## COMPUTER NETWORKS TEST 2

**Number of Questions: 35** **Section Marks: 30**

***Directions for questions 1 to 35:*** Select the correct alternative from the given choices.

**1.** In data link layer, the error detection is achieved by
(A) Hamming code
(B) Bit stuffing
(C) Cyclic redundancy codes
(D) Equalization

**2.** Which of the following statements are true about a carrier sense network, if the current status is "channel busy"?
I. If the technique used is non-persistent then it results in randomized wait and sense
II. If the technique used is non-persistent then it senses continuously
III. If the technique used is 1-persistent then the channel is continually sensed
IV. If the technique used is *p*-persistent then randomized retransmission is done
(A) I and III (B) I, III and IV
(C) II and III (D) II, III and IV

**3.** Which one of the following is a sample of client server application?
(A) Network printing (B) E-mail
(C) WWW (D) All the above

**4.** Find the number of characters per second (7 bits + 1 parity) that can be transmitted over a 8400 bps line using asynchronous transfer.
(1 start & 1 stop bit)?
(A) 820 (B) 420
(C) 620 (D) 840

**5.** A terminal multiplexer has four 1200 bps terminals and '*n*' 600 bps terminals connected to it. The outgoing line is 9600 bps, what is the maximum value of '*n*'?
(A) 16 (B) 4
(C) 32 (D) 8

**6.** Which layer of the OSI model provides end to end connectivity between the hosts?
(A) Session layer (B) Network layer
(C) Transport layer (D) Data link layer

**7.** Which one of the following measures the number of lost or garbled messages as a fraction of the total sent in the sampling period?
(A) Residual Error rate
(B) Connection release failure probability
(C) Connection establishment failure probability
(D) Transfer failure probability

**8.** What is the use of Time-To-Live (TTL) field in the header fields of IP datagram?
(A) To reduce delays
(B) To prioritize packets
(C) To prevent packet looping
(D) To optimize throughput

**9.** The number of networks allowed under class C address of an IPv4 network is:
(A) $2^{21}$ (B) $2^{24}$
(C) $2^{16}$ (D) $2^{8}$

**10.** Which one of the following is true about an address resolution protocol (ARP)?
(A) Used to find IP address that corresponds to a MAC address
(B) Used to find MAC address that corresponds to an IP address
(C) Does not perform the translation between IP addresses and MAC layer addresses
(D) ARP is not a member of the TCP/IP.

**11.** The transport layer protocols used for DNS, WWW, VoIp and FTP respectively are:
(A) UDP, TCP, TCP and UDP
(B) TCP, UDP, UDP and TCP
(C) TCP, UDP, TCP and UDP
(D) UDP, TCP, UDP and TCP

**12.** In Ethernet when Manchester encoding is used, the baud rate is
(A) Same as the bit rate (B) Half the bit rate
(C) Twice the bit rate (D) None of these

**13.** Which one of the following is not a session layer protocol?
(A) ADSP (B) L2TP
(C) SDP (D) AFP

**14.** What is the maximum sending window size for data transmission using Go-Back *N* protocol with 8-bit frame sequence number?
(A) 255 (B) 128
(C) 8 (D) 256

**15.** A message is send from host *A* to host *B* using public key encryption mechanism. Which one of the following is true about the keys used at encryption and decryption?
(A) Encryption: *A*'s private key and *B*'s private key
Decryption: *A*'s public key and *B*'s public key
(B) Encryption: *A*'s private key and *B*'s public key
Decryption: *B*'s private key and *A*'s public key
(C) Encryption: *A*'s public key and *B*'s private key
Decryption: *A*'s private key and *B*'s public key
(D) Encryption: *A*'s public key and *B*'s public key
Decryption: *A*'s private key and *B*'s private key

**16.** Using 64 byte packets host $A$ sends messages to host $B$ (protocol is sliding window protocol). The round trip delay between $A$ and $B$ is 60 milliseconds and the bottleneck bandwidth on the path between $A$ and $B$ is 128 kbps. What is the optimal window size that $A$ should use?

(A) 40 (B) 30
(C) 15 (D) 32

**17.** Consider a broadcast LAN of 8 km long, having a bandwidth of $10^7$ bps. It uses CSMA/CD and the signal travels along the wire at $4 \times 10^8$ m/s. What is the minimum packet size that can be used on this network?

(A) 25 bytes (B) 400 bytes
(C) 50 bytes (D) 200 bytes

**18.** A company having a class $B$ address has to be splitted into subnets with 5-bit subnet number. Find the maximum number of subnets and the maximum number of hosts in each subnet?

(A) Subnets: 32 and Hosts: 2046
(B) Subnets: 30 and Hosts: 2048
(C) Subnets: 32 and Hosts: 2048
(D) Subnets: 30 and Hosts: 2046

**19.** Consider a host system on a 20 Mbps network regulated by a token bucket. The arrival rate of token bucket is 4 Mbps. The token bucket is initially filled with 32 Megabits. Find the maximum duration for which the computer can transmit at the full 20 Mbps?

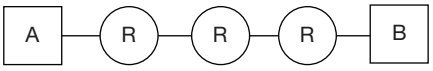
(A) 4 seconds (B) 1.5 seconds
(C) 1 seconds (D) 2 seconds

**20.** Match the following:

| | | | |
|---|---|---|---|
| I. | Network Layer | 1. | Hub |
| II. | Data Link Layer | 2. | Switches |
| III. | Physical Layer | 3. | Bridges |
| | | 4. | Routers |
| | | 5. | Repeater |

(A) I–4, II–2 and 3, III–1 and 5
(B) I–3 and 4, II–1 and 2, III–5
(C) I–1 and 4, II–2 and 3, III–5
(D) I–4, II–1, 2 and 3, III–5

**21.** Consider 2 computers $A$ and $B$ connected through three intermediate routers ($R$) as shown in the figure



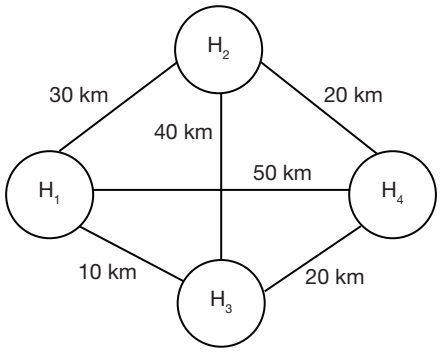

Determine how many times each packet has to visit the network layer and the data link layer during a transmission from $A$ to $B$?

(A) Network layer – 8 times and
Data link layer – 8 times
(B) Network layer – 2 times and
Data link layer – 8 times
(C) Network layer– 5 times and
Data link layer – 8 times
(D) Network layer – 6 times and
Data link layer – 5 times

**22.** Consider an instance of TCP's Additive Increase Multiplicative Decrease (AIMD) algorithm where the size at the start of the slow start phase is 2 MSS and the threshold at the start of the first transmission is 8 MSS. Assume that a time-out occurs during $5^{th}$ transmission. Find the congestion window size at the end of the $8^{th}$ transmission?

(A) 6 MSS (B) 5 MSS
(C) 12 MSS (D) 10 MSS

**23.** Consider a network that consists of 4 hosts distributed as shown in the figure. Assume that the network uses CSMA/CD and signal travels at $4 \times 10^5$ km/sec. If the sender sends at 1 Mbps, what could be the minimum size of packet?




(A) 2500 bits (B) 250 bits
(C) 500 bits (D) 5000 bits

**Linked Answer Questions 24 and 25**

Consider three nodes $P$, $Q$, $R$ connected in series. Node $P$ is connected to Node $Q$ via 2 Gbps link, 400 km length. Node $Q$ is connected to Node $R$ via 80 Mbps link, 20 km length. The links are full duplex. $A$ large file is to be sent from node $P$ to node $R$. The packets are 2048 bytes, and the velocity of propagation is $2 \times 10^8$ m/sec.

**24.** What is the round trip time?

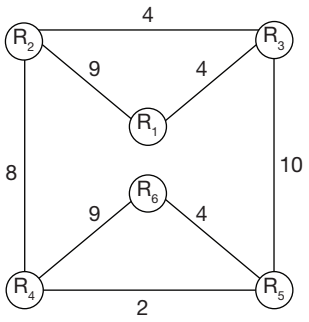
(A) 3.62 m sec
(B) 6.48 m sec
(C) 5.44 m sec
(D) 4.42 m sec

**25.** Find the optimal value of sender's window using end to end sliding window protocol?

(A) 24 packets (B) 26 packets
(C) 21 packets (D) 27 packets

**Linked Answer Questions 26 and 27**

Consider a network with six routers $R_1$ to $R_6$ connected with links having weights as shown in the following diagram




**26.** All the routers use the distance vector based routing algorithm to update their routing tables. Each router starts with its routing table initialized to contain an entry for each neighbour with the weight of the respective connecting link. After all the routing tables stabilize, how many links in the network will never be used for carrying any data?
(A) 2 (B) 3
(C) 1 (D) 4

**27.** The weight of all the unused links are changed to 2 and the distance vector algorithm is used again until all routing tables stabilize. How many links will now remain unused?
(A) 3 (B) 2
(C) 1 (D) 0

**28.** Two computers *X* and *Y* have IP addresses 20.126.5.109 and 20.126.5.80 respectively and they both use the same network mask *N*. Which of the following values of *N* given below should not be used if *A* and *B* should belong to the same network?
(A) 255.255.0.0 (B) 255.255.255.45
(C) 255.255.255.0 (D) 255.255.255.64

**29.** What will be the maximum number of hosts per subnet on a class A network with subnet mask of 255.255.224.0?
(A) 8192 (B) 4096
(C) 4094 (D) 8190

**30.** Which one of the following is true about adaptive or dynamic directory used in packet routing?
(A) Changes with each user session
(B) Changes within each user session
(C) Changes at system generation time only
(D) Both (A) and (B)

**31.** Choose the correct statement from the following statements?
(A) Initial setup is required for connectionless service
(B) Packet sequencing is not guaranteed in connection–oriented service
(C) In connection–oriented service, the destination address is to be specified only during the setup
(D) Initial setup is possible in connectionless service

**32.** Which one of the following statement is true about ICI (Interface Control Information)?
(A) It is a combination of Service Data Unit (SDU) and Protocol Control Information (PCI)
(B) It is a temporary parameter passed between *N* and *N* – 1 layers to involve service functions between two layers
(C) It is used to transfer user data from layer to layer
(D) It is used to exchange information by peer entities at different sites on the network to instruct an entity to perform a service function

**33.** Which one of the following statements is not correct?
(A) PGP encrypts data by using a block cipher MD5
(B) Masquerade is an active attack
(C) DES algorithm is vulnerable to Brute Force attack
(D) The key size of Triple DES can be 56 bits or 112 bits or 168 bits

**34.** Which one of the following statement is true?
(A) RIP is a distance vector routing protocol and OSPF is a link state routing protocol
(B) OSPF is a distance vector routing protocol and RIP is a link state routing protocol
(C) Both RIP and OSPF are distance vector routing protocols
(D) Both RIP and OSPF are link state routing protocols

**35.** Consider the path $R_1$–$R_2$–$R_3$–$R_4$, where $R_1$, $R_2$, $R_3$, $R_4$ are routers. The maximum bandwidth of each router, $R_1$ to $R_4$ are 600 Kbps, 500 Kbps, 800 Kbps and 400 Kbps respectively. What is the effective bandwidth if no buffering is possible?
(A) 800 Kbps
(B) 575 Kbps
(C) 400 Kbps
(D) 2300 Kbps

## Answer Keys

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1.** C | **2.** A | **3.** D | **4.** D | **5.** D | **6.** C | **7.** A | **8.** C | **9.** A | **10.** B |
| **11.** D | **12.** C | **13.** D | **14.** A | **15.** B | **16.** C | **17.** C | **18.** D | **19.** D | **20.** A |
| **21.** C | **22.** B | **23.** B | **24.** D | **25.** C | **26.** A | **27.** C | **28.** B | **29.** D | **30.** B |
| **31.** C | **32.** B | **33.** A | **34.** A | **35.** C | | | | | |

## Hints and Explanations

**4.** $\frac{8400}{8+2} = 840$ Choice (D)

**5.** $4 \times 1200 + n \times 600 = 9600$
$\Rightarrow \quad n \times 600 = 9600 - 4800$
$\Rightarrow \quad n = \frac{4800}{600} = 8$ Choice (D)

**12.** Baud rate = 2 * Bit rate Choice (C)

**14.** Sending window Size of Go Back = $2^n - 1$
$= 2^8 - 1 = 255$ Choice (A)

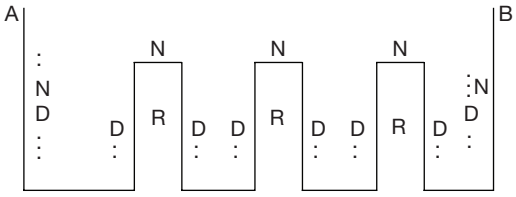
**16.** Window size $= \frac{R \times t}{\text{Packet size}}$
$= \frac{128 \times 10^3 \times 60 \times 10^{-3}}{64 \times 8} = 15$ Choice (C)

**17.** Minimum frame size = 2 × $z$ × band width Minimum packet size
$= 2 \times \frac{8 \times 10^3}{4 \times 10^8} \times 10^7 = 400$ bits
In bytes, $\frac{400}{8} = 50$ bytes Choice (C)

**18.** Maximum number of subnets
$= 2^5 - 2 = 30$
Maximum number of hosts in each subnet
$= 2^{(16-5)} - 2 = 2^{11} - 2 = 2046$ Choice (D)

**19.** Data Arrival rate = 4 Mbps
Data transfer rate = 20 Mbps
Initial capacity = 32 Mb
Net data rate = 20 – 4 = 16 Mbps
$\therefore$ Maximum duration $= \frac{32 \text{ Mb}}{16 \text{ Mbps}} = 2 \text{ sec}$
Choice (D)

**21.**




Choice (C)

**22.** Initial Threshold = 8 MSS
window size for: 1st transmission: 2 MSS
2nd transmission: 4 MSS
3rd transmission: 8 MSS
Threshold Reached, so increase linearly (according to AIMD):
4th transmission: 9 MSS
5th transmission: 10 MSS
Time out at 5th transmission:
New threshold $= \frac{10}{2} = 5$ MSS
6th transmission = 2 MSS
7th transmission = 4 MSS
Threshold reached (5 MSS)
8th transmission = 5 MSS Choice (B)

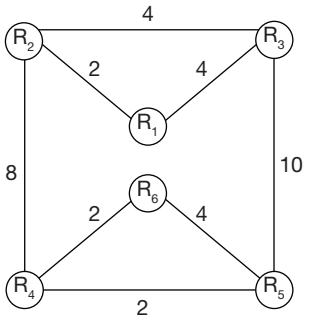
**23.** Minimum frame size = Transmission delay = RTT
Maximum distance between any 2 hosts = 50 km (between $H_1$ & $H_4$)
$\text{RTT} = \frac{(2 \times 50)}{4 \times 10^5} = 250 \,\mu\text{sec}$
$\frac{L}{B} = \text{RTT}$, where $B = 1$ Mbps $= 1 \times 10^6$ bps
$\therefore \quad L = \text{RTT} \times B$
$= 250 \times 10^{-6} \times 1 \times 10^6 = 250$ bits Choice (B)

**24.** RTT = Transmission delay + 2 × propagation Delay
$\text{Transmission delay} = \frac{\text{Number of bits}}{\text{Rate of transmission}}$
$\text{Propagation delay} = 2 \times \frac{\text{distance}}{\text{speed}}$
$= 2 \times \left( \frac{400 \times 10^3}{2 \times 10^8} + \frac{20 \times 10^3}{2 \times 10^8} \right)$
RTT = 4.42 m sec Choice (D)

**25.** Minimum bandwidth between $P$ & $R$ is 80 Mbps
Maximum end to end bandwidth = 80 Mbps
RTT = 4.42 m sec
Maximum bytes that can be transferred with in RTT
= 80 Mbps × 4.42 m sec
= 353600 bits = 44200 bytes
$\text{Number of packets} = \frac{44200}{2048} = 21 \text{ packets}$ Choice (C)

**26.** Shortest distances from $R_1$ to $R_2$, $R_3$, $R_4$, $R_5$, $R_6$
$R_1(8, 4, 16, 14, 18)$
The links used are $R_1$–$R_3$, $R_3$–$R_2$, $R_2$–$R_4$, $R_3$–$R_5$, $R_5$–$R_6$
$R_2(4, 8, 10, 14)$
The links used are $R_2$–$R_3$, $R_2$–$R_4$, $R_4$–$R_5$, $R_5$–$R_6$
$R_3(12, 10, 14)$
The links used are $R_3$–$R_2$, $R_2$–$R_4$, $R_3$–$R_5$, $R_5$–$R_6$
$R_4(2, 6)$
The links used are $R_4$–$R_5$, $R_5$–$R_6$
$R_5(4)$
The link used is $R_5$–$R_6$
$\therefore$ Unused links are $R_1$–$R_2$, $R_4$–$R_6$. Choice (A)

**27.** The network is shown below:




$R_1$ (2, 4, 10, 12, 12)
The links used are $R_1$–$R_2$, $R_1$–$R_3$, $R_2$–$R_4$, $R_4$–$R_6$, $R_4$–$R_5$
$R_2$ (4, 8, 10, 10)
The links used are $R_1$–$R_3$, $R_2$–$R_4$, $R_4$–$R_5$, $R_4$–$R_6$
$R_3$ (12, 10, 14)
The links used are $R_3$–$R_2$, $R_2$–$R_4$, $R_3$–$R_5$, $R_4$–$R_6$
$R_4$ (2, 2)
The links used are $R_4$–$R_5$, $R_4$–$R_6$
$R_5$ (4)
The links used are $R_5$–$R_4$, $R_4$–$R_6$
$\therefore$ Unused link is $R_5$–$R_6$ Choice (C)

**28.** IP of $A$ = 20.126.5.109
↓
01101101
IP of $B$ = 20.126.5.80
↓
01010000
perform AND operation between each mask with both the IP's of $A$ and $B$. If the resultants are same then both belong to same network. Choice (B)

**29.** 224 – 11100000
Number of host bits = 32 – (8 + 8 + 3) = 13
$\therefore$ Total number of hosts per subnet = $2^{13} - 2$
= 8190 Choice (D)

**35.** As there is no buffering, the smallest bandwidth is the determining factor. Choice (C)