COMPUTER NETWORKS PYQS

1. Host A is sending data to host B over a full duplex link. A and B are using the sliding window protocol for flow control. The send and receive window sizes are 5 packets each. Data packets (sent only from A to B) are all 1000 bytes long and the transmission time for such a packet is 50 µs. Acknowledgement packets (sent only from B to A) are very small and require negligible transmission time. The propagation delay over the link is 200 us. What is the maximum achievable throughput in this communication?

   Hindi [CLICK HERE]
   English [CLICK HERE]

   GATE-2003

2. Choose the best matching between Group 1 and Group 2.

   (A) P-1, Q-4, R-3
   (B) P-2, Q-4, R-1
   (C) P-2, Q-3, R-1
   (D) P-1, Q-3, R-2
   Hindi [CLICK HERE]
   English [CLICK HERE]

3. How many 8-bit characters can be transmitted per second over a 9600 baud serial communication link using asynchronous mode of transmission with one start bit, eight data bits, two stop bits, and one parity bit ?
   (A) 600
   (B) 800

(C) 876
(D) 1200

4. A serial transmission T1 uses 8 information bits, 2 start bits, 1 stop bit and 1 parity bit for each character. A synchronous transmission T2 uses 3 eight bit sync characters followed by 30 eight bit information characters. If the bit rate is 1200 bits/second in both cases, what are the transfer rates of T1 and T2?

(A) 100 characters/sec, 153 characters/sec
(B) 80 characters/sec, 136 characters/sec
(C) 100 characters/sec, 136 characters/sec
(D) 80 characters/sec, 153 characters/sec

5. In a data link protocol, the frame delimiter flag is given by 0111. Assuming that bit stuffing is employed, the transmitter sends the data sequence 01110110 as

(A) 01101011
(B) 011010110
(C) 011101100
(D) 0110101100

6. In a sliding window ARQ scheme, the transmitter's window size is N and the receiver's window size is M. The minimum number of distinct sequence numbers required to ensure correct operation of the ARQ scheme is

(A) min (M, N)

(B) max (M, N)
(C) M + N
(D) MN

7. 20 Kbps satellite link has a propagation delay of 400 ms. The transmitter employs the "go back n ARQ" scheme with n set to 10. Assuming that each frame is 100 bytes long, what is the maximum data rate possible?

    (A) 5Kbps
    (B) 10Kbps
    (C) 15Kbps
    (D) 20Kbps

8. Consider a parity check code with three data bits and four parity check bits. Three of the code words are 0101011, 1001101 and 1110001. Which of the following are also code words?

    I. 0010111   II. 0110110   III. 1011010   IV. 0111010

    (A) I and III
    (B) I, II and III
    (C) II and IV
    (D) I, II, III and IV

9. The maximum window size for data transmission using the selective reject protocol with n-bit frame sequence numbers is:
    (A) 2^n
    (B) $2^{(n-1)}$

(C) 2^n − 1
(D) 2^(n-2)

10. Consider the following message M = 1010001101. The cyclic redundancy check (CRC) for this message using the divisor polynomial $x^5 + x^4 + x^2 + 1$ is :

(A) 01110
(B) 01011
(C) 10101
(D) 10110

11. A channel has a bit rate of 4 kbps and one-way propagation delay of 20 ms. The channel uses stop and wait protocol. The transmission time of the acknowledgement frame is negligible. To get a channel efficiency of at least 50%, the minimum frame size should be

(A) 80 bytes
(B) 80 bits
(C) 160 bytes
(D) 160 bits

12. In the 4B/5B encoding scheme, every 4 bits of data are encoded in a 5-bit codeword. It is required that the codewords have at most 1 leading and at most 1 trailing zero. How many such codewords are possible?

(A) 14
(B) 16
(C) 18
(D) 20

13. On a wireless link, the probability of packet error is 0.2. A stop-and-wait protocol is used to transfer data across the link. The channel condition is assumed to be independent from transmission to transmission. What is the average number of transmission attempts required to transfer 100 packets?
(A) 100
(B) 125
(C) 150
(D) 200

14. Station A uses 32 byte packets to transmit messages to Station B using a sliding window protocol. The round trip delay between A and B is 80 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) 20
(B) 40
(C) 160
(D) 320

15. Station A needs to send a message consisting of 9 packets to Station B using a sliding window (window size 3) and go-back-n error control strategy. All packets are ready and immediately available for transmission. If every 5th packet that A transmits gets lost (but no acks from B ever get lost), then what is the number of packets that A will transmit for sending the message to B?

(A) 12
(B) 14
(C) 16
(D) 18

16. The message 11001001 is to be transmitted using the CRC polynomial $x^3 + 1$ to protect it from errors. The message that should be transmitted is:

(A) 11001001000
(B) 11001001011
(C) 11001010
(D) 110010010011

17. An error correcting code has the following code words: 00000000, 00001111, 01010101, 10101010, 11110000. What is the maximum number of bit errors that can be corrected?

(A) 0
(B) 1
(C) 2
(D) 3

18. In the waveform (a) given below, a bit stream is encoded by Manchester encoding scheme. The same bit stream is encoded in a different coding scheme in wave form (b). The bit stream and the coding scheme are

(A) 1000010111 and Differential Manchester respectively
(B) 0111101000 and Differential Manchester respectively

(C) 1000010111 and Integral Manchester respectively
(D) 0111101000 and Integral Manchester respectively

19. Let us consider a statistical time division multiplexing of packets. The number of sources is 10. In a time unit, a source transmits a packet of 1000 bits. The number of sources sending data for the first 20 time units is 6, 9, 3, 7, 2, 2, 2, 3, 4, 6, 1, 10, 7, 5, 8, 3, 6, 2, 9, 5 respectively. The output capacity of multiplexer is 5000 bits per time unit. Then the average number of backlogged of packets per time unit during the given period is

(A) 5
(B) 4.45
(C) 3.45
(D) 0

20. Your are given the following four bytes :

10100011   00110111   11101001   10101011

Which of the following are substrings of the base 64 encoding of the above four bytes ?
(A) zdp
(B) fpq
(C) qwA
(D) oze

21. How many bytes of data can be sent in 15 seconds over a serial link with baud rate of 9600 in asynchronous mode with odd parity and two stop bits in the frame?
(A) 10,000 bytes
(B) 12,000 bytes
(C) 15,000 bytes
(D) 27,000 bytes

22. A 1Mbps satellite link connects two ground stations. The altitude of the satellite is 36,504 km and speed of the signal is 3 × 108 m/s. What should be the packet size for a channel utilization of 25% for a satellite link using go-back-127 sliding window protocol? Assume that the acknowledgment packets are negligible in size and that there are no errors during communication.
(A) 120 bytes
(B) 60 bytes
(C) 240 bytes
(D) 90 bytes

23. Data transmitted on a link uses the following 2D parity scheme for error detection: Each sequence of 28 bits is arranged in a 4×7 matrix (rows r0 through r3, and columns d7 through d1) and is padded with a column d0 and row r4 of parity bits computed using the Even parity scheme. Each bit of column d0 (respectively, row r4) gives the parity of the corresponding row (respectively, column). These 40 bits are transmitted over the data link.

The table shows data received by a receiver and has n corrupted bits. What is the minimum possible value of n?
(A) 1
(B) 2
(C) 3
(D) 4

24.
pending

25. Frames of 1000 bits are sent over a 10^6 bps duplex link between two hosts. The propagation time is 25ms. Frames are to be transmitted into this link to maximally pack them in transit (within the link).What is the minimum number of bits (i) that will be required to represent the sequence numbers distinctly? Assume that no time gap needs to be

given between transmission of two frames.

(A) i = 2
(B) i = 3
(C) i = 4
(D) i = 5

26. [continuation of last question]

Suppose that the sliding window protocol is used with the sender window size of 2^i where is the number of bits identified in the previous question and acknowledgments are always piggybacked. After sending 2^i frames, what is the minimum time the sender will have to wait before starting transmission of the next frame? (Identify the closest choice ignoring the frame processing time.)
(A) 16ms
(B) 18ms
(C) 20ms
(D) 22ms

ANSWER - reffer the video solution of previous question(1.25) I have covered both parts in that video

27. In the following pairs of OSI protocol layer/sub-layer and its functionality, the INCORRECT pair is
(A) Network layer and Routing
(B) Data Link Layer and Bit synchronization
(C) Transport layer and End-to-end process communication
(D) Medium Access Control sub-layer and Channel sharing

28.

29. Suppose that the stop-and-wait protocol is used on a link with a bit rate of 64 kilobits per second and 20 milliseconds propagation delay. Assume that the transmission time for the acknowledgment and the processing time at nodes are negligible. Then the minimum frame size in bytes to achieve a link utilization of at least 50% is _____.

    Hindi [CLICK HERE]
    English [CLICK HERE]

30. A link has a transmission speed of 10^6 bits/sec. It uses data packets of size 1000 bytes each. Assume that the acknowledgment has negligible transmission delay, and that its propagation delay is the same as the data propagation delay. Also assume that the processing delays at nodes are negligible. The efficiency of the stop-and-wait protocol in this setup is exactly 25%. The value of the one-way propagation delay (in milliseconds) is _____.

    Hindi [CLICK HERE]
    English [CLICK HERE]

31. consider a network connecting two systems located 8000 kilometers apart. The bandwidth of the network is 500 × 106 bits per second. The propagation speed of the media is 4 × 10^6 meters per second. It is needed to design a Go-Back-N sliding window protocol for this network. The average packet size is 10^7 bits. The network is to be used to its full capacity. Assume that processing delays at nodes are negligible. Then, the minimum size in bits of The sequence number field has to be _____.

    Hindi [CLICK HERE]
    English [CLICK HERE]

32. Since it is a network that uses switch, every packet goes through two links, one from source to switch and other from switch to destination.

    Since there are 10000 bits and packet size is 5000, two packets are sent.

Transmission time for each packet is 5000 / 10^7 microseconds.

Two hosts are connected via a packet switch with 10^7 bits per second links. Each link has a propagation delay of 20 microseconds. The switch begins forwarding a packet 35 microseconds after it receives the same. If 10000 bits of data are to be transmitted between the two hosts using a packet size of 5000 bits, the time elapsed between the transmission of the first bit of data and the reception of the last bit of the data in microseconds is _____.

Hindi [CLICK HERE]
English [CLICK HERE]

33. Consider two hosts X and Y, connected by a single direct link of rate 10^6 bits/sec. The distance between the two hosts is 10,000 km and the propagation speed along the link is 2 x 108 m/s. Hosts X send a file of 50,000 bytes as one large message to hosts Y continuously. Let the transmission and propagation delays be p milliseconds and q milliseconds, respectively. Then the values of p and q are:
(A) p = 50 and q = 100
(B) p = 50 and q = 400
(C) p = 100 and q = 50
(D) p = 400 and q = 50

Hindi [CLICK HERE]
English [CLICK HERE]

1. A 2 km long broadcast LAN has 107 bps bandwidth and uses CSMA/CD. The signal travels along the wire at 2 × 10^8 m/s. What is the minimum packet size that can be used on this network?

   (A) 50 bytes
   (B) 100 bytes
   (C) 200 bytes
   (D) None of these

   Hindi [CLICK HERE]
   English [CLICK HERE]

2. A host is connected to a Department network which is part of a University network. The University network, in turn, is part of the Internet. The largest network in which the Ethernet address of the host is unique is

   (A)the subnet to which the host belongs
   (B)the Department network
   (C)the University network
   (D)the Internet

   Hindi [CLICK HERE]
   English [CLICK HERE]

3. Consider a simplified time slotted MAC protocol, where each host always has data to send and transmits with probability p = 0.2 in every slot. There is no back-off and one frame can be transmitted in one slot. If more than one host transmits in the same slot, then the transmissions are unsuccessful due to collision. What is the maximum number of hosts which this protocol can support, if each host has to be provided a minimum through put of 0.16 frames per time slot?
   (A) 1
   (B) 2
   (C) 3
   (D) 4

   Hindi [CLICK HERE]

4. A and B are the only two stations on an Ethernet. Each has a steady queue of frames to send. Both A and B attempt to transmit a frame, collide, and A wins the first backoff race. At the end of this successful transmission by A, both A and B attempt to transmit and collide. The probability that A wins the second backoff race is:
   (A) 0.5
   (B) 0.625
   (C) 0.75
   (D) 1.0

5.

   Pending

6. Which of the following statements is TRUE about CSMA/CD:

   (A) IEEE 802.11 wireless LAN runs CSMA/CD protocol
   (B) Ethernet is not based on CSMA/CD protocol
   (C) CSMA/CD is not suitable for a high propagation delay network like satellite network
   (D) There is no contention in a CSMA/CD network

7. Which of the following statements is FALSE regarding a bridge?
   (A) Bridge is a layer 2 device
   (B) Bridge reduces collision domain
   (C) Bridge is used to connect two or more LAN segments
   (D) Bridge reduces broadcast domain

8. A network with CSMA/CD protocol in the MAC layer is running at 1 Gbps over a 1 km cable with no repeaters. The signal speed in the cable is 2 x 10^8 m/sec. The minimum frame size for this network should be

   (A) 10000 bits

(B) 10000 bytes
(C) 5000 bits
(D) 5000 bytes

9. In a TDM medium access control bus LAN, each station is assigned one time slot per cycle for transmission. Assume that the length of each time slot is the time to transmit 100 bits plus the end-to-end propagation delay. Assume a propagation speed of 2 x 10^8 m/sec. The length of the LAN is 1 km with a bandwidth of 10 Mbps. The maximum number of stations that can be allowed in the LAN so that the throughput of each station can be 2/3 Mbps is

(A) 3
(B) 5
(C) 10
(D) 20

10. A router has two full-duplex Ethernet interfaces each operating at 100 Mb/s. Ethernet frames are at least 84 bytes long (including the Preamble and the Inter-Packet-Gap). The maximum packet processing time at the router for wirespeed forwarding to be possible is (in microseconds)

(A) 0.01
(B) 3.36
(C) 6.72
(D) 8

11. In Ethernet when Manchester encoding is used, the bit rate is:

(A) Half the baud rate.
(B) Twice the baud rate.
(C) Same as the baud rate.
(D) None of the above

12. A broadcast channel has 10 nodes and total capacity of 10 Mbps. It uses polling for medium access. Once a node finishes transmission, there is a polling delay of 80 µs to poll the next node. Whenever a node is polled, it is allowed to transmit a maximum of 1000 bytes. The maximum throughput of the broadcast channel is
(A) 1 Mbps
(B) 100/11 Mbps
(C) 10 Mbps
(D) 100 Mbps

13. There are n stations in a slotted LAN. Each station attempts to transmit with a probability p in each time slot. What is the probability that ONLY one station transmits in a given time slot?

14. The distance between two stations M and N is L kilometers. All frames are K bits long. The propagation delay per kilometer is t seconds. Let R bits/second be the channel capacity. Assuming that the processing delay is negligible, the minimum number of bits for the sequence number field in a frame for maximum utilization, when the sliding window protocol is used, is:

15. The minimum frame size required for a CSMA/CD based computer network running at 1 Gbps on a 200m cable with a link speed of 2×10^8 m/s is
(A) 125 bytes
(B) 250 bytes

(C) 500 bytes
(D) None of these

16. Consider a source computer(S) transmitting a file of size 10^6 bits to a destination computer(D)over a network of two routers (R_1 and R_2) and three links(L_1, L_2, and L_3). L_1connects S to R_1; L_2 connects R_1 to R_2; and L_3 connects R_2 to D.Let each link be of length 100 km. Assume signals travel over each link at a speed of 10^8 meters per second.Assume that the link bandwidth on each link is 1Mbps. Let the file be broken down into 1000 packets each of size 1000 bits. Find the total sum of transmission and propagation delays in transmitting the file from S to D?
    (A) 1005 ms
    (B) 1010 ms
    (C) 3000 ms
    (D) 3003 ms

17. Determine the maximum length of the cable (in km) for transmitting data at a rate of 500 Mbps in an Ethernet LAN with frames of size 10,000 bits. Assume the signal speed in the cable to be 2,00,000 km/s.
    (A) 1
    (B) 2
    (C) 2.5
    (D) 5

18. Consider a LAN with four nodes S1,S2,S3, and S4. Time is divided into fixed-size slots, and a node can begin its transmission only at the beginning of a slot. A collision is said to have occurred if more than one node transmits in the same slot. The probabilities of generation of a frame in a time slot by S1,S2,S3, and S4 are

0.1,0.2,0.3 and 0.4 respectively. The probability of sending a frame in the first slot without any collision by any of these four stations is_____.

19. Consider a CSMA/CD network that transmits data at a rate of 100 Mbps (108 bits per second) over a 1 km (kilometre) cable with no repeaters. If the minimum frame size required for this network is 1250 bytes, what is the signal speed (km/sec) in the cable?
(A) 8000
(B) 10000
(C) 16000
(D) 20000

20. Which one of the following protocols is NOT used to resolve one form of address to another one?

(A) DNS
(B) ARP
(C) DHCP
(D) RARP

21. Which of the following is/are example(s) of stateful application layer protocols?

(i) HTTP
(ii) FTP
(iii) TCP
(iv) POP3

(A) (i) and (ii) only
(B) (ii) and (iii) only
(C) (ii) and (iv) only
(D) (iv) only

22. A sender uses the Stop-and-Wait ARQ protocol for reliable transmission of frames. Frames are of size 1000 bytes and the transmission rate at the sender is 80 Kbps (1Kbps = 1000 bits/second). Size of an acknowledgement is 100 bytes and the transmission rate at the receiver is 8 Kbps. The one-way propagation delay is 100 milliseconds. Assuming no frame is lost, the sender throughput is _____ bytes/second.

Hindi [CLICK HERE]
English [CLICK HERE]

23. In an Ethernet local area network, which one of the following statements is TRUE ?

(A) A station stops to sense the channel once it starts transmitting a frame.
(B) The purpose of the jamming signal is to pad the frames that are smaller than the minimum frame size.
(C) A station continues to transmit the packet even after the collision is detected.
(D) The exponential backoff mechanism reduces the probability of collision on retransmissions

Hindi [CLICK HERE]
English [CLICK HERE]

24. A network has a data transmission bandwidth of 20 × 106 bits per second. It uses CSMA/CD in the MAC layer. The maximum signal propagation time from one node to another node is 40 microseconds. The minimum size of a frame in the network is _____ bytes.

Hindi [CLICK HERE]
English [CLICK HERE]

25. Consider a 128×10^3 bits/second satellite communication link with one-way propagation delay of 150 milliseconds. Selective retransmission (repeat) protocol is used on this link to send data with a frame size of 1 kilobyte. Neglect the transmission time of acknowledgment. The minimum number of bits required for the sequence number field to achieve 100% utilization is _____

Hindi [CLICK HERE]
English [CLICK HERE]

26. Not in syllabus

27. The values of parameters for the Stop-and-Wait ARQ protocol are as given below:

- Bit rate of the transmission channel =1 Mbps.
- Propagation delay from sender to receiver =0.75 ms.
- Time to process a frame =0.25 ms.
- Number of bytes in the information frame =1980.
- Number of bytes in the acknowledge frame =20.
- Number of overhead bytes in the information frame =20.

Assume there are no transmission errors. Then, the transmission efficiency (expressed in percentage) of the Stop-and-Wait ARQ protocol for the above parameters is _____ (correct to 2 decimal places).

Hindi [CLICK HERE]
English [CLICK HERE]

28. A computer network uses polynomial over GF(2) for error checking with 8 bits as information bits and uses $x^3 + x + 1$ as the generator polynomial to generate the check bits.

In this network, the message 01011011 is transmitted as

(A) 01011011010
(B) 01011011011
(C) 01011011101
(D) 01011011100

Hindi [CLICK HERE]
English [CLICK HERE]

29. Consider a binary code that consists only four valid codewords as given below.

00000, 01011, 10101, 11110

Let minimum Hamming distance of code be p and maximum number of erroneous bits that can be corrected by the code be q. The value of p and q are:

(A) p = 3 and q = 1
(B) p = 3 and q = 2
(C) p = 4 and q = 1
(D) p = 4 and q = 2

Hindi [CLICK HERE]
English [CLICK HERE]

30. Consider a simple communication system where multiple nodes are connected by a shared broadcast medium (like Ethernet or wireless). The nodes in the system use the following carrier-sense the medium access protocol. A node that receives a packet to transmit will carrier-sense the medium for 5 units of time. If the node does not detect any other transmission in this duration, it starts transmitting its packet in the next time unit. If the node detects another transmission, it waits until this other transmission finishes, and then begins to carrier-sense for 5 time units again. Once they start to transmit, nodes do not perform any collision detection and continue transmission even if a collision occurs. All transmissions last for 20 units of time. Assume that the transmission signal travels at the speed of 10 meters per unit time in the medium.

Assume that the system has two nodes P and Q, located at a distance d meters from each other. P starts transmitting a packet at time t = 0 after successfully completing its carrier-sense phase. Node Q has a packet to transmit at time t = 0 and begins to carrier-sense the medium.

The maximum distance d (in meters, rounded to the closest integer) that allows Q to successfully avoid a collision between its proposed transmission and P's on going transmission is _____ .

Hindi [CLICK HERE]
English [CLICK HERE]

31. Consider that 15 machines need to be connected in a LAN using 8-port Ethernet switches. Assume that these switches do not have any separate up link ports. The minimum number of switches needed is _____.

Hindi [CLICK HERE]
English [CLICK HERE]

32.
Suppose that in an IP-over-Ethernet network, a machine X wishes to find the MAC address of another machine Y in its subnet. Which one of the following techniques can be used for this?

(A) X sends an ARP request packet to the local gateway's IP address which then finds the MAC address of Y and sends to X

(B) X sends an ARP request packet to the local gateway's MAC address which then finds the MAC address of Y and sends to X

(C)   X sends an ARP request packet with broadcast MAC address in its local subnet

(D)   X sends an ARP request packet with broadcast IP address in its local subnet

Hindi [CLICK HERE]
English [CLICK HERE]

1.

2.

3. The subnet mask for a particular network is 255.255.31.0. Which of the following pairs of IP addresses could belong to this network?
    (A) 172.57.88.62 and 172.56.87.23
    (B) 10.35.28.2 and 10.35.29.4
    (C) 191.203.31.87 and 191.234.31.88
    (D) 128.8.129.43 and 128.8.161.55

    Hindi [CLICK HERE]
    English [CLICK HERE]

4.

5.

6. A subnet has been assigned a subnet mask of 255.255.255.192. What is the maximum number of hosts that can belong to this subnet?

   (A) 14
   (B) 30
   (C) 62
   (D) 126

   Hindi [CLICK HERE]
   English [CLICK HERE]

7. In TCP, a unique sequence number is assigned to each

   (A)byte
   (B)word
   (C)segment
   (D)message

   Hindi [CLICK HERE]
   English [CLICK HERE]

8. In the TCP/IP protocol suite, which one of the following is NOT part of the IP header?

   (A)Fragment Offset
   (B)Source IP address
   (C)Destination IP address
   (D)Destination port number

   Hindi [CLICK HERE]
   English [CLICK HERE]

9. A TCP message consisting of 2100 bytes is passed to IP for delivery across two networks. The first network can carry a maximum payload of 1200 bytes per frame and the second network can carry a maximum payload of 400 bytes per frame, excluding network overhead. Assume that IP overhead per packet is 20 bytes. What is the total IP overhead in the second network for this transmission?

(A) 40 bytes
(B) 80 bytes
(C) 120 bytes
(D) 160 bytes

Hindi [CLICK HERE]
English [CLICK HERE]

10.

11. The routing table of a router is shown below:

On which interfaces will the router forward packets addressed to destinations 128.75.43.16 and 192.12.17.10 respectively?
(A) Eth1 and Eth2
(B) Eth0 and Eth2
(C) Eth0 and Eth3
(D) Eth1 and Eth3

Hindi [CLICK HERE]
English [CLICK HERE]

12. Consider three IP networks A, B and C. Host H_A in network A sends messages each containing 180 bytes of application data to a host H_C in network C. The TCP layer prefixes a 20 byte header to the message. This passes through an intermediate network B. The maximum packet size, including 20 byte IP header, in each network is

A : 1000 bytes
B : 100 bytes
C : 1000 bytes

The network A and B are connected through a 1 Mbps link, while B and C are connected by a 512 Kbps link (bps = bits per second).

Assuming that the packets are correctly delivered, how many bytes,

including headers, are delivered to the IP layer at the destination for one application message, in the best case ? Consider only data packets.
(A) 200
(B) 220
(C) 240
(D) 260

Hindi [CLICK HERE]
English [CLICK HERE]

13. [continuation of last question]

What is the rate at which application data is transferred to host Hc? Ignore errors, acknowledgements, and other overheads.
(A) 325.5 Kbps
(B) 354.5 Kbps
(C) 409.6 Kbps
(D) 512.0 Kbps

ANSWER - reffer the video solution of previous question(3.12) I have covered both parts in that video

14. Packets of the same session may be routed through different paths in

(A) TCP, but not UDP
(B) TCP and UDP
(C) UDP, but not TCP
(D) Neither TCP, nor UDP

Hindi [CLICK HERE]
English [CLICK HERE]

15. The address resolution protocol (ARP) is used for

(A) Finding the IP address from the DNS
(B) Finding the IP address of the default gateway
(C) Finding the IP address that corresponds to a MAC address
(D) Finding the MAC address that corresponds to an IP address

16. An organization has a class B network and wishes to form subnets for 64 departments. The subnet mask would be

    (A) 255.255.0.0
    (B) 255.255.64.0
    (C) 255.255.128.0
    (D) 255.255.252.0

17. In a packet switching network, packets are routed from source to destination along a single path having two intermediate nodes. If the message size is 24 bytes and each packet contains a header of 3 bytes, then the optimum packet size is:
    (A) 4
    (B) 6
    (C) 7
    (D) 9

18. Suppose the round trip propagation delay for a 10 Mbps Ethernet having 48-bit jamming signal is 46.4 ms. The minimum frame size is

    (A) 94
    (B) 416
    (C) 464
    (D) 512

19. On a TCP connection, current congestion window size is Congestion Window = 4 KB. The window size advertised by the receiver is Advertise Window = 6 KB. The last byte sent by the sender is LastByteSent = 10240 and the last byte acknowledged by the receiver is LastByteAcked = 8192. The current window size at the sender is

    (A) 2048 bytes

(B) 4096 bytes
(C) 6144 bytes
(D) 8192 bytes

20. In a communication network, a packet of length L bits takes link L1 with a probability of P_1 or link L2 with a probability of P_2. Link L1 and L2 have bit error probability of b_1 and b_2 respectively. The probability that the packet will be received without error via either L1 or L2 is

21. A company has a class C network address of 204.204.204.0. It wishes to have three subnets, one with 100 hosts and two with 50 hosts each. Which one of the following options represents a feasible set of subnet address/subnet mask pairs?

(A) 204.204.204.128/255.255.255.192
204.204.204.0/255.255.255.128
204.204.204.64/255.255.255.128

(B) 204.204.204.0/255.255.255.192
204.204.204.192/255.255.255.128
204.204.204.64/255.255.255.128

(C) 204.204.204.128/255.255.255.128
204.204.204.192/255.255.255.192
204.204.204.224/255.255.255.192

(D) 204.204.204.128/255.255.255.128
204.204.204.64/255.255.255.192
204.204.204.0/255.255.255.192

22. Which of the following statements is TRUE?

(A)Both Ethernet frame and IP packet include checksum fields
(B)Ethernet frame includes a checksum field and IP packet includes a CRC field
(C)Ethernet frame includes a CRC field and IP packet includes a checksum field
(D)Both Ethernet frame and IP packet include CRC fields

23. For which one of the following reasons does Internet Protocol (IP) use the timeto-live (TTL) field in the IP datagram header

(A) Ensure packets reach destination within that time
(B) Discard packets that reach later than that time
(C) Prevent packets from looping indefinitely
(D) Limit the time for which a packet gets queued in intermediate routers.

24. A router uses the following routing table:

A packet bearing a destination address 144.16.68.117 arrives at the router. On which interface will it be forwarded?
(A) eth0
(B) eth1
(C) eth2
(D) eth3

25.

26.

27. A program on machine X attempts to open a UDP connection to port 5376 on a machine Y, and a TCP connection to port 8632 on machine Z. However, there are no applications listening at the corresponding ports on Y and Z. An ICMP Port Unreachable error will be generated by

(A) Y but not Z
(B) Z but not Y
(C) Neither Y nor Z
(D) Both Y and Z

Hindi [CLICK HERE]
English [CLICK HERE]

28. A subnetted Class B network has the following broadcast address : 144.16.95.255. Its subnet mask

(A) is necessarily 255.255.224.0
(B) is necessarily 255.255.240.0
(C) is necessarily 255.255.248.0
(D) could be any one of 255.255.224.0, 255.255.240.0, 255.255.248.0

Hindi [CLICK HERE]
English [CLICK HERE]

29. Two computers C1 and C2 are configured as follows. C1 has IP address 203.197.2.53 and netmask 255.255.128.0. C2 has IP address 203.197.75.201 and netmask 255.255.192.0. which one of the following statements is true?

(A) C1 and C2 both assume they are on the same network
(B) C2 assumes C1 is on same network, but C1 assumes C2 is on a different network
(C) C1 assumes C2 is on same network, but C2 assumes C1 is on a different network
(D) C1 and C2 both assume they are on different networks.

Hindi [CLICK HERE]
English [CLICK HERE]

30. Consider the following statements about the timeout value used in TCP.

i. The timeout value is set to the RTT (Round Trip Time) measured during TCP connection establishment for the entire duration of the connection.

ii. Appropriate RTT estimation algorithm is used to set the timeout value of a TCP connection.

iii. Timeout value is set to twice the propagation delay from the sender to the receiver.

Which of the following choices hold?

(A) (i) is false, but (ii) and (iii) are true
(B) (i) and (iii) are false, but (ii) is title
(C) (i) and (ii) are false, but (iii) is true
(D) (i), (ii) and (iii) are false

31. Consider a TCP connection in a state where there are no outstanding ACKs. The sender sends two segments back to back. The sequence numbers of the first and second segments are 230 and 290 respectively. The first segment was lost, but the second segment was received correctly by the receiver. Let X be the amount of data carried in the first segment (in bytes), and Y be the ACK number sent by the receiver.

    The values of X and Y (in that order) are

    (A) 60 and 290
    (B) 230 and 291
    (C) 60 and 231
    (D) 60 and 230

32. The address of a class B host is to be split into subnets with a 6-bit subnet number. What is the maximum number of subnets and the maximum number of hosts in each subnet?

    (A) 62 subnets and 262142 hosts.
    (B) 64 subnets and 262142 hosts.
    (C) 62 subnets and 1022 hosts.
    (D) 64 subnets and 1024 hosts.

33. What is the maximum size of data that the application layer can pass on to the TCP layer below?

    (A) Any size
    (B) 2^16 bytes - size of TCP header
    (C) 2^16 bytes
    (D) 1500 bytes

34. Which of the following system calls results in the sending of SYN packets?

    (A) socket
    (B) bind
    (C) listen
    (D) connect

35.

36.

37. Host X has IP address 192.168.1.97 and is connected through two routers R1 and R2 to another host Y with IP address 192.168.1.80. Router R1 has IP addresses 192.168.1.135 and 192.168.1.110. R2 has IP addresses 192.168.1.67 and 192.168.1.155. The netmask used in the network is 255.255.255.224.

    Given the information above, how many distinct subnets are guaranteed to already exist in the network?
    (A) 1
    (B) 2

(C) 3
(D) 6

Hindi [CLICK HERE]
English [CLICK HERE]

38. [continuation of last question]

    Which IP address should X configure its gateway as?
    (A) 192.168.1.67
    (B) 192.168.1.110
    (C) 192.168.1.135
    (D) 192.168.1.155

    ANSWER - reffer the video solution of previous question(3.37) I have covered both parts in that video

39.
    Pending

40. If a class B network on the Internet has a subnet mask of 255.255.248.0, what is the maximum number of hosts per subnet?

    (A) 1022
    (B) 1023
    (C) 2046
    (D) 2047

    Hindi [CLICK HERE]
    English [CLICK HERE]

41.
    Pending

42.
    Pending

43. One of the header fields in an IP datagram is the Time to Live(TTL)field.Which of the following statements best explains the need for this field?

    (A) It can be used to prioritize packets

(B) It can be used to reduce delays
(C) It can be used to optimize throughput
(D) It can be used to prevent packet looping

Hindi [CLICK HERE]
English [CLICK HERE]

44. Suppose computers A and B have IP addresses 10.105.1.113 and 10.105.1.91 respectively and they both use the same netmask N. Which of the values of N given below should not be used if A and B should belong to the same network?

    (A) 255.255.255.0
    (B) 255.255.255.128
    (C) 255.255.255.192
    (D) 255.255.255.224

    Hindi [CLICK HERE]
    English [CLICK HERE]

45. Not in syllabus

46.
    Pending

47.
    Pending

48. An Internet Service Provider (ISP) has the following chunk of CIDR-based IP addresses available with it: 245.248.128.0/20. The ISP wants to give half of this chunk of addresses to Organization A, and a quarter to Organization B, while retaining the remaining with itself. Which of the following is a valid allocation of addresses to A and B?

    (A) 245.248.136.0/21 and 245.248.128.0/22
    (B) 245.248.128.0/21 and 245.248.128.0/22
    (C) 245.248.132.0/22 and 245.248.132.0/21
    (D) 245.248.136.0/24 and 245.248.132.0/21

    Hindi [CLICK HERE]
    English [CLICK HERE]

49. Consider an instance of TCP's Additive Increase Multiplicative Decrease (AIMD) algorithm where the window 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 timeout occurs during the fifth transmission. Find the congestion window size at the end of the tenth transmission.

(A) 8 MSS
(B) 14 MSS
(C) 7 MSS
(D) 12 MSS

Hindi [CLICK HERE]
English [CLICK HERE]

50. In an IPv4 datagram, the M bit is 0, the value of HLEN is 10, the value of total length is 400 and the fragment offset value is 300. The position of the datagram, the sequence numbers of the first and the last bytes of the payload, respectively are

(A) Last fragment, 2400 and 2789
(B) First fragment, 2400 and 2759
(C) Last fragment, 2400 and 2759
(D) Middle fragment, 300 and 689

Hindi [CLICK HERE]
English [CLICK HERE]

51. Let the size of congestion window of a TCP connection be 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 _____.

Hindi [CLICK HERE]
English [CLICK HERE]

52. Consider a selective repeat sliding window protocol that uses a frame size of 1 KB to send data on a 1.5 Mbps link with a one-way latency of 50 msec. To achieve a link utilization of 60%, the minimum number of bits required to represent the sequence number field is _____.

Hindi [CLICK HERE]
English [CLICK HERE]

53.
Hindi [CLICK HERE]

54. In the diagram shown below L1 is an Ethernet LAN and L2 is a Token-Ring LAN. An IP packet originates from sender S and traverses to R, as shown. The link within each ISP, and across two ISPs, are all point to point optical links. The initial value of TTL is 32. The maximum possible value of TTL field when R receives the datagram is

55. Consider the store and forward packet switched network given below. Assume that the bandwidth of each link is 10^6 bytes / sec. A user on host A sends a file of size 10^3 bytes to host B through routers R1 and R2 in three different ways. In the first case a single packet containing the complete file is transmitted from A to B. In the second case, the file is split into 10 equal parts, and these packets are transmitted from A to B. In the third case, the file is split into 20 equal parts and these packets are sent from A to B. Each packet contains 100 bytes of header information along with the user data. Consider only transmission time and ignore processing, queuing and propagation delays. Also assume that there are no errors during transmission. Let T1, T2 and T3 be the times taken to transmit the file in the first, second and third case respectively. Which one of the following is CORRECT?

(A) T1 < T2 < T3
(B) T1 > T2 > T3
(C) T2 = T3, T3 < T1
(D) T1 = T3, T3 > T2

56. Host A (on TCP/IP v4 network A) sends an IP datagram D to host B (also on TCP/IP

v4 network B). Assume that no error occurred during the transmission of D. When D reaches B, which of the following IP header field(s) may be different from that of the original datagram D?

(i) TTL
(ii) Checksum
(iii) Fragment Offset

(A) (i) only
(B) (i) and (ii) only
(C) (ii) and (iii) only
(D) (i), (ii) and (iii)

Hindi [CLICK HERE]
English [CLICK HERE]

57. Classless Inter-domain Routing (CIDR) receives a packet with address 131.23.151.76. The router's routing table has the following entries:

Prefix	Output Interface Identifier
131.16.0.0/12	3
131.28.0.0/14	5
131.19.0.0/16	2
131.22.0.0/15	1

The identifier of the output interface on which this packet will be forwarded is _____.

Hindi [CLICK HERE]
English [CLICK HERE]

58.

59. An IP router with a Maximum Transmission Unit (MTU) of 1500 bytes has received an IP packet of size 4404 bytes with an IP header of length 20 bytes. The values of the relevant fields in the header of the third IP fragment generated by the router for this packet are

(A) MF bit: 0, Datagram Length: 1444; Offset: 370
(B) MF bit: 1, Datagram Length: 1424; Offset: 185
(C) MF bit: 1, Datagram Length: 1500; Offset: 37
(D) MF bit: 0, Datagram Length: 1424; Offset: 2960

Hindi [CLICK HERE]

60. 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?

1. If the sequence number of a segment is m, then the sequence number of the subsequent segment is always m+1.

2. If the estimated round trip time 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.

3. The size of the advertised window never changes during the course of the TCP connection.

4. The number of unacknowledged bytes at the sender is always less than or equal to the advertised window

(A) 3 only
(B) 1 and 3 only
(C) 1 and 4 only
(D) 2 and 4 only

61. Which one of the following fields of an IP header is NOT modified by a typical IP router?

(A) Checksum
(B) Source address
(C) Time to Live (TTL)
(D) Length

62. Identify the correct order in which a server process must invoke the function calls accept, bind, listen, and recv according to UNIX socket API.

(A) listen, accept, bind recv
(B) bind, listen, accept, recv
(C) bind, accept, listen, recv
(D) accept, listen, bind, recv

63.

64.

65. Host A sends a UDP datagram containing 8880 bytes of user data to host B over an Ethernet LAN. Ethernet frames may carry data up to 1500 bytes (i.e. MTU = 1500 bytes). Size of UDP header is 8 bytes and size of IP header is 20 bytes. There is no option field in IP header. How may total number of IP fragments will be transmitted and what will be the contents of offset field in the last fragment?

(A) 6 and 925
(B) 6 and 7400
(C) 7 and 1110
(D) 7 and 8880

66. Consider the following statements.

I. TCP connections are full duplex.
II. TCP has no option for selective acknowledgment
III. TCP connections are message streams.

(A) Only I is correct
(B) Only I and II are correct
(C) Only II and III are correct
(D) All of I, II and III are correct

67. In the network 200.10.11.144/27, the fourth octet (in decimal) of the last IP address of the network which can be assigned to a host is _____

68. An IP datagram of size 1000 bytes arrives at a router. The router has to forward this packet on a link whose MTU (maximum transmission unit) is 100 bytes. Assume that the size of the IP header is 20 bytes. The number of fragments that the IP datagram will be divided into for transmission is _____.

Hindi [CLICK HERE]
English [CLICK HERE]

69. For a host machine that uses the token bucket algorithm for congestion control, the token bucket has a capacity of 1 megabyte and the maximum output rate is 20 megabytes per second. Tokens arrive at a rate to sustain output at a rate of 10 megabytes per second. The token bucket is currently full and the machine needs to send 12 megabytes of data. The minimum time required to transmit the data is _____ seconds.

Hindi [CLICK HERE]
English [CLICK HERE]

70.

71. The maximum number of IPv4 router address addresses that can be listed in the record route (RR) option field of an IPv4 header is ____.

Hindi [CLICK HERE]
English [CLICK HERE]

72.

73.

74. Consider a long-lived TCP session with an end-to-end bandwidth of 1 Gbps (= 10^9 bits-per-second). The session starts with a sequence number of 1234. The minimum time (in seconds, rounded to the closest integer) before this sequence number can be used again is _____ .

Hindi [CLICK HERE]
English [CLICK HERE]

75.

76. Match the following:

(A) P-III, Q-IV, R-II, S-I
(B) P-II, Q-I, R-IV, S-III
(C) P-IV, Q-I, R-II, S-III
(D) P-IV, Q-I, R-III, S-II

Hindi [CLICK HERE]
English [CLICK HERE]

77. Consider three machines M, N and P with IP addresses 100.10.5.2, 100.10.5.5 and 100.10.5.6 respectively. The subnet mask is set to 255.255.255.252 for all the three machines. Which one of the following is true?

(A) M, N and P all belong to the same subnet
(B) Only N and P belong to the same subnet
(C) M, N, and P belong to three different subnets
(D) Only M and N belong to the same subnet

Hindi [CLICK HERE]
English [CLICK HERE]

78. Consider a TCP connection between a client and a server with the following specifications: the round trip time is 6 ms, the size of the receiver advertised window is 50 KB, slow-start threshold at the client is 32 KB, and the maximum segment size is 2 KB. The connection is established at time t=0. Assume that there are no timeouts and errors during transmission.

Then the size of the congestion window (in KB) at time t+60 ms after all acknowledgements are processed is _____ .

Hindi [CLICK HERE]
English [CLICK HERE]

79.

1.

2. Not in syllabus

3.

4.

5. Count to infinity is a problem associated with
   (A) link state routing protocol.
   (B) distance vector routing protocol
   (C) DNS while resolving host name.
   (D) TCP for congestion control.

6.

7. Not in syllabus

8.

9.

10.

11.

12. Not in syllabus

13. Not in syllabus

14. Not in syllabus

15. Not in syllabus

16.

17.

18.

19.

20. Two popular routing algorithms are Distance Vector(DV) and Link State (LS) routing. Which of the following are true?

(S1) Count to infinity is a problem only with DV and not LS routing
(S2) In LS, the shortest path algorithm is run only at one node
(S3) In DV, the shortest path algorithm is run only at one node
(S4) DV requires lesser number of network messages than LS

(A) S1, S2 and S4 only
(B) S1, S3 and S4 only
(C) S2 and S3 only
(D) S1 and S4 only

21. Not in syllabus

22.

23.

24. A computer on a 10Mbps network is regulated by a token bucket. The token bucket is filled at a rate of 2Mbps. It is initially filled to capacity with 16 Megabits. What is the maximum duration for which the computer can transmit at the full 10Mbps?
(A) 1.6 seconds
(B) 2 seconds
(C) 5 seconds
(D) 8 seconds

25. Not in syllabus

26.

27.

28.

29. Consider different activities related to email:

m1: Send an email from a mail client to a mail server
m2: Download an email from mailbox server to a mail client
m3: Checking email in a web browser

Which is the application level protocol used in each activity?
(A) m1: HTTP m2: SMTP m3: POP
(B) m1: SMTP m2: FTP m3: HTTP
(C) m1: SMTP m2: POP m3: HTTP
(D) m1: POP m2: SMTP m3: IMAP

Hindi [CLICK HERE]
English [CLICK HERE]

30.

31.

32.

33. The transport layer protocols used for real time multimedia, file transfer, DNS and email, respectively are:

(A) TCP, UDP, UDP and TCP
(B) UDP, TCP, TCP and UDP
(C) UDP, TCP, UDP and TCP
(D) TCP, UDP, TCP and UDP

Hindi [CLICK HERE]
English [CLICK HERE]

34. Not in syllabus

35. Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D.

(A) Network layer − 4 times and Data link layer − 4 times
(B) Network layer − 4 times and Data link layer − 3 times
(C) Network layer − 4 times and Data link layer − 6 times
(D) Network layer − 2 times and Data link layer − 6 times

Hindi [CLICK HERE]
English [CLICK HERE]

36.

37. Not in syllabus

38.

39. An IP machine Q has a path to another IP machine H via three IP routers R1, R2, and R3.

Q───────R1───────R2──────R3─────H

H acts as an HTTP server, and Q connects to H via HTTP and downloads a file. Session layer encryption is used, with DES as the shared key encryption protocol. Consider the following four pieces of information:

[I1] The URL of the file downloaded by Q
[I2] The TCP port numbers at Q and H
[I3] The IP addresses of Q and H
[I4] The link layer addresses of Q and H
Which of I1, I2, I3, and I4 can an intruder learn through sniffing at R2 alone?

(A) Only I1 and I2
(B) Only I1
(C) Only I2 and I3
(D) Only I3 and I4

Hindi [CLICK HERE]
English [CLICK HERE]

40. In one of the pairs of protocols given below, both the protocols can use multiple TCP connections between the same client and the server. Which one is that?

(A) HTTP, FTP
(B) HTTP, TELNET
(C) FTP, SMTP
(D) HTTP, SMTP

Hindi [CLICK HERE]
English [CLICK HERE]

41. Not in syllabus

42. Not in syllabus

43.

44. 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) HTTP GET request, DNS query, TCP SYN
(B) DNS query, HTTP GET request, TCP SYN
(C) DNS query, TCP SYN, HTTP GET request
(D) TCP SYN, DNS query, HTTP GET request

Hindi [CLICK HERE]
English [CLICK HERE]

45. Not in syllabus

46. Not in syllabus

47. Not in syllabus

48. Consider an IP packet with a length of 4,500 bytes that includes a 20-byte IPv4 header and 40-byte TCP header. The packet is forwarded to an IPv4 router that supports a Maximum Transmission Unit (MTU) of 600 bytes. Assume that the length of the IP header in all the outgoing fragments of this packet is 20 bytes. Assume that the fragmentation offset value stored in the first fragment is 0.

    The fragmentation offset value stored in the third fragment is _____ .

    Hindi [CLICK HERE]
    English [CLICK HERE]

49. Not in syllabus

50. Which of the following protocol pairs can be used to send and retrieve e-mails (in that order)?

    (a) IMAP, SMTP
    (b) SMTP, MIME
    (c) IMAP, POP3
    (d) SMTP, POP3

    Hindi [CLICK HERE]
    English [CLICK HERE]

51. Not in syllabus

52. Consider the following statements about the functionality of an IP based router.

I. A router does not modify the IP packets during forwarding.
II. It is not necessary for a router to implement any routing protocol.
III. A router should reassemble IP fragments if the MTU of the outgoing link is larger than the size of the incoming IP packet.
Which of the above statements is/are TRUE ?

(A) I and II only
(B) I only
(C) II and III only
(D) II only
Hindi [CLICK HERE]
English [CLICK HERE]

53. Assume that you have made a request for a web page through your web browser to a web server. Initially the browser cache is empty. Further, the browser is configured to send HTTP requests in non-persistent mode. The web page contains text and five very small images. The minimum number of TCP connections required to display the web page completely in your browser is _____ .

Hindi [CLICK HERE]
English [CLICK HERE]

of