transmission Delay = Data size / bandwidth = (L/B) second

Propagation delay :
Time taken by the first bit to travel from sender to receiver end of the link. In other words, it is simply the time required for bits to reach the destination from the start point. Factors on which Propagation delay depends are Distance and propagation speed.

Propagation delay = distance/transmission speed = d/s

Queuing Delay :
Queuing delay is the time a job waits in a queue until it can be executed. It depends on congestion. It is the time difference between when the packet arrived Destination and when the packet data was processed or executed. It may be caused by mainly three reasons i.e. originating switches, intermediate switches or call receive servicing switches.

No. of hops= No. of links = M= 4
Here we send 10 packets, also since there is no acknowledgement of packet received required, we perform parallel processing. When the 1st packet reaches R2, the second packet reaches R1.

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Formulas used-

R is in Mbps so convert to bps by multiplying 10^6.

Bandwidth=R*(10^6) bps

Packet size =L bits

Transmission delay= Packet size/Bandwidth =L/( R*(10^6) )

Propagation Delay = Distance / Speed = D /S

Processing delay is in seconds no change
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Delay can also be calculated as : Delay for 1st packet to reach + delay for (N-1) packets
Delay for 1st packet = M*(Propagation delay + Transmission delay) + (M-1)*(Processing delay + Queuing delay)
Delay for N-1 remaining packets = (N-1)*(Transmission delay)

So finally applying the formula and putting the values we get-
Total delay = 4*(L/(R*(10^6) + D/S) + (4-1)*(P + 0) + (10-1)*(L/(R*(10^6))