COMPUTER NETWORKS TEST 3

Number of Questions: 25 **Section Marks: 30**

Directions for questions 1 to 25: Select the correct alternative from the given choices.

1. Which of the following layers of ISO/OSI model implements ARP (address Resolution protocol)?
(A) Data link layer (B) Network layer
(C) Transport layer (D) Application layer

2. Which of the following routing has more chances for getting TTL as zero?
(A) Source routing
(B) Router routing with default route
(C) Router routing with dynamic default route
(D) Routing will not affect the value of TTL

3. Which of these protocols doesnot accept the out of order packets?
(I) Go back N (II) selective repeat
(A) Only (I) (B) Only (II)
(C) Both (I) and (II) (D) None of the above

4. Which of the following is not the functionality of presentation layer?
(A) translation
(B) encryption
(C) compression
(D) synchronizes the interaction between the two parties

5. In 802.3 LAN the Bandwidth of the cable is 5 Mbps, velocity of propagation is 2.1×10^8 m/s, length of LAN is 2.1 km, what is the minimum packet size?
(A) 100 bits (B) 120 bits
(C) 210 bits (D) 115 bits

6. In 802.3 LAN the encoding technique used is:
(A) Manchester encoding
(B) defracted Manchester encoding
(C) Both (A) and (B)
(D) None of these

7. Match the following:

Column–I		Column–II	
(1)	Logical addressing	(i)	Data link layer
(2)	Physical addressing	(ii)	Network layer
(3)	Service Point addressing	(iii)	Physical Layer
		(iv)	Transport layer

(A) 1–(i), 2–(iv), 3–(iii)
(B) 1–(ii), 2–(iii), 3–(i)
(C) 1–(iii), 2–(i), 3–(iv)
(D) 1–(ii), 2–(i), 3–(iv)

8. CHECKSUM calculations for a packet is done by:
(A) data link layer (B) network layer
(C) transport layer (D) physical layer

9. Match the following:
(A) Dividing the transmitted bit stream into frames
(B) Determining which route the subnet has to use
(C) Fragment the incoming byte stream into discrete messages.
I. TRANSPORT LAYER
II. DATA LINK LAYER
III. NETWORK LAYER
(A) I–A, II–C, III–B (B) I–C, II–A, III–B
(C) I–A, II–B, III–C (D) I–B, II–C, III–A

10. Which of the following situations would not cause packet retransmission?
(A) when packet TTL becomes zero
(B) when there is congestion at the link
(C) when the buffer is full at the router
(D) None of the above

11. Consider a link with 10 Mbps bandwidth and 16 m sec round trip time, if frame size is 1 K bytes then how much percentage of link capacity is utilized?
(A) 9.5 (B) 7.8
(C) 5 (D) 12

12. What will be the length of the packet if the senders utilization is 50%, Band width of the link is 10 Mbps and the Round trip time is 4 msec?
(A) 40 KB (B) 8 KB
(C) 6 KB (D) 5 KB

13. What is the size of sender's window for stop wand wait, Go-back N and selective repeat, when the available sequence numbers are 8.
(A) 1, 7 , 4 (B) 8, 8, 8
(C) 4, 4, 4 (D) 2, 4, 8

14. Host *A* sends 64 byte packets using sliding window protocol to host *B*. The round trip delay between *A* and *B* is 160 m sec Bandwidth of the link is 256 Kbps what will be the optimal window size that *A* should use:
(A) 40 (B) 80
(C) 120 (D) 160

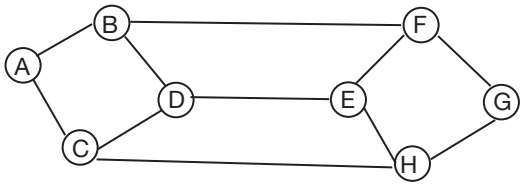
15. A computer on a 20 Mbps network is regulated by a token bucket algorithm, the token bucket is filled at a rate of 2 Mbps and it is initially filled with a capacity of 16 Mbps. The duration for which the computer can transmit, at the maximum regulated output rate (in seconds) is _____.
(A) 1.98 sec (B) 0.89 sec
(C) 2.5 sec (D) 3.0 sec

16. The message 100011001 is to be transmitted using the CRC polynomial $x^3 + x^2 + 1$ the message that should be transmitted is:
(A) 1000110010000 (B) 1000110010100
(C) 1000110011001 (D) 1000110011000

17. In 802.3, *A* and *B* are the only two stations each has a steady queue of frames to send, both *A* and *B* attempt to transmit a frame, collide and *A* wins the first back off race. At the end of this successful transmission by *A* both *A* and *B* attempt to transmit, collide and *A* again wins the back off race, at the end of this successful transmission by *A*, both *A* and *B* attempt to transmit, collide and *A* again wins the back off race. At the end of this successful transmission by *A*, both the stations attempt to transmit and collide. The probability that *B* wins the first back off race is:

(A) 0.625 (B) 0.0625
(C) 0.75 (D) 0.075

18. Consider the following figure:



For the above network, ignore the line weights, suppose flooding is used for the routing algorithm. If a packet is sent from '*D*' to '*G*', with a maximum hop count of 3, list all the routes it take and how many packets are sent in this flooding?

(A) 5 Routes, 11 packets
(B) 4 Routes, 11 packets
(C) 4 Routes, 3 packets
(D) 5 Routes, 5 packets

19. A network system with *n*-layers, Application generated message of length *m*-bytes. If each layer adds an *h*-byte header what fraction of network Bandwidth is filled with headers?

(A) $h/(n \times m)$ bytes
(B) $h \times n \times m$ bytes
(C) $(n \times h)/m$ bytes
(D) $m/(n \times h)$ bytes

20. Consider the following bit stream '01111010111111011110111' using bit stuffing framing method in the data link layer, how many 0s should be stuffed in the data using a flag pattern of '011110'?

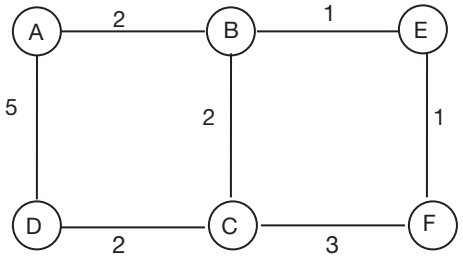
(A) 3 (B) 4
(C) 5 (D) 6

21. Match the following:

(a)	Distance vector routing	(I)	BGP
(b)	Link state routing	(II)	RIP
(c)	Path vector protocol	(III)	OSPF

(A) a–III, b–II, c–I
(B) a–II, b–III, c–I
(C) a–I, b–II, c–III
(D) a–I, b–II, c–III

22. Consider network:



At $t = 0$, the distance vector is

Information stored	Distance to reach node					
	A	B	C	D	E	F
A	0	2	∞	5	∞	∞
B	2	0	2	∞	1	∞
C	∞	2	0	2	∞	3
D	5	∞	2	0	∞	∞
E	0	1	∞	∞	0	3
F	∞	∞	3	∞	3	0

What would be the distance vector in next cycle?

(A)

Information stored at node	Distance to reach nodes					
	A	B	C	D	E	F
A	0	2	4	5	3	∞
B	2	0	2	4	1	2
C	4	2	0	2	3	3
D	5	4	2	0	∞	5
E	3	1	3	∞	0	3
F	∞	2	3	5	3	0

(B)

Information stored at node	Distance to reach node					
	A	B	C	D	E	F
A	0	2	4	5	3	∞
B	2	0	2	4	1	4
C	4	2	0	2	3	3
D	5	4	2	0	∞	5
E	3	1	3	∞	0	3
F	∞	2	3	5	3	0

(C)

Information stored at node	Distance to reach node					
	A	B	C	D	E	F
A	0	2	4	1	3	∞
B	2	0	2	4	1	2
C	4	2	0	2	3	3

D	5	1	2	0	∞	5
E	3	1	3	∞	0	3
F	∞	4	3	5	3	0

(D)

Information stored at node	Distance to reach node					
	A	B	C	D	E	F
A	∞	2	4	5	3	∞
B	2	0	2	4	1	4
C	4	2	0	2	3	3
D	5	4	2	0	∞	5
E	3	1	3	∞	0	3
F	∞	4	3	5	3	0

23. Which of the following statements are correct, when router malfunctions?
(i) each node computes only its own table
(ii) node can advertise incorrect link cost in link state algorithm
(iii) Each node's table is used by other in distance vector
(iv) Distance vector node can advertise in correct path cost
(A) (i) and (iii) are correct
(B) (i) and (iv) are correct
(C) (ii) and (iii) are correct
(D) All statements are correct

24. Which of the following is TRUE about routing information protocol (RIP)?
(a) RIP is based on distance vector routing
(b) RIP protocol is slow converging and instable
(c) the router forwards only the packets that have traveled the shortest path from the source to the route
(d) RIP uses Dijkstra algorithm to determine best path to a particular destination.
(A) Only (a) and (b) (B) Only (a) and (d)
(C) Only (b) and (c) (D) Only (c) and (d)

25. Which of the following is TRUE about open shortest path first protocol?
(a) OSPF is based on link state routing
(b) OSPF routing tables are calculated by using Dijkstra algorithm
(A) Only (a) is correct
(B) Only (b) correct
(C) (a) and (b) are correct
(D) (a) and (b) are false

Answer Keys

1. A	**2.** B	**3.** A	**4.** D	**5.** A	**6.** A	**7.** D	**8.** C	**9.** B	**10.** D
11. C	**12.** D	**13.** A	**14.** B	**15.** B	**16.** D	**17.** B	**18.** B	**19.** C	**20.** C
21. B	**22.** A	**23.** D	**24.** A	**25.** C					

Hints and Explanations

1. ARP (Address Resolution Protocol) maps IP addresses to hardware addresses. It is used by Internet protocol (IP) and used in Data link layer. Choice (A)

2. TTL (Time To Leave) is a field in a IP header which avoids packet going in to infinite loop. In default route routing there are more chances for getting a packet in to an infinite loop. Choice (B)

3. In Go back–N protocol, Receiver can't receive out of order packet, if it receives it sends NAK. In selective repeat, it can receive out of order packets and sorting algorithm is used for sorting the packets at the receiver end. Choice (A)

4. The functionalities of the presentation layer is
(a) Encoding
(b) Encryption
(c) Compression Choice (D)

5. Condition for minimum packet size in Ethernet:
Transmission delay = round trip delay

i.e., $2 \times \frac{L}{B} = 2 \times \frac{d}{v}$

$$2 \times \frac{L}{5 \times 10^6} = 2 \times \frac{2.1 \times 10^3 \text{ m}}{2.1 \times 10^8}$$

$L = 100$ bits. Choice (A)

6. In 802.3, Manchestar encoding is used for data encoding. In this, coding data bit is either high, low or of equal time. Choice (A)

7. (1) Logical addressing is implemented in Network layer
(2) Physical addressing is implemented in data link layer
(3) Service point addressing is implemented in Transport layer. Choice (D)

8. The end to end error control in a network is done by Transport layer by using checksum.
Choice (C)

9. Data Link Layer divides bit stream into frames.
One of the main functionality of Network Layer is routing.
Fragmentation is done by Transport Layer.
Choice (B)

10. The packet gets discarded
When TTL becomes zero
When there is congestion at the link
When the buffer is full at the router Choice (D)

11. Throughput $= \dfrac{1 \text{ K bytes}}{16 \text{ m sec}}$

$$= \frac{1 \times 10^3 \times 8 \text{ bits}}{16 \times 10^{-3} \text{ sec}}$$

$$= \frac{10^6}{2} \times \text{bps}$$

% of link utilization

$$= \frac{\frac{10^6}{2}}{10 \times 10^6} \times 100$$

$$= \frac{10^6}{2 \times 10 \times 10^6} \times 100 = 5\%.$$

Choice (C)

12. When senders utilization is 50% then

$L = BR$

where L = length of the packet
B = Band width of link
R = Round trip time

$\therefore \quad L = 10 \times 10^6 \times 4 \times 10^{-3}$ bits
$= 10 \times 4 \times 10^3$ bits
$= 40 \times 10^3$ bits
$= 5$ KB. Choice (D)

13. When N is the available sequence numbers, then sender's window size of stop and wait, Go-back N and selective repeat are 1, $N-1$, $\dfrac{N}{2}$. Choice (A)

14. R.T.T $= 160 \times 10^{-3}$ sec
B.W $= 256 \times 10^3$ bps
(Band width)
Length of the packet
$= 256 \times 160 \times 10^3 \times 10^{-3}$
$= 256 \times 160$

Window size $= \dfrac{256 \times 160}{64 \times 8} = 80.$ Choice (B)

15. Capacity of the bucket (C) = 16 Mbps
Maximum regulated output rate (M) = 20 Mbps
Token filling rate $\left(\int\right)$ = 2 Mbps
Time duration for incoming bursty traffic (t) = ?

$C + \int t = Mt$

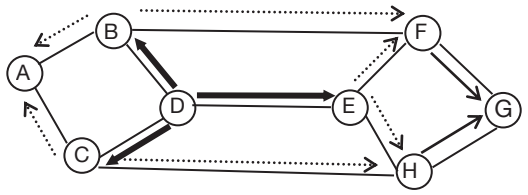
$16 + 2t = 20t$

$\Rightarrow \quad 16 = 18t \Rightarrow t = 0.89$ seconds Choice (B)

16. Message = 100011001 divisor = 1101 and CRC remainder is 1000 the transmitted message is 1000110011000.
Choice (D)

17. A has two conditions to win first back off race (0, 1) & B has eight conditions (0, 1, 2, 3, 4, 5, 6 and 7) i.e., B has only one chance to win i.e., $\dfrac{1}{16} = 0.0625$.
Choice (B)

18. See the figure given below:



Hop 1 (→), Hop 2 (→), Hop 3 (→)
11 packets are sent in this flooding.
In Hop 1, 3 packets are sent (→)
In Hop 2, 6 packets are sent (→)
In Hop 3, 2 packets are sent (→) Choice (B)

19. Network with 'n' layers adds 'n' – h – byte headers to a packet of length 'm' then the fraction of network bandwidth filled with headers are $\left(\dfrac{n \times h}{m}\right)$ bytes.
Choice (C)

20. Data will be stuffed as
0111010101111011100
↑ ↑ ↑
1110101110
↑ ↑
After every 3 consecutive 1s we will stuff '0' bit therefore total = 5. Choice (C)

21.
- Distance vector routing is implemented using RIP.
- Link state routing is implemented using OSPF.
- Path vector protocol includes BGP. Choice (B)

22. In distance vector routing, at every step shortest path are calculated to the all nodes from its neighbours.
Choice (A)

23. The functionalities in the above all statements are performed by a mal functioned router. Choice (D)

24. RIP uses the hop count for the packet routing and there is no compulsive that it should be shortest.
RIP uses Bellman–Ford algorithm for finding shortest path. Choice (A)

25. OSPF is based on link state routing.
Paths among the nodes are calculated using Dijkstra's algorithm. Choice (C)