

UNIT-XII

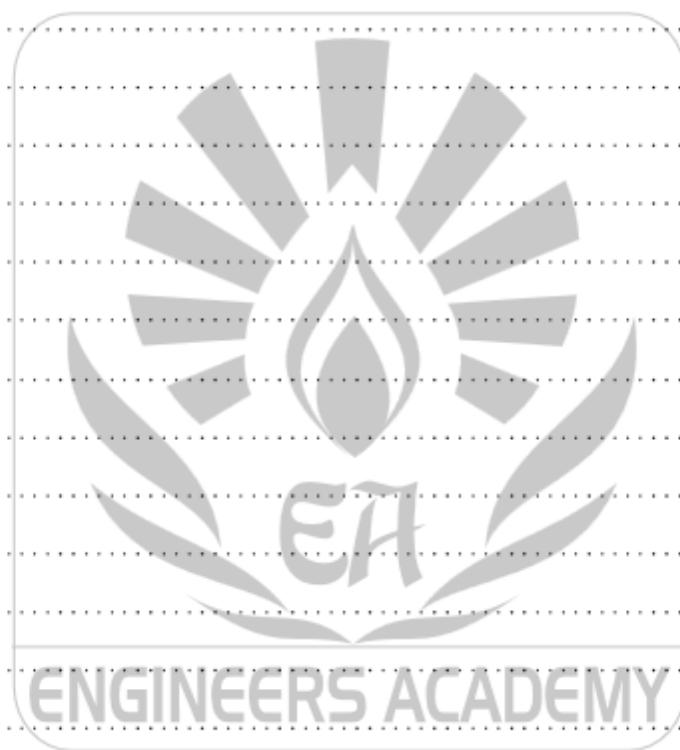
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COMPUTER NETWORK

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NOTES



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INTRODUCTION AND OSI/TCP MODEL

OBJECTIVE QUESTIONS

CHAPTER

1

1. Segmentation is done in
 - (a) transport layer (b) network layer
 - (c) data link layer (d) physical layer
2. process-to-process delivery is related to
 - (a) data link layer (b) network layer
 - (c) transport layer (d) all of these
3. synchronization of bits is done by
 - (a) data link layer (b) network layer
 - (c) transport alyer (d) none of these
4. Routing is done in
 - (a) network layer (b) physical layer
 - (c) data link layer (d) transport layer
5. Congestion control is done in
 - (a) MAC layer (b) data link layer
 - (c) transport layer (d) application layer
6. Network to network delivery is done on
 - (a) network layer (b) transport layer
 - (c) application layer (d) data link layer
7. the upper layers of the OSI model are in correct order-
 - (a) session, application, presentation
 - (b) session, presentation, application
 - (c) session, application, presentation, physcial
 - (d) application, presentation, session, physical
8. the Internet Protocol (IP) generally corresponds to which OSI layer?
 - (a) network (layer three)
 - (b) transport (layer four)
 - (c) data link (layer two)
 - (d) session (layer five)
9. The part of OSI where one most commonly finds data encryption, compression, and other encoding for network communication is
 - (a) application (layer seven)
 - (b) session (layer five)
 - (c) presentation (layer six)
 - (d) none of these
10. Which of these network devices belongs at the OSI physical layer (layer one)?
 - (a) repeater (b) router
 - (c) switch (d) bridge
11. which of these network devices belong at the OSI data link layer (layer two)?
 - (a) router (b) bridge
 - (c) VPN (d) none of these
12. Which of these network devices primarily functions at the OSI Netwcrk layer (layer 3)?
 - (a) switch (b) gateway
 - (c) router (d) all of these
13. Which Protocol Data Unit (PDU) is employed at the Transport layer?
 - (a) bits (b) frames
 - (c) packets (d) segments
14. What is the Protocol Data Unit (PDU) employed at the Data Link Layer?
 - (a) bits (b) frames
 - (c) packets (d) segments
15. What is the Protocol Data Unit (PDU) employed at the Physcial Layer?
 - (a) bits (b) frames
 - (c) packets (d) segments

16. the bottom layer of the OSI model is about electrical and mechanical aspects of networking. What is the layer known as?
- transport
 - data link
 - physical
 - session
17. What network topology implements at least two paths to and from each node?
- bus
 - ring
 - star
 - mesh
18. What type of network topology is depicted by a single cable where devices connect using 'T' connectors?
- star
 - bus
 - ring
 - 10 base T
19. The physical layer is responsible for the transmission of _____ over the physical medium.
- packets
 - bits
 - message
 - all of these
20. Baud rate means
- number of bits transmitted per unit time
 - number of signal units per second to represent bits
 - number of pulse transmitted per unit time
 - number of bits received per unit time
21. How many characters per second (7 bits + 1 parity) can be transmitted over a 2400 bps line in case of synchronous and asynchronous transfer (1 stop and 1 start bit)
- 300, 300
 - 300, 240
 - 250, 300
 - 240, 300
22. Which of the following options is not an useful property of Manchester line code for an Ethernet?
- continuous energy
 - continuous clock transition
 - no DC component
 - no signal change at a 1 to 0 transition
23. Which of the following statements best describes a hub?
- all connected systems are in the same broadcast domain, but different collision domains
 - all connected systems are in the same collision domain, but different broadcast domains
 - all connected systems are in the same broadcast and collision domains
 - all connected systems are in their own broadcast and collision domains
24. Every port on a switch defines a:
- collision domain
 - broadcast domain
 - broadcast and collision domain
 - none of these
25. If a frame enters a bridge and the MAC address is not found in the MAC address table, what will the bridge do with the frame?
- drop it
 - forward it to all ports except the port it came in from
 - hold it until the destination MAC address is discovered
 - block it
26. Modulation and demodulation are done by
- hub
 - modem
 - bridge
 - none of these
27. Which one of the following devices can be used to connect two LAN networks which use similar protocols?
- bridge
 - transceiver
 - repeater
 - gateway
28. Which one is not true for repeater?
- A repeater connects segments of a LAN
 - A repeater has filtering capability
 - A repeater is a regenerator
 - A repeater can't act as an amplifier

29. If switches are used to replace hubs on a network, which of the following statements is true?
- the number of broadcast domains will increase
 - the number of collision domains will increase
 - the number of collision domains will decrease
 - the number of broadcast domains will decrease
30. What layer of the OSI model is designed to perform error recovery functions?
- physical
 - data link
 - network
 - transport
31. What layer of the OSI model is associated with the MAC and LLC sublayers?
- physical
 - data link
 - network
 - transport
32. At what layer of the OSI model are data encryption and decryption processed?
- application
 - presentation
 - session
 - physical
33. In the OSI model, which layer deals with the procedures to ensure reliable delivery of messages?
- presenation
 - session
 - transport
 - network
34. What OSI layer handles error recognition, recovery, and is responsible for re-packaging long messages into small packets for transmission?
- session
 - presentation
 - transport
 - physical
35. What layer of the OSI model is responsible for packaging and transmitting data on the physical media?
- the session layer
 - the transport layer
 - the physical layer
 - the data link layer
36. What layer of the OSI model would be concerned with network applications such as Telent and FTP?
- the application layer
 - the data link layer
 - the session layer
 - the network layer
37. Which of the following are functions of the presentation layer?
- connection establishment
 - data translation
 - Error checking
 - data encryption
 - data compression
- 1 and 2
 - 2, 4 and 5
 - 1 and 3
 - 3, 4 and 5
38. The file transfer protocl (FTP) corresponds to which OSI layer?
- presentation
 - application
 - session
 - none of these
39. Match the following :
- | Layer | Protocols |
|-----------------|-------------|
| A. Application | 1. Ethernet |
| B. Presentation | 2. UDP |
| C. Transport | 3. SNMP |
| D. Data link | 4. Telent |
- A → 4; B → 3; C → 2; D → 1
 - A → 4; B → 3; C → 1; D → 2
 - A → 3; B → 4; C → 2; D → 1
 - A → 1; B → 2; C → 3; D → 4
40. Which of the following statements is/are true?
- S1: TCP/IP doesn't have session or presentation layers
- S2: OSI supports internetworking
- only S1
 - only S2
 - both S1 and S2
 - none of these

41. Which of the following statements is/are true?

S1: The transport layer is responsible for delivery messages between hosts that may or may not be on different networks.

S2: The network layer is responsible for delivery messages between processes

- (a) only S1
- (b) only S2
- (c) both S1 and S2
- (d) none of these

42. Which of the following networking devices work in the data link layer?

- | | |
|-------------|-------------|
| 1. Bridge | 2. Hub |
| 3. Router | 4. Switch |
| (a) 1 and 4 | (b) 1 and 2 |
| (c) 2 and 3 | (d) 3 and 4 |

43. The Transport layer is divided into two different protocols according to the reliability of data transfer. Which of the following is/are transport layer protocols?

- | | |
|-------------|-------------|
| 1. UDP | 2. IP |
| 3. TCP | 4. FTP |
| (a) 1 and 2 | (b) 2 and 3 |
| (c) 1 and 3 | (d) 3 and 4 |

44. the following are names of data units in each layer. Which choice is not a correct match?

- | | |
|-------------|-------------|
| (a) frame | — data link |
| (b) packet | — network |
| (c) segment | — transport |
| (d) frame | — network |

45. What are the addresses used in the data link layer?

- 1. Logical address
 - 2. Hardware address
 - 3. Network address
 - 4. Physical address
- (a) 1 and 2
 - (b) 2 and 3
 - (c) 1 and 3
 - (d) 2 and 4

46. Choose the best matching between List-I and List II

List-I

- P. Data link layer
- Q. Network layer
- R. Transport-layer

List-II

1. Ensures reliable transport of data over a physical point-to-point link
2. Encodes / decodes data for physical transmission
3. Allow end-to-end communication between two processes
4. Routes data from one network node to the next

A	B	C
(a) 1	4	3
(b) 2	4	1
(c) 2	3	1
(d) 1	3	2

47. 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 and one parity bit and two stop bits?

- (a) 600
- (b) 800
- (c) 876
- (d) 1200

48. 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

49. 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 Bits synchronization
- (c) Transport layer and End-to-end process communication
- (d) Medium Access Control sub-layer and Channel sharing

50. A host is connected to 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
- the subnet to which the host belongs
 - the Department network
 - the University network
 - the Internet
51. Which of the following statements is FALSE regarding a bridge
- Bridge is a layer 2 device
 - Bridge reduces collision domain
 - Bridge is used to connect two or more LAN segments
 - Bridge reduces broadcast domain
52. 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 |
53. Which of the following is/are example(s) of Statefull application layer protocols?
- | | |
|-----------|-----------|
| (i) HTTP | (ii) FTP |
| (iii) TCP | (iv) POP3 |
- (i) and (ii) only
 - (ii) and (iii) only
 - (ii) and (iv) only
 - (iv) only
54. Which of the following functionalities must be implemented by a transport protocol over and above the network protocol?
- Recovery from packet losses
 - Detection of duplicate packets
 - Packet delivery in the correct order
 - End to end connectivity
55. Which of the following is NOT true with respect to a transparent bridge and a router?
- Both bridge and router selectively forward data packets
 - A bridge uses IP addresses while a router uses MAC addresses
 - A bridge builds up its routing table by inspecting incoming packets
 - A router can connect between a LAN and a WAN
56. In TCP, a unique sequence number assigned to each
- | | |
|-------------|-------------|
| (a) byte | (b) work |
| (c) segment | (d) message |
57. The address resolution protocol (ARP) is used for
- Finding the IP address from the DNS
 - Finding the IP address of the default gateway
 - Finding the IP address that corresponds to a MAC address
 - Finding the MAC address that corresponds to an IP address
58. Which of the following transport layer protocols is used to support electronic mail?
- | | |
|----------|---------|
| (a) SMTP | (b) IP |
| (c) TCP | (d) UDP |

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ANSWER KEY

1. Ans. (a)
2. Ans. (c)
3. Ans. (d)
4. Ans. (a)
5. Ans. (c)
6. Ans. (a)
7. Ans. (b)

By convention, the “upper layers” of OSI consist of session (layer five), presentation (layer six), and application (layer seven). All other layers of OSI belong in the “lower layers” category, although some references will claim that the transport layer (layer four) also belongs in the upper layers. Overall, the distinction between upper and lower layers in OSI is not nearly as important as the ordering and purpose of each layer individually.

8. Ans. (a)

Internet Protocol (IP) initiates the routing of datagrams and also breaks large datagrams into packets according to the needs of the data link layer. In the OSI model, the network layer owns responsibility for these functions.

9. Ans. (c)

Unlike some other layers of OSI, the presentation layer does not generally correspond to any particular network protocol. The presentation layer instead deals with data formats. For example, GIF (Graphic Interchange Format) and JPEG (Joint Photographic Experts Group) image formats fit into the presentation layer.

10. Ans. (a)

Repeaters operate on the electrical signal of network communication. They regenerate signals by amplifying their strength and sometimes reconstructing to recover from distortion. An active hub is perhaps the most common physical manifestation of a repeater. Being at the lowest level of OSI, repeaters lack the intelligence of higher level devices like bridges and routers.

11. Ans. (b)

A bridge device joins two network segments together. Bridges work at layer two, above the physical layer, so that they are capable of connecting networks of different physical types (such as Ethernet and Token Ring or Token Ring and POFI). At layer two, however, bridges lack knowledge of the protocol information passing through them.

12. Ans. (c)

Although some newer network devices are marketed as “Layer 3 switches,” traditional switches operate at the Data Link layer. A “Gateway” is a generic term for an internetworking system that can be implemented completely in software, completely in hardware, or as a combination of the two. Depending on its implementation, a gateway can operate at literally any level of OSI. Most run at an application layer or Network layer. Routers, on the other hand, are true layer 3 devices. Routers address and communicate with each other through a specific network layer protocol such as IP.

13. Ans. (d)

The Transport layer packages data into segments for use by the next, lower layer of the OSI model.

14. Ans. (b)

The Data Link layer packages data into frames for use by the next lower layer of the OSI model.

15. Ans. (a)

The Physical layer organizes data into a bit stream for transmission over the physical network media.

16. Ans. (c)

The Physical layer deals with mechanical and electrical characteristics of the network voltage, voltage change, physical data rates, physical connectors, and transmission distance. The physical layer provides the hardware the means of sending and receiving data on a carrier.

17. Ans. (d)

18. Ans. (b)

The Bus topology utilizes a single cable with “T” connectors at each node.

19. *Ans. (b)*

20. *Ans. (b)*

21. *Ans. (d)*

22. *Ans. (d)*

23. *Ans. (c)*

24. *Ans. (a)*

25. *Ans. (b)*

26. *Ans. (b)*

27. *Ans. (a)*

28. *Ans. (b)*

29. *Ans. (b)*

30. *Ans. (d)*

The Transport layer performs error recovery on incoming frames. It ensures data are received in order and without corruption.

31. *Ans. (b)*

32. *Ans. (b)*

The Presentation layer is responsible for scrambling data before it is transmitted and unscrambling it once it is received at the other end. Also compression and decompression of data are processed in this presentation layer.

33. *Ans. (c)*

The Transport layer is responsible for reliable transmission of data to the receiving node. If errors are detected, the Transport layer requests retransmission of data ensuring complete data transfer. This layer manages the end-to-end control as well as error checking.

34. *Ans. (c)*

35. *Ans. (c)*

Data bits placed and received on the media are handled at the Physical layer of the OSI model.

36. *Ans. (a)*

The Application layer defines the network applications that support end-user programs. Common functions of this layer include; opening, closing, reading and writing files, file transport, e-mail, and terminal emulation.

37. *Ans. (b)*

The primary function of the presentation layer is to format the data. Encryption, decryption, compression, and decompression are also taking place in this layer.

38. *Ans. (b)*

FTP, telnet, and Simple mail Transfer Protocol (SMTP) are all examples of the OSI application layer. The application layer, layer seven, typically consists of high-level protocols that a specific application uses for client/server or other network communication.

39. *Ans. (a)*

40. *Ans. (a)*

41. *Ans. (d)*

The network layer is responsible for delivery messages between hosts and the transport layer is responsible for delivery messages between processes. The transport layer uses the network layer to deliver messages to the right host, and then transport layer handles delivery to the right process.

42. *Ans. (a)*

A bridge is a device that operates at the Data Link layer. When the second layer devices, bridge and switch, receive frame from the source, they check the source and destination addresses of the MAC. If information about received frames is not found in the table, the frame will be flooded to the devices connected to the ports. The Data Link layer devices make filtering decisions based on the hardware address of the frame. A hub is a physical device, and the router work on the Network layer.

43. *Ans. (c)*

44. *Ans. (d)*

A packet is a unit of information in the network layer. A frame with a physical source and destination address is a unit used in the Data Link layer. The segment is a data unit for the transport layer. And the bit is 0 or 1 transmitting over the physical medium.

45. Ans. (d)

A physical device in the network has one unique address called a hardware address or physical address. This address is burned in the network interface card by the vendor. The hardware address identifies the device address to the network. The source of the message needs to know the hardware address in order to send the information to the receiver. The address used in the Data Link layer is not a logical network address that should be assigned on the interface of the network device.

46. Ans. (a)

P. Data link layer :

- Ensures reliable transport of data over a physical point-to-point link - Reliable message error correction & detection done by Data link layer.

Q. Network layer :

- Router data from one network node to the next according to routing algorithm.

R. Transport layer :

- Allows end-to-end communication between two processes with the help of TCP and UDP protocol.

47. Ans. (b)

Total number of bits = 12

Modulation Rate = 9600 baud

Number of characters (8 bit character) are

$$\text{transmitted} = \frac{9600}{12 \text{ bits}} = 800$$

48. Ans. (b)

No of bits needed to send 1 byte of data

$$= 8 + 1 + 1 + 2$$

$$= 12 \text{ bits}$$

$$\text{Baud rate} = 9600 = 800 \text{ hr/sec}$$

Hence, 800 bytes are sent in 1 sec

$$\text{In 15 sec} = 15 \times 800$$

$$= 12,000 \text{ bytes}$$

49. Ans. (b)

Bit synchronization is in physical layer.

50. Ans. (d)

Ethernet address is nothing but MAC Address which is present on NIC and it is unique for every system or host in the internet.

51. Ans. (d)

Bridge does not reduce broadcast domain, it remains same.

52. Ans. (a)

- DNS is used for mapping host name to IP address
- ARP is address resolution protocol used to map IP address with MAC address.
- RARP is reverse address resolution protocol used to map MAC address with IP address.
- DHCP is also used to map MAC address with IP address.

Since all options are used to find one address to another address but option (c) is most appropriate answer.

53. Ans. (c)

FTP has control and data connection it requires authorization. HTTP is stateless protocol. TCP is not application layer but it is stateful. POP3 is application protocol and it gets state with help of TCP.

54. Ans. (d)

The transport protocol provides an end-to-end connectivity that shields network layer protocol from the details of the intervening network or networks. A transport protocol can be either connection oriented such as TCP, or connectionless such as UDP.

55. Ans. (b)

Choice (b) is not true.

A bridge operates at layer 2 (Data Link Layer) so it uses MAC address while routers operate at layer 3 (Network Layer) so it uses IP addresses.

56. *Ans. (d)*

TCP sequences each byte in the packet. Assigning a sequence number to indicate the first byte in a multi-byte packet does this. The second packet will have a sequence number equal to the first sequence number plus the number of bytes in the first packet.

57. *Ans. (d)*

The Address Resolution Protocol (ARP), allows a host to find the MAC (Physical) address of a target host on the same physical network, given only the targets IP address.

58. *Ans. (c)*

UDP and TCP are transport layer protocol. TCP supports electronic mail.



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DATA LINK LAYER

OBJECTIVE QUESTIONS

CHAPTER
2

1. Consider the following statements:

S1 : Media Access Control (MAC) address are used to address individual devices on the same LAN.

S2 : The MAC addresses are assigned by the manufacturer and are globally unique.

Which one of the following is true?

- (a) S1 is true, S2 is false
- (b) S2 is true, S1 is false
- (c) both are true
- (d) both are false

2. Which error detection method consists of a parity bit for each data unit as well as an entire data unit of parity bits?

- (a) simple parity check
- (b) two dimensional parity check
- (c) CRC
- (d) checksum

3. Which error detection method uses ones complement arithmetic?

- (a) simple parity check
- (b) two-dimensional parity check
- (c) CRC
- (d) checksum

4. Which error detection method involves polynomials?

- (a) simple parity check
- (b) two-dimensional parity check
- (c) CRC
- (d) checksum

5. Which of the following best describes a single-bit error?

- (a) a single bit is inverted
- (b) a single bit is inverted per data unit
- (c) a single bit is inverted per transmission
- (d) any of the above

6. In cyclic redundancy checking, what is the CRC?

- (a) the divisor
- (b) the quotient
- (c) the dividend
- (d) the remainder

7. In cyclic redundancy checking, the divisor is _____ the CRC

- (a) the same size as
- (b) 1 bit less than
- (c) 1 bit more than
- (d) 2 bits more than

8. The sum of the checksum and data as the receiver is _____ if there are no errors

- (a) -0
- (b) +0
- (c) the complement of the checksum
- (d) the complement of the data

9. In CRC there is no error if the remainder at the receiver is _____

- (a) equal to the remainder of the sender
- (b) zero
- (c) non-zero
- (d) the quotient at the sender

10. In CRC the quotient at the sender _____
- becomes the dividend at the sender
 - becomes the divisor at the sender
 - is discarded
 - in the remainder
11. Which error detection method involves the use of parity bits?
- simple parity check
 - two-dimensional parity check
 - CRC
 - both (a) and (b)
12. Which error detection method can detect a burst error?
- simple parity check
 - two-dimensional parity check
 - CRC
 - both (b) and (c)
13. At the CRC checker, _____ means that the data unit is damaged
- a string of 0s
 - a string of 1s
 - a string of alternating 1s and 0s
 - a nonzero remainder
14. Hamming code is used for
- error detection
 - error correction
 - error generation
 - both (a) and (b)
15. If 100100 data has to be sent and divisor is 1101 in CRC then what would be received data if no error occurs
- 100100100
 - 100100010
 - 100100001
 - none of these
16. If the original data 1101011011 and generator 10011 then the bit stream will be sent as
- 11010110111111
 - 1101000111001
 - 11010110111110
 - 11000110110101
17. If the original size of data bit is 20 then after adding error detection redundancy bit the size of data length
- 24
 - 25
 - 26
 - 27
18. If divisor is binary equivalent of $x^8 + x^3 + x + 1$ then CRC will be
- 2 bit
 - 3 bit
 - 8 bit
 - 9 bit
19. The bit stream 10011101 is transmitted using the CRC method described in class using generator polynomial $x^3 + 1$. Which one of the following represent the transmitted bit string
- 10011101100
 - 10011101101
 - 10011101110
 - none of these
20. What is the remainder obtained by dividing $x^7 + x^5 + 1$ by the generator polynomial $x^3 + 1$?
- $x^3 + x + 1$
 - $x^2 + x + 1$
 - $x^4 + x + 1$
 - none of these
21. Consider a CRC generator polynomial $x^3 + x^2 + 1$. Match the polynomial and their remainder
- | | |
|--------------------------------------|--------------|
| A. 1001010 ($x^6 + x^3 + x$) | 1. $x^2 + x$ |
| B. 1001110 ($x^6 + x^3 + x^2 + x$) | 2. $x^2 + 1$ |
| C. 111000000 ($x^8 + x^7 + x^6$) | |
- $A \rightarrow 2; B \rightarrow 1; C \rightarrow 1$
 - $A \rightarrow 1; B \rightarrow 1; C \rightarrow 1$
 - $A \rightarrow 1; B \rightarrow 2; C \rightarrow 2$
 - none of these

22. Start and stop bits are used in serial communication for
 (a) error detection
 (b) error correction
 (c) synchronization
 (d) slowing down the communication
23. Is Stop and Wait ARQ if ACK1 is sent by receiver then sender sends
 (a) frame 2 (b) frame 0
 (c) frame 1 (d) none of these
24. Piggy backing is a method of
 (a) backtracking
 (b) forwarding
 (c) method to combine a data frame and ACK
 (d) none of these
25. In Go Back N ARQ if 4 frames are sent and if ACK 4 arrives then sender will
 (a) send 1, 2, 3 frame
 (b) send next frame
 (c) send all four frame again
 (d) none of these
26. In sliding window protocol the receiver window size is at most
 (a) 2^n (b) $2^n + 1$
 (c) $2^n - 1$ (d) 1
27. In Go Back N ARQ the window size in the receiver side is always
 (a) 2 (b) 1
 (c) 2^n (d) $2^n - 1$
28. In which ARQ, if a NAK is received, only specific damaged or lost frame is retransmitted?
 (a) stop-and-wait
 (b) go-back-N
 (c) selective repeat
 (d) both (a) & (b)
29. A Go-Back-N ARQ uses a window size of 15. How many bits are needed to define the sequence number?
 (a) 4 (b) 5
 (c) 15 (d) 16
30. A selective repeat ARQ is using 7 bits to represent the sequence number. What is the size of the window?
 (a) 127 (b) 8
 (c) 64 (d) none of these
31. A computer is using the following sequence numbers
 0, 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 0, 1
 What is the size of the window (assume selective repeat protocol is used)?
 (a) 16 (b) 8
 (c) 14 (d) 3
32. A computer uses the following sequence numbers
 0, 1, 2, 3, 4, 5, 6, 7, 0, 1, 2, 3.....
 What will be the sender's and receiver's window size that are not possible in SR protocol?
 (a) 4, 4 (b) 5, 3
 (c) 7, 1 (d) 5, 4
33. Stop and wait protocol is equal to
 (a) SR protocol with SWS = 1
 (b) GBN protocol with RWS = 1
 (c) SR protocol with sender's and receiver's window equal
 (d) GBN protocol with sender's window size equal to receiver's window size
34. In a Stop and Wait ARQ bandwidth 1 Mbps and 1 bit takes 20 ms to make a round trip if system data frame are 1000 bit's in length what is the % of utilization of the link
 (a) 2% (b) 3%
 (c) 10% (d) 5%

35. A channel has propagation delay of 10 ms. For 320 bits frame, what will be the channel bit rate of stop-n-wait give efficiency of 50%?
(a) 80 kbps (b) 110 kbps
(c) 16 kbps (d) 320 kbps
36. A 2000 km long channel operates at 2Mbps and is used to transmit 60 byte frames. If the propagation speed is 3μ sec/km, then how many bits will be needed to represent sequence numbers?
(a) 5 (b) 6
(c) 7 (d) 8
37. If L is the length of the frame, B is the band width and R is the propagation delay, then what condition holds good to have at least 50% efficiency in stop-n-wait protocol?
(a) $L = BR$ (b) $L < BR$
(c) $L = 2BR$ (d) $L \geq 2BR$
38. If we run N simultaneous stop-n-wait ARQ processors parallelly over the transmission channel, then it is equal to
(a) go back N protocol
(b) SR protocol
(c) stop-n-wait protocol
(d) none of these
39. If bit rate is 10 kbps propagation delay is 40 ms then for what frame size does stop-n-wait protocol give efficiency of 50%?
(a) 1000 bytes (b) 800 bytes
(c) 900 bits (d) 512 bits
40. A 1000 km long cable operates at 1 MBPS. Propagation delay is $10\ \mu$ s/km. If frame size is 1kB, then how many bits are required for sequence number?
(a) 3 (b) 4
(c) 5 (d) 6
41. Consider sliding window protocol for a 10 MBPS point to point link with propagation delay of 2 sec. If frame size is of 4 KB then what will be the minimum number of bits required for the sequence number?
(a) 10 bits (b) 11 bits
(c) 12 bits (d) 14 bits
42. Consider sliding window protocol for a 10 mbps channel with propagation delay of $300\ \mu$ s. If packet size is 1 kb then what is the maximum link utilization for window size of 127 ?
(a) 100% (b) 75%
(c) 2.8% (d) 43%
43. In stop and wait ARQ a station A sends 1000 bit packet to station B with 10,000 kbps. After sending a packet how much time computer will idle if size of ACK is 2 bit and RTT is 1 sec
(a) 1.002×10^{-4} (b) 2×10^{-4}
(c) 2.002×10^{-4} (d) 1.5×10^{-4}
44. Data link layer is divided into
(a) MAC and LLC (b) L2CAP and MAC
(c) LCAP and MAC (d) none of these
45. In NIC the printed address is
(a) physical address (b) logical address
(c) all of these (d) none of these
46. In Ethernet, MAC sub layer uses access method
(a) ALOHA (b) CSMA/CD
(c) slotted CSMA (d) none of these
47. IEEE 802.5 is called
(a) bus (b) token bus
(c) token ring (d) none of these
48. 10Base-t refers to
(a) ethernet using thin coaxial cable
(b) ethernet using thick coaxial cable
(c) ethernet using unshielded twisted pair (utp) cabling
(d) none of the previous
49. 10-Base-5 refers to
(a) ethernet using thin coaxial cable
(b) ethernet using thick coaxial cable
(c) ethernet using unshielded twisted pair (utp) cabling
(d) none of the previous
50. State true (T) or False (F)?
 1. Bus topology is suitable for a growing network
 2. mesh topology is robust
 3. Star topology allows direct traffic between devices

4. Bus topology is robust
 (a) TTFB (b) FTFT
 (c) TFTC (d) TTFT
51. Match with the suitable one
- | List-I | List-II |
|--|------------------|
| A. unidirectional traffic | 1. Mesh topology |
| B. Multipoint | 2. Star topology |
| C. Direct traffic between two devices | 3. Bus topology |
| D. Data passes through hub | 4. Ring topology |
| (a) $A \rightarrow 4; B \rightarrow 1; C \rightarrow 2; D \rightarrow 3$ | |
| (b) $A \rightarrow 3; B \rightarrow 4; C \rightarrow 1; D \rightarrow 2$ | |
| (c) $A \rightarrow 2; B \rightarrow 3; C \rightarrow 4; D \rightarrow 1$ | |
| (d) $A \rightarrow 4; B \rightarrow 3; C \rightarrow 1; D \rightarrow 2$ | |
52. Data is transmitted using light through a _____ cable.
 (a) twisted pair
 (b) fiber-optic
 (c) coaxial
 (d) microwave
53. Which physical connection is the fastest?
 (a) twisted pair
 (b) coaxial cable
 (c) fiber-optics
 (d) microwaves
54. Match with the suitable one
- | List-I | List-II |
|---------------------------|------------|
| A. cable TV network | 1. Simplex |
| B. Telephone network | 2. MAN |
| C. Microphone and speaker | 3. Duplex |
- (a) $A \rightarrow 3; B \rightarrow 1; C \rightarrow 2$
 (b) $A \rightarrow 3; B \rightarrow 2; C \rightarrow 1$
 (c) $A \rightarrow 2; B \rightarrow 3; C \rightarrow 1$
 (d) none of these
55. Which one is false?
 (a) optical fibre support higher bandwidth than COAXIAL
 (b) installation is a headache for optical fibre
 (c) fiber optic is bi-directional
 (d) MT-RJ is a connector used in fibre optic
56. Let N denotes the number of stations, P denotes propagation delay in the ring and T is the token holding time then to detect a missing token, the monitor maintains a timer equal to
 (a) $N \times T + P$ (b) $N(T + P)$
 (c) $N \times (T - 1) + P$ (d) $(N - 1) \times (T - 1) + P$
57. A 24 mbps token ring has a token holding time of 20 ms, then what is the longest frame that can be sent on the ring?
 (a) 48 KB (b) 60 KB
 (c) 32 KB (d) none of these
58. Consider building a CSMA/CD network at 1Gbps over a 1km cable with no repeaters. What is the minimum frame size? (Assume the signal speed in the cable is 200,000km / sec)
 (a) 1000 bits (b) 5000 bits
 (c) 10000 bits (d) 15000 bits
59. A 4-mbps token ring has a token holding time value of 10 msec. What is the longest frame (in bytes) that can be sent on this ring?
 (a) 40000 (b) 40 m
 (c) 5000 (d) none of these
60. Consider a token ring consisting of 20 stations with 10 mt distance between each. If propagation speed is 2×10^8 m/sc and per station has 5 bit delay, then what will be ring latency if ring band width is 10 mbps?
 (a) 7 μ s (b) 10 μ s
 (c) 11 μ s (d) none of these
61. Using 5 bit sequence numbers, what is the maximum size of the sender and receiver windows for stop and wait ARQ, Go-Back-N ARQ and selective repeat ARQ.
 (a) 2, 32, 32 (b) 2, 32, 16
 (c) 1, 32, 16 (d) 1, 31, 16

62. If M is the size of sequence number field in bits in selective repeat ARQ and Go-Back N ARQ, then what will be window size in these protocols respectively.
- (a) $2^m, 2^m$ (b) $2^{m-1}, 2^{m-1}$
 (c) $2^{m-1}, 2^{m-1}$ (d) $2^{m-1}, 2^{m-1}$
63. Station A needs to send a message consisting of 6 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 4th 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) 15 (b) 17
 (c) 11 (d) 25
64. Consider a network connecting two systems located 16000 km apart. The network uses go-back-n sliding window protocol. The bandwidth of the network is 10Mbps. If the packet size is 10kb and the propagation delay of the media is 2×10^8 mps, then the minimum size in bits of the sequence number field has to be if the network is to be used its full capacity _____.
- (a) 2 (b) 5
 (c) 6 (d) 3
65. Consider a node A is sending a bit pattern of 1010101010 to B and using CRC polynomial $x^4 + x + 1$ for error detection. Which of the following will be received by the receiver.
- (a) 10101010100000 (b) 10101010100101
 (c) 10101010100111 (d) 10101010100100
66. Suppose a message is sent by a node with data = 1001010101. If CRC error detection scheme is used with CRC generator G = 100110 then which one of the following will be sent
- (a) 10010101010000
 (b) 10010101001
 (c) 10010101011111
 (d) 1001010101100110
67. Suppose the round trip propagation delay for 10 Mbps ethernet having 48 bit jamming signal is 46.4μsec. the minimum frame size is :
- (a) 94 bits (b) 416 bits
 (c) 464 bits (d) 512 bits
68. Suppose the length of a 10 base 5 cable is 2500 m. If the speed of propagation in a thin coaxial cable is 2×10^8 m/sec., then how long does it take for a bit to travel from the beginning to the end of the network? (Assume there are 10μs delay in the equipment)
- (a) 12.5μsec. (b) 22.5μsec.
 (c) 2.5μsec. (d) 50μsec.
69. An ethernet MAC sublayer receives 1510 bytes of data from the upper layer.
- Which one of the following is true?
- (a) MAC sublayer of ethernet encapsulate the data in only one frame.
 (b) MAC sublayer of ethernet encapsulate the data in more than one frame of same size.
 (c) MAC sublayer of ethernet encapsulate the data in two frames of size 1518B and 28B
 (d) MAC sublayer of ethernet encapsulate the data in two frames of size 1518 B and 64B
70. In the ethernet, ratio of the useful data to the entire packet for the smallest and largest frame respectively are :
- (a) 71.9% and 98.8% (b) 100% for both
 (c) 39.1% and 70% (d) None
71. If an ethernet frame is received with destination address 07:01:02:03:04:05, then what is the type of destination address :
- (a) Unicast (b) Multicast
 (c) Broadcast (d) None
72. The address 43:7B:6C:DE:10:00 has been shown as the source address in an ethernet frame. The receiver will
- (a) Discards the frame
 (b) Accept the frame
 (c) Put the frame in queue
 (d) None

73. In a CSMA/CD network with a data rate of 10Mbps, the minimum frame size is found to be 512 bits for the correct operation of the collision detection process. What should be the minimum frame size if we increase the data rate to 1Gbps?
- (a) 512 bits (b) 5120 bits
 (c) 51200 bits (d) 512000 bits
74. One hundred stations on a pure ALOHA network share a 1Mbps channel. If frames are 1000 bits long, the throughput if each station is sending 10 frames per second will be
- (a) 18% (b) 38%
 (c) 13.5% (d) None
75. Which one of the following CRC generators guarantee the detection of a single bit error?
- (a) $x^4 + x^2$ (b) $x^3 + x + 1$
 (c) $x^3 + x^2$ (d) 1
76. A sender needs to send the four data items 0X3456, 0XABCC, 0X02BC, and 0XEEEE. the checksum at the sender side is :
- (a) 2E32 (b) D1CC
 (c) 2E33 (d) D1CD
77. In que. 31 if the receiver receives all data items without any error then the checksum at the receiver is
- (a) FFFF (b) 0000
 (c) 2E32 (d) 2E33
78. In que 31 if the second data item received by receiver is changed to 0XABCE then the checksum at the receiver side is
- (a) FFFD (b) FFF2
 (c) 0002 (d) 0000
79. A sender needs to send dat items 0X3456, 0XABCC, 0X02BC, 0XEEEE.
- If the receiver receives first, last and checksum (attached by sender) data items correctly but second data item is changed to 0XABCE and thire data item is changed to 0X02BA.
80. Which one of the following is true for simple-parity-check code.
- (a) A simple parity-check-code can detect only one bit error.
- (b) A simple parity-check-code can detect any odd number of errors.
 (c) A simple parity check can detect any even number of errors.
 (d) A simple parity check can detect both any odd number of errors and any even number of errors.
81. A pure ALOHA network transmits 200-bit frames on a shared channel of 200kbps. what is the throughput if the system (all stations together) produces 1000 frames per second.
- (a) 0.184 (b) 0.135
 (c) 0.152 (d) 0.368
82. If a slotted ALOHA networks transmits 200 bit frames on a shared channel of 200kbps, what is the throughput if the system produces 500 frames per second.
- (a) 30.3% (b) 36.8%
 (c) 19.5% (d) 18.4%
83. A sliding window protocol of 4Mbps point to point link has propogation delay of 0.5sec. Assume that each frame carries 2KB of data. What is the minimum no. of bits used for sequence number field if link is used at its full capacity.
- (a) 10 (b) 9
 (c) 12 (d) 8
84. A system uses the sliding window protocol is having a bandwidth of 10Mbps with a window size of 100. What is the size of the data if the distance between the sender and receiver is 72000km and the propogation speed is 3×10^8 m/sec?
- Given link utilization is 0.5.
- (a) 2048B (b) 3015B
 (c) 4096B (d) 4072B
85. 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

97. In Ethernet when Manchester encoding is used. The bit rate is
- Half the baud rate
 - Twice the baud rate
 - Same as the baud rate
 - None of these
98. The distance between two stations M and N is L kilometres. All frames are K bits long. The propagation delay per kilometre is t seconds. Let R bits/second be the channel capacity. Assuming that 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:
- $\left\lceil \log_2 \frac{2LtR+2K}{K} \right\rceil$
 - $\left\lceil \log_2 \frac{2LtR}{K} \right\rceil$
 - $\left\lceil \log_2 \frac{2LtR+K}{K} \right\rceil$
 - $\left\lceil \log_2 \frac{2LtR+K}{K} \right\rceil$
99. 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
- 125 bytes
 - 250 bytes
 - 500 bytes
 - None of these
100. In an Ethernet local area network, which one of the following statements is TRUE?
- A station stops to sense the channel once it starts transmitting a frame.
 - The purpose of the jamming signal is to pad the frames that are smaller than the minimum frame size.
 - A station continues to transmit the packet even after the collision is detected.
 - The exponential backoff mechanism reduces the probability of collision on retransmissions.
101. A computer network uses polynomials 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
- 01011011010
 - 01011011011
 - 01011011101
 - 01011011100

□□□

ANSWER KEY

1. Ans. (c)
2. Ans. (b)
3. Ans. (d)
4. Ans. (c)
5. Ans. (d)
6. Ans. (d)
7. Ans. (c)
8. Ans. (a)
9. Ans. (b)
10. Ans. (c)
11. Ans. (d)
12. Ans. (c)
13. Ans. (d)
14. Ans. (d)
15. Ans. (c)
16. Ans. (c)
17. Ans. (b)
18. Ans. (d)
19. Ans. (a)
20. Ans. (b)
21. Ans. (a)
22. Ans. (c)
23. Ans. (c)
24. Ans. (c)
25. Ans. (b)
26. Ans. (c)
27. Ans. (b)
28. Ans. (c)
29. Ans. (a)
30. Ans. (a)
31. Ans. (a)
32. Ans. (c)
33. Ans. (d)
34. Ans. (d)
35. Ans. (c)
36. Ans. (b)
37. Ans. (a)
38. Ans. (a)
39. Ans. (b)
40. Ans. (c)
41. Ans. (d)
42. Ans. (a)
43. Ans. (c)
44. Ans. (a)
45. Ans. (a)
46. Ans. (b)
47. Ans. (c)
48. Ans. (c)
49. Ans. (b)
50. Ans. (a)
51. Ans. (a)
52. Ans. (b)
53. Ans. (c)
54. Ans. (c)
55. Ans. (d)
56. Ans. (b)
57. Ans. (c)
58. Ans. (a)
59. Ans. (a)
60. Ans. (c)
61. Ans. (d)
62. Ans. (d)
63. Ans. (c)
64. Ans. (b)
65. Ans. (d)
66. Ans. (a)
67. Ans. (c)
68. Ans. (b)

69. Ans. (b)

70. Ans. (a)

71. Ans. (b)

72. Ans. (a)

73. Ans. (c)

74. Ans. (c)

75. Ans. (b)

76. Ans. (a)

77. Ans. (b)

78. Ans. (a)

79. Ans. (*)

80. Ans. (b)

81. Ans. (b)

82. Ans. (a)

83. Ans. (d)

84. Ans. (b)

85. Ans. (d)

86. Ans. (b)

In case of the selective Reject Protocol, the

$$\text{maximum window size} = \frac{2^n}{2} = 2^{n-1}$$

In the case of Selective Reject the window size will be half.

87. Ans. (a)

Generator polynomial is of degree 5 so append 5 '0's to the end of data and then divide new data by generator polynomial $x^5 + x^4 + x^2 + 1 = 110101$.

CRC (Remainder) is 01110

88. Ans. (d)

Efficiency of stop and wait

$$= 1(1 + 2a).$$

$$\text{If } 1/(1 + 2a) = 0.5$$

$$\Rightarrow 2*T_p = T_s$$

$$\Rightarrow L 2*B*T_p = 160 \text{ bits.}$$

89. Ans. (b)

Given round trip delay $t = 80 \text{ ms}$

$$= 80 \times 10^{-3} \text{ sec}$$

$$R = 128 \text{ kbps}$$

$$= 128 \times 10^3 \text{ bps}$$

$$L = Rt$$

$$= 128 \times 10^3 \times 80 \times 10^{-3}$$

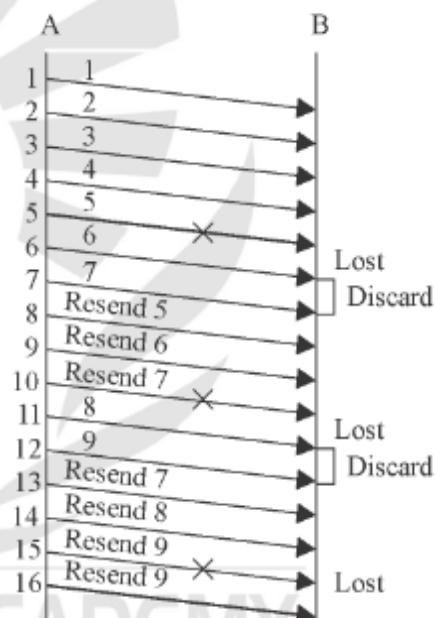
$$= 128 \times 80$$

So, optional window size = n

$$= \frac{128 \times 80}{32 \times 8} = \frac{10240}{256}$$

$$n = 40$$

90. Ans. (c)



91. Ans. (b)

$$P(x) = 11001001$$

Divisor D(x) = 1001 and CRC remainder is 011.

So the transmitted message is 11001001011.

92. Ans. (d)

The maximum hamming distance among the given code words is 8, i.e.

$$01010101$$

$$+ 10101010$$

$$\hline 11111111$$

The maximum number of bit errors that can be corrected are 'd'.

The hamming distance to correct the 'd' errors should be $2d + 1$.

$$\therefore 2d + 1 = 8$$

$$d = 7/2 = 3.5$$

$$d \leq 3$$

\therefore Maximum 3 bit errors can be corrected.

93. Ans. (b)

Input string : 0111110101

Output string: 01111100101

After five consecutive 1's in the input, bit 0 is inserted.

94. Ans. (d)

Given:

$$B = 10^6 \text{ bps}$$

$$\text{Distance} = 10000 \text{ km}$$

$$T_p = 2 \times 10^8 \text{ m/s}$$

$$L = 50000 \text{ B}$$

$$p = T_x = \frac{L}{B} = \frac{50000 \times 8}{100 \times 10^4}$$

$$= \frac{4}{10} \times \frac{10^3}{10^3}$$

$$= \frac{4000}{10} = 400 \text{ msec}$$

$$q = \frac{d}{v} = \frac{10000 \times 10^3}{2 \times 10^8}$$

$$= \frac{1}{20} = \frac{1}{20} \times \frac{10^3}{10^3}$$

$$= \frac{1000}{20} \text{ ms} = 50 \text{ ms}$$

95. Ans. (b)

There are two conditions when A will win the first back-off (0,1). In second back-off there are four conditions (0,1,2,3). If A choose 1, 0 in first then required probability

$$= \frac{1}{2} \cdot \frac{3}{4} + \frac{1}{2} \cdot \frac{1}{2} = \frac{3}{8} + \frac{1}{4} = \frac{3}{8} = 0.625$$

96. Ans. (a)

Let S is minimum packet size.

$$T_p = \frac{x}{1 \times 10^9 \text{ bps}}$$

$$T_p = (1 \text{ Km})/(2 \times 10^8 \text{ m/s}) \\ = 5 \times 10^{-6} \text{ seconds.}$$

Minimum frame size can be found by formula

$$T_x = 2 T_p S / 1 \text{ Gbps}$$

$$S = 10^9 \times 10^{-5} = 10^4 \text{ bits.}$$

97. Ans. (b)

In Manchester encoding, two signal changes to represent a bit. Therefore baud rate (number of signals/sec) = 2 * bit rate (number of bits/sec). Hence, bit rate is half the baud rate.

98. Ans. (c)



Frame size K bit long

Propagation delay t sec/km

Channel capacity = R bits/sec

$$U = \frac{\frac{w}{R} \text{ sec}}{\frac{K}{R} \text{ sec} + 2Lt}$$

$$l = \frac{\frac{wK}{R} \text{ sec}}{K + 2 Ltr}$$

$$w = \frac{K + 2 Ltr}{K}$$

$$2^n = \frac{K + 2 Ltr}{K}$$

$$n = \left[\log_2 \frac{K + 2 Ltr}{K} \right]$$

99. Ans. (b)

The minimum frame size for a CSMA/CD is

$$= 2 \times P_d \times BW$$

$$= 2 \times \frac{200}{2 \times 10^8} \times 1 \text{ Gbps}$$

$$= 2 \times 10^{-6} \times 10^9$$

$$= 2000 \text{ bits}$$

$$= 250 \text{ bytes}$$

100. Ans. (d)

Exponential back off algorithm reduce the possibility of collisions in next iteration.

101. Ans. (c)

$$\begin{aligned}\text{CRC generator} &= x^3 + x + 1 \\ &= 1.x^3 + 0.x^2 + 1.x^1 + 1.x^0 \\ &= 1011\end{aligned}$$

Data = 01011011

$$\begin{array}{r} 1011 \\ \hline 01011011000 \quad 0100011 \\ 0000 \\ \hline 1011 \\ 1011 \\ \hline 0000 \\ 0000 \\ \hline 0001 \\ 0000 \\ \hline 0011 \\ 0000 \\ \hline 0110 \\ 0000 \\ \hline 1100 \\ 1011 \\ \hline 1110 \\ 1011 \\ \hline 101 \end{array}$$

So the message 01011011 is transmitted as 01011011101.



ENGINEERS ACADEMY

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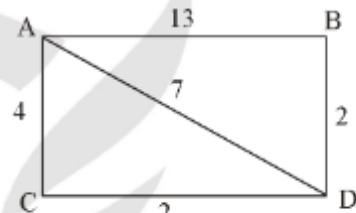
OBJECTIVE QUESTIONS

1. Which one of the following determines whether a network is classified as a LAN or WAN?
(a) distance and size (b) distance and time
(c) size and shape (d) topology and time
2. A network topology in which every system has a connection to every other system is referred to as a
(a) hybrid (b) full mesh
(c) bus (d) ring
3. Which one of the following network topologies requires the use of tap?
(a) ring (b) star
(c) bus (d) mesh
4. RIP is based on
(a) link state routing
(b) distance vector routing
(c) dijkstra's algorithm
(d) path vector routing
5. A router consults its routing table
(a) to determine voice of packet
(b) to determine data of packet
(c) to determine best path for a packet
(d) to determine how packet switching could work
6. In distance vector routing each router receives information directly from
(a) every router on the network
(b) every router less than two units away
(c) a table stored by the network hosts
(d) its neighbours only
7. A routing table contains
(a) the destination network ID
(b) the hop count
(c) next hop router ID
(d) all of these
8. Which of the following is an exterior routing protocol?
(a) RIP (b) OSPF
(c) BGP (d) all of these
9. OSPF is based on
(a) distance vector routing
(b) link state routing
(c) path vector routing
(d) none of these
10. BGP is based on
(a) distance vector routing
(b) link state routing
(c) path vector routing
(d) both (a) and (b)
11. Which of the following are not example of dynamic routing protocols?
(a) RIP (b) IPX
(c) ICMP (d) both (b) and (c)
12. Which of the following are examples of routed protocols?
(a) IP (b) IPX
(c) RIP (d) OSPF
13. _____ is the process of breaking down information sent or transmitted across the internet into small parts called packets.
(a) protocol
(b) bandwidth
(c) reformatting
(d) identification
14. Traffic descriptors are the
(a) qualitative value that represent a call flow
(b) qualitative value that represent a noise flow
(c) qualitative value that represent a bursty traffic
(d) qualitative value that represent a data flow

51. Find the mask that creates 30 subnets in class A
- (a) 255 . 255 . 240 . 0
 - (b) 255 . 255 . 0 . 0
 - (c) 255 . 248 . 0 . 0
 - (d) 255 . 240 . 0 . 0
52. What is the maximum number of subnets in class C using the mask:
255 . 255 . 255 . 240
- (a) 16
 - (b) 8
 - (c) 5
 - (d) 4
53. A class C network address has been subnetted with a /27 mask. Which of the following addresses is a broadcast address for one of the resulting subnets?
- (a) 192 . 57 . 78 . 33
 - (b) 192 . 57 . 78 . 64
 - (c) 192 . 57 . 78 . 97
 - (d) 192 . 57 . 78 . 159
54. Given the mask 255 . 255 . 254 . 0, how many hosts per subnet does this create?
- (a) 254
 - (b) 256
 - (c) 254
 - (d) 510
55. You have an IP host address of 201 . 222 . 5 . 121 and a subnet mask of 255 . 255 . 255 . 248. What is the broadcast address?
- (a) 201 . 222 . 5 . 127
 - (b) 201 . 222 . 5 . 120
 - (c) 201 . 222 . 5 . 121
 - (d) 201 . 222 . 5 . 122
56. What is the address of the last subnet?
- (a) 201 . 222 . 5 . 254
 - (b) 201 . 222 . 5 . 248
 - (c) 201 . 222 . 5 . 240
 - (d) none of these
57. What is the address of the 4th host of the 5th subnet?
- (a) 201 . 222 . 5 . 52
 - (b) 201 . 222 . 5 . 8
 - (c) 201 . 222 . 5 . 36
 - (d) 201 . 222 . 5 . 44
58. Which addresses are valid host addresses?
- 1. 201 . 222 . 5 . 17
 - 2. 201 . 222 . 5 . 18
 - 3. 201 . 222 . 5 . 16
 - 4. 201 . 222 . 5 . 19
 - 5. 201 . 222 . 5 . 31
- (a) 1, 2, 4
 - (b) 1, 2, 5
 - (c) 2, 4, 5
 - (d) 3, 4, 5
59. What is the subnetwork address for a host with IP address 165 . 100 . 5 . 68/28
- (a) 165 . 100 . 5 . 0
 - (b) 165 . 100 . 5 . 32
 - (c) 165 . 100 . 5 . 64
 - (d) 165 . 100 . 5 . 65
60. Which of the following IP addresses are considered “Network” address with a /26 prefix?
- (a) 165 . 203 . 5 . 192
 - (b) 65 . 203 . 6 . 63
 - (c) 165 . 203 . 6 . 191
 - (d) 165 . 203 . 8 . 255
61. The IP network 192 . 168 . 130 . 0 is using the subnet mask 255 . 255 . 255 . 224, what are the possible hosts on this network?
- (a) 192 . 165 . 130 . 10 & 192 . 168 . 130 . 250
 - (b) 192 . 165 . 130 . 67 & 192 . 168 . 130 . 93
 - (c) 192 . 165 . 130 . 199 & 192 . 168 . 130 . 222
 - (d) none of these
62. You have been asked to create a subnet that supports 16 hosts. What subnet mask should you use?
- (a) 255 . 255 . 255 . 252
 - (b) 255 . 255 . 255 . 248
 - (c) 255 . 255 . 255 . 240
 - (d) 255 . 255 . 255 . 224

63. You are a network administrator and have been assigned the IP address of 201 . 222 . 5 . 0. You need to have 20 subnets with 6 hosts per subnet. What subnet mask will you use?
- 255 . 255 . 255 . 248
 - 255 . 255 . 255 . 128
 - 255 . 255 . 255 . 192
 - 255 . 255 . 255 . 240
64. Identify three valid hosts in any subnet of 192 . 168 . 32 . 0, assuming the subnet mask used is 255 . 255 . 255 . 240
- 192 . 168 . 32 . 33
 - 192 . 168 . 32 . 112
 - 192 . 168 . 32 . 119
 - 192 . 168 . 32 . 126
 - 192 . 168 . 32 . 175
 - 192 . 168 . 32 . 208
- 1, 3 and 5
 - 1, 3 and 4
 - 2, 4, 5
 - 1, 2, 3, 4
65. An ISP has a block with block ID 193.1.2.0/24, the number of bits reserved for host ID and the number of hosts possible are
- $16, 2^{24}-2$
 - $8, 2^8-2$
 - $9, 2^{32}-2$
 - $16, 2^{16}-2$
66. In the above question, if ISP wants to divide the block between three organizations having the requirement 120, 60 and 60, then block ID's for the organizations can be:
- 193.1.2.0/25, 193.1.2.28/26, 193.1.2.192/26
 - 193.1.2.0/120, 193.1.2.128/60, 193.1.2.192/60
 - 193.1.2.128/25, 193.1.2.64/26, 193.1.2.0/26
 - Both (a) and (b)
67. If a class B network is divided into subnets, and the subnet mask is 255.255.192.0, then how many subnets and hosts per subnet are possible
- $4, 2^{14}$
 - 4, 16
 - 16, 16
 - $4, 2^{14}-2$
68. An IPV4 packet has the first few hexadecimal digits as shown below :
- 0X4500005C000300005906...
- How many hops can this packet take before being dropped?
- 30
 - 59
 - 89
 - 90
69. An IPV4 datagram has arrived in which the offset value is 800, the value of HLEN is 8 and the value of the total length field is 500 and the M bit is 0. What are the numbers of the first byte, last byte and the position of the datagram?
- 6400, 6867 and last fragment
 - 6400, 6867 and first fragment
 - 6400, 6867 and last fragment
 - 801, 1268 and first fragment
70. The following is a dump of UDP header in hexadecimal format
- 5EFA00FD001C3297
- What is the total length of user datagram? Is the packet from client to server or vice versa?
- 30 bytes and packet is going from client to server
 - 28 bytes and packet is going from client to server
 - 30 bytes and packet is going from server to client
 - 28 bytes and packet is going from server to client
71. An organization is granted the block 150.36.0.0/16. The administrator wants to create 512 subnets, what is the subnet mask?
- 255.255.255.128/25
 - 255.255.255.192/26
 - 255.255.255.224/27
 - 255.255.255.240/28

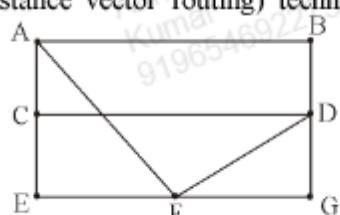
72. In above question what will be the number of address in each subnet, first and last address in first subnet respectively :
- 128, 150.36.0.1 and 150.36.0.127
 - 128, 150.36.0.129 and 150.36.0.255
 - 126, 150.36.0.1 and 150.36.0.126
 - 126, 150.36.0.129 and 150.36.0.254
73. The routing table of a router is shown as below:
- | Destination | Subnet Mask | Interface |
|-------------|-----------------|-----------|
| 128.75.43.0 | 255.255.255.0 | Eth 0 |
| 128.75.43.0 | 255.255.255.128 | Eth 1 |
| 192.12.17.5 | 255.255.255.255 | Eth 2 |
| Default | | Eth 3 |
- On which interface will the router forward packets addressed to destinations 128.75.43.16 and 192.12.17.0 respectively?
- Eth 1 and Eth 3
 - Eth 0 and Eth 1
 - Eth 0 and Eth 2
 - Eth 1 and Eth 2
74. Suppose a subnet 'X' has a subnet mask 255.255.192.0 and a system A has IP 157.106.46.234.
- Which of the following belongs to same network A?
- 157.106.65.03
 - 157.106.142.77
 - Both a & b
 - None
75. IP packets whose total length (data plus packet) is 16 kb passing out of a router live for 15 seconds. The maximum line speed (in MBPS) of the router can operate at without cycling through the IP datagram identification number space is?
- 68.266
 - 57.233
 - 8.533
 - 10.333
76. Consider a three stage 200×200 switch with 20 input lines and 4 cross bars at middle stage.
- Total number of crosspoints will be :
- 400
 - 2000
 - 1600
 - 1200
77. 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:
- Last fragment, 2400 and 2789
 - First, 2400 and 2759
 - Last, 2400 and 2759
 - Middle, 300 and 689
78. Host A sends UDP datagram containing 8880B of user data to host B over an ethernet LAN. Ethernet frames may carry data up to 1500 bytes (MTU = 1500B) size of UDP header is 8B and size of IP header is 20B. There is no option field in the IP header. How many total number of IP fragments will be transmitted and what will be the contents of offset field in last fragment?
- 6 and 925
 - 6 and 7400
 - 7 and 1110
 - 7 and 8880
79. Consider the following network :
-



Using distance vector routing, the distance to 'B' that 'A' will store initially in its routing table _____ and once the router have been converged, the distance to B that A will store in its routing table is _____.

- 9 and 8
- 13 and 9
- 13 and 8
- 13 and 13

80. For the network given below, the routing table of the nodes A, E, D and G are shown. Suppose that F has estimated its delay to its neighbours A, E, D and G are 8, 10, 12 and 6 msec respectively and update its routing table by using DVR (Distance vector routing) technique.



Routing tables :

A	E	D	G
A	24		
B	40	20	21
C	14	8	24
D	17	30	22
E	21	0	19
F	9	14	22
G	24	7	10
		F	0
		G	22

Which one of the following options represents the updated routing table of F :

A	E
A	0
B	40
C	14
D	17
E	21
F	9
G	24

D	G
A	20
B	8
C	30
D	0
E	14
F	7
G	22

(a)	(b)																												
<table border="1"> <tr><td>A</td><td>0</td></tr> <tr><td>B</td><td>40</td></tr> <tr><td>C</td><td>14</td></tr> <tr><td>D</td><td>17</td></tr> <tr><td>E</td><td>21</td></tr> <tr><td>F</td><td>9</td></tr> <tr><td>G</td><td>24</td></tr> </table>	A	0	B	40	C	14	D	17	E	21	F	9	G	24	<table border="1"> <tr><td>A</td><td>24</td></tr> <tr><td>B</td><td>27</td></tr> <tr><td>C</td><td>7</td></tr> <tr><td>D</td><td>20</td></tr> <tr><td>E</td><td>0</td></tr> <tr><td>F</td><td>11</td></tr> <tr><td>G</td><td>22</td></tr> </table>	A	24	B	27	C	7	D	20	E	0	F	11	G	22
A	0																												
B	40																												
C	14																												
D	17																												
E	21																												
F	9																												
G	24																												
A	24																												
B	27																												
C	7																												
D	20																												
E	0																												
F	11																												
G	22																												
(c)	(d)																												
<table border="1"> <tr><td>A</td><td>20</td></tr> <tr><td>B</td><td>8</td></tr> <tr><td>C</td><td>30</td></tr> <tr><td>D</td><td>0</td></tr> <tr><td>E</td><td>14</td></tr> <tr><td>F</td><td>7</td></tr> <tr><td>G</td><td>22</td></tr> </table>	A	20	B	8	C	30	D	0	E	14	F	7	G	22	<table border="1"> <tr><td>A</td><td>21</td></tr> <tr><td>B</td><td>24</td></tr> <tr><td>C</td><td>22</td></tr> <tr><td>D</td><td>19</td></tr> <tr><td>E</td><td>22</td></tr> <tr><td>F</td><td>10</td></tr> <tr><td>G</td><td>0</td></tr> </table>	A	21	B	24	C	22	D	19	E	22	F	10	G	0
A	20																												
B	8																												
C	30																												
D	0																												
E	14																												
F	7																												
G	22																												
A	21																												
B	24																												
C	22																												
D	19																												
E	22																												
F	10																												
G	0																												

81. Which of the following statements is/are true about distance vector routing and link state routing.

- (i) Count to infinity is a problem only with DV (Distance Vector), not LS (Link State).
 - (ii) In LS, shortest path algorithm is run only at one node.
 - (iii) In DV, the shortest path algorithm, run only at one node.
 - (iv) DV requires lesser number of messages than LS.
- (a) (i), (ii) and (iv) (b) (i), (iii) and (iv)
 (c) (ii) and (iii) only (d) (i) and (iv) only

82. In an IPV4 packet, the value of HLEN is 15, and the value of the total length field is 0X0064. How many bytes of data are being carried by this packet?

- (a) 85B (b) 49B
 (c) 40B (d) 20B

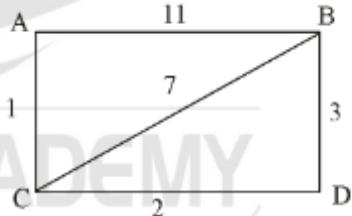
83. A building running CSMA-CD protocol is having a bandwidth of 512 Mbps and distance of 2km. then determine the minimum data size in order to detect a collision. Assume that the signal speed is 2,00,000 km/sec.

- (a) 1000B (b) 1250B
 (c) 1280B (d) 1024B

84. Two hosts are connected via a packet switch with 10^7 bits per second links. Each link has a propagation delay of $20\mu\text{sec}$. The switch begins forwarding a packet $35\mu\text{sec}$ 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 _____.

85. Resource reservation is a feature of :
 (a) Circuit switching (b) Packet switching
 (c) Both (a) and (b) (d) None

86. Consider a network with four nodes as following :



If distance vector routing (DRV) is applied, how many edges go unused?

- (a) 1 (b) 2
 (c) 3 (d) 4

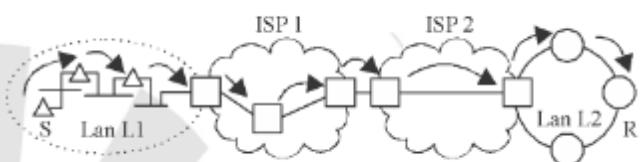
87. In OSPF, which of the following router should be in area zero?

- (a) Area border router
 (b) Designated router
 (c) Backbone router
 (d) Boundary router

88. In a network of LANs connected by bridges, packets are sent from one LAN to another through intermediate bridges. Why is the spanning tree algorithm used for bridge routing?
- For shortest path routing between LANs
 - For avoiding loops in the routing paths
 - For fault tolerance
 - For minimizing collisions
89. What is the primary purpose of ARP?
- Translate URLs to IP address.
 - Resolve IPV4 addresses to MAC addresses
 - Provide dynamic IP configuration to network devices
 - Convert internal private address to external public address.
90. Match the following :
- Column-I (Protocol)**
- (A) Border gateway protocol
 - (B) Open shortest path first protocol
 - (C) Routing information protocol
- Column-II (Routing Algorithms)**
- (i) Distance vector routing
 - (ii) Link state routing
 - (iii) Path vector routing
- (A-i), (B-ii), (C-iii)
 - (A-iii), (B-i), (C-ii)
 - (A-ii), (B-iii), (C-i)
 - (A-iii), (B-ii), (C-i)
91. Which of the following assertions is FALSE about the Internet Protocol (IP)?
- It is possible for a computer to have multiple IP addresses
 - IP packets from the same source to the same destination can take different routes in the network
 - IP ensures that a packet is forwarded if it is unable to reach its destination within a given number of hops
 - The packet source cannot set the route of an outgoing packets; the route is determined only by the routing tables in the routers on the way
92. Which one of the following statements is FALSE?
- TCP guarantees a minimum communication rate
 - TCP ensures in-order delivery
 - TCP reacts to congestion by reducing sender window size
 - TCP employs retransmission to compensate for packet loss
93. 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?
- 14
 - 30
 - 62
 - 126
94. An organization has a class B network and wishes to form subnets for 64 departments. The subnet mask would be
- 255.255.0.0
 - 255.255.64.0
 - 255.255.128.0
 - 255.255.252.0
95. Which of the following statements is TRUE?
- Both Ethernet frame and IP packet include checksum fields
 - Ethernet frame includes a checksum field and IP packet includes a CRC field
 - Ethernet frame includes a CRC field and IP packet includes a checksum field
 - Both Ethernet frame and IP packet include CRC fields
96. For which one of the following reasons does Internet Protocol (IP) use the time-to-live (TTL) field in the IP datagram header?
- Ensure packets reach destination within that time
 - Discard packets that reach later than that time
 - Prevent packets from looping indefinitely
 - Limit the time for which a packet gets queued in intermediate routers

97. 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 subnet and the maximum number of hosts in each subnet?
- 62 subnets and 262142 hosts
 - 62 subnets and 262142 hosts
 - 62 subnets and 1022 hosts
 - 62 subnets and 1024 hosts
98. 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?
- 1022
 - 1023
 - 2046
 - 2047
99. One of the header field in an IP datagram is the Time-to-Live (TTL) field. Which of the following statements best explains the need for this field?
- It can be used to prioritize packets
 - It can be used to reduce delays
 - It can be used to optimize throughput
 - It can be used to prevent packet looping
100. In the IPv4 addressing format, the number of networks allowed under Class C addresses is
- 2^{14}
 - 2^7
 - 2^{21}
 - 2^{24}
101. 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
- Last fragment, 2400 and 2789
 - First fragment, 2400 and 2759
 - Last fragment, 2400 and 2759
 - Middle fragment, 300 and 689

102. 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 links within each ISP and across the two ISPs, are all point-to-point optical links. The initial value of the TTL field is 32. The maximum possible value of the TTL field when R receives the datagram is _____.
- 28
 - 30
 - 26
 - 29



103. An IP router implementing 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 _____.

- 3
- 5
- 2
- 1

104. 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

- MF bit : 0, Datagram Length : 1444; Offset: 370
- MF bit : 1, Datagram Length : 1424; Offset: 185
- MF bit : 1, Datagram Length : 1500; Offset: 370
- MF bit : 0, Datagram Length : 1424; Offset: 2960

ANSWER KEY

1. Ans. (a) 31. Ans. (d)
2. Ans. (b) 32. Ans. (d)
3. Ans. (c) 33. Ans. (a)
4. Ans. (b) 34. Ans. (a)
5. Ans. (c) 35. Ans. (a)
6. Ans. (d) 36. Ans. (b)
7. Ans. (d) 37. Ans. (d)
8. Ans. (c) 38. Ans. (d)
9. Ans. (b) 39. Ans. (a)
10. Ans. (c) 40. Ans. (c)
11. Ans. (d) 41. Ans. (d)
12. Ans. (a) 42. Ans. (d)
13. Ans. (c) 43. Ans. (a)
14. Ans. (d) 44. Ans. (c)
15. Ans. (b) 45. Ans. (a)
16. Ans. (b) 46. Ans. (b)
17. Ans. (a) 47. Ans. (a)
18. Ans. (a) 48. Ans. (a)
19. Ans. (b) 49. Ans. (a)
20. Ans. (b) 50. Ans. (a)
21. Ans. (a) 51. Ans. (c)
22. Ans. (a) 52. Ans. (a)
23. Ans. (d) 53. Ans. (d)
24. Ans. (a) 54. Ans. (d)
25. Ans. (c) 55. Ans. (a)
26. Ans. (c) 56. Ans. (c)
27. Ans. (c) 57. Ans. (d)
28. Ans. (a) 58. Ans. (a)
29. Ans. (a) 59. Ans. (c)
30. Ans. (d) 60. Ans. (a)

61. *Ans. (a)*
 62. *Ans. (d)*
 63. *Ans. (a)*
 64. *Ans. (b)*
 65. *Ans. (b)*
 66. *Ans. (d)*
 67. *Ans. (d)*
 68. *Ans. (c)*
 69. *Ans. (c)*
 70. *Ans. (b)*
 71. *Ans. (a)*
 72. *Ans. (d)*
 73. *Ans. (a)*
 74. *Ans. (d)*
 75. *Ans. (c)*
 76. *Ans. (b)*
 77. *Ans. (c)*
 78. *Ans. (c)*
 79. *Ans. (c)*
 80. *Ans. (a)*
 81. *Ans. (d)*
 82. *Ans. (c)*
 83. *Ans. (c)*
 84. *Ans. (1575)*
 85. *Ans. (a)*
 86. *Ans. (b)*
 87. *Ans. (c)*
 88. *Ans. (b)*
 89. *Ans. (b)*
 90. *Ans. (d)*

91. *Ans. (d)*

Consider each choice separately

Choice (a): It is possible for a computer to have multiple IP addresses-IP addresses specify the network connection not to a host computer so if a host computer moves from one network to another, its IP address must change. In the network the IP address for a computer is unique but when we move the host computer from one network to another network, its IP address must be changed.

Choice (b) : IP packets from the same source to the same destination can take different routes in the network. In packet switching network the routes are determined by routing algorithms. It may be possible that different network follow different routing algorithms so the statement is true.

Choice (c) : IP ensures that a packet is discarded if it is unable to reach its destination within a given number of hops, so statement is true.

Choice (d) : The packet source cannot set the route of an outgoing packet, the route is determined only by the routing table in the routers on the way. The usual IP routing algorithm employs an internet routing table on each machine (computer) that stores information about possible destination and how to reach them. Because both hosts (computer) and routers route datagrams both have IP routing tables so the statement is false.

92. *Ans. (a)*

Some of the services that TCP does not provide: it does not guarantee a minimum transmission rate, a sending process is not permitted to transmit at any rate it wishes, the sending rate is regulated by TCP congestion control, or it may force the sender to send at a low average rate. Hence 1st statement is false. All other statements are true.

93. *Ans. (c)*

Since you have 6 subnet bits so we can make $(64-2) = 62$ hosts.

94. *Ans. (d)*

In a class B network initial two octets are all 1's but the third octet specifies the physical network for subnet of 64 department or 2^6 so initial 6 bits of third octet are 1's.

11111111.11111111.11111100.00000000

255.255.252.0

95. *Ans. (c)*

Ethernet uses a Cyclic Redundancy Check (CRC) algorithm to detect transmission errors. The Internet Protocol (IP) and most higher-layer protocols of the Internet Protocol Suite (ICMP, IGMP, UDP, UDP-Lite, TCP) use a common checksum algorithm to validate the integrity of the packets that they exchange.

96. *Ans. (c)*

The class B is defined as follows

0	16	31	
1	0	netid	hostid

Maximum number of subnets

$$= 2^6 - 2 = 64 - 2 = 62$$

Maximum number of hosts in each subnet

$$= 2^{16-6} - 2 = 2^{10} - 2 = 1022$$

97. *Ans. (c)*

11111111111111111111111100000000000000

So the number of hosts per subnet

$$= 2^{11} - 2 = 2048 - 2 = 2046$$

98. *Ans. (c)*

The class B is defined as follows

0	16	31	
1	0	netid	hostid

Maximum number of subnets

$$= 2^6 - 2 = 64 - 2 = 62$$

Maximum number of hosts in each subnet

$$= 2^{16-6} - 2 = 2^{10} - 2 = 1022$$

99. *Ans. (c)*

11111111111111111111111100000000000000

So the number of hosts per subnet

$$= 2^{11} - 2 = 2048 - 2 = 2046$$

100. *Ans. (d)*

In the IP datagram there is time to live (TTL) field. It is mainly used to prevent packet looping. Means every packet is associated with certain time stamp. If one packet is received after certain time stamp (TTL) then this packet discarded so it can be used to prevent packet looping.

101. *Ans. (c)*

No. of Network in class 'C' are 2^{21} as in class 'C' there

24 bits 8bits

Net id host id

out of 24 bits 3-bits are used for representation class 'C' i.e. 110

∴ 21 bits with 21 bits we can make 2^{21} networks.

102. *Ans. (c)*

M = 0 : Means no more fragmentation so it represent the last fragment.

HLEN = 10 :

Header length = $10 \times 4 = 40$ bytes

Payload : $400 - 40 = 360$ bytes [0 to 359]

Fragment offset: = 300 means 300×8

= 2400 bytes

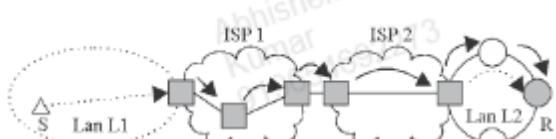
Sequence number of first fragment = 2400

Sequence number of last fragment

$$= 2400 + 359 = 2759$$

Option (c) is correct.

103. (c)



$32 - 6 = 26$ is maximum possible value of TTL.

104. (d)

131.23.151.76 = 10000011.00010111.

10010111.01001100

131.16.0.0/12 = 10000011.0001

0000.0000 0000.00000000

131.22.0.0/15 = 10000011.00010110.

00000000.00000000

Longest prefix match is : 131.22.0.0/15

∴ Interface 1 will be selected to forward the packet.



TCP AND NETWORK SECURITY

OBJECTIVE QUESTIONS

CHAPTER

4

1. For a system using TCP, the sender window size is determined by _____ window size
- Receiver
 - Sender
 - Congestion
 - 1 and 2 only
 - 2 and 3 only
 - 1 and 3 only
 - 1, 2 and 3
2. What flag is used to take care of “out of band” data, in TCP header
- RST
 - SYN
 - FIN
 - URG
3. What are the protocol parameters that might be negotiated when a connection is set up?
- Window size, maximum packet size and total data size
 - MSS, timer values and total data size
 - Window size, maximum packet size and total number of packets
 - MSS, timer values, Window size
4. TCP operates over a 40 gbps link. If TCP uses the full bandwidth continuously, how long would it take the sequence numbers to wrap around completely.
- 962 ms
 - 330 ms
 - 859 ms
 - 642 ms
5. Consider the following fields in IP header and choose correct combination:

List-I		List-II	
P.	MF	1.	Zero for first fragment
Q.	DF	2.	It must be available in all fragments
R.	Offset	3.	If it is '1', then fragmentation is not allowed
S.	Strict source routing	4.	Zero for last fragment

Codes: P Q R S

(a) 3	1	4	2
(b) 2	3	1	4
(c) 4	3	1	2
(d) 4	3	2	1

6. What are the reasons for “Silly Window Syndrome”?
- Receiver announces advertised window as zero
 - Client generates only one byte at a time
 - Router process only one byte data at a time
 - Server consumes only one byte at a time
 - 1, 2, 3 are the reasons
 - 1, 2 are the reasons
 - 1, 2, 4 are the reasons
 - 1, 2, 3, 4 are the reasons
7. Match the following with correct combination

List-I	List-II
P. Time out for ACK as per Jacobson's algorithm in TCP is	1. 0.0.0.0
Q. Default subnet mask for class B address	2. 0.0.0.100
R. Valid source address	3. 255.255.0.0
S. Subnet mask for default route	4. 255.0.0.0

Codes: P Q R S

(a) 5	3	2	4
(b) 6	3	2	1
(c) 6	3	2	4
(d) 5	3	2	1

8. How many number of hosts and usable hosts a network can have with /21 notation
 (a) 1024, 1022 (b) 1022, 1024
 (c) 2046, 2048 (d) 2048, 2046
9. Using the IP address 172.168.42.58 and subnet mask 255.255.252.0, identify the correct subnet ID and directed broadcast address.
 (a) The correct network ID is 172.168.40.0, and the broadcast address is 172.168.255.255
 (b) The correct network ID is 172.168.40.0, and the broadcast address is 172.168.43.255
 (c) The correct network ID is 172.168.40.0, and the broadcast address is 172.168.44.255
 (d) The correct network ID is 172.168.40.0, and the broadcast address is 172.169.43.255
10. A TCP session sends 10 packets per second over an Ethernet Local Area Network(LAN). Each Ethernet packet has payload of 1466. What therefore is the TCP throughput of the session?
 (a) 100 kbps (b) 114 kbps
 (c) 140 kbps (d) 175 kbps
11. Consider a network 219.7.9.0 and subnet mask 255.255.255.248
 TCP uses stop and wait protocol to control the flow between sender and receiver. TCP advertises its empty space at receiver's side in terms of "Advertised Window", then sender computes "Effective Window". Which is correct from the following
 (a) Effective Widow = Advertised Window (Last byte sent + Last byte acked)
 (b) Effective widow = Advertised window - (Last byte sent - Last byte acked)
 (c) Effective widow = Advertised window + (Last byte sent - Last byte Acked)
 (d) It cannot be calculated
12. In 45 mbps line, how long it takes to wrap around the 32 bit sequence number space.
 (a) 14.72 seconds (b) 12.72 minutes
 (c) 6.72 hrs (d) 14.72 minutes
13. Suppose that the TCP congestion window is set to 36 KB and a time out occurs. How big will the window be if the next four transmission bursts are all successful? Assume that the maximum segment size is 1 KB
 (a) 8 KB (b) 16 KB
 (c) 4 KB (d) 32 KB
14. Assume that the IP address is 108.77.51.70 and subnet mask is 255.255.128.0. What is the subnet number and host number?
 (a) 108.77.0.0, 0.0.51.70
 (b) 0.0.51.70, 108.77.0.0
 (c) 0.77.0.0, 0.0.51.70
 (d) 0.0.51.70, 0.77.0.0
15. TCP uses timer to calculate time out for every transmission. The initial deviation for the system is 5, smoothing factor $\alpha = 0.9$ and initial RTT is 30 msec. Calculate estimated RTT, if you get ACK at 40 msec.
 (a) 27 msec (b) 31 msec
 (c) 30 msec (d) 4 msec
16. Why do you think IPV4 has fragment reassembly done at the end point, rather than at the next hop router?
 (a) Fragment may follow the same route
 (b) Fragments may follow the different routes
 (c) Different networks will have the same MTU size
 (d) Intermediate routers do not know the reassemble algorithm
17. TCP timer management maintains an ACK timer to keep track RTT. Assume IRTT = 30 msec and ACK arrives at 40 msec. If initial deviation is 5 msec and smoothing factor is 0.9 then, what is the time out period for the next transmission?
 (a) 53 msec (b) 53 sec
 (c) 62 msec (d) 31 msec

18. An organization has network growth plans as follow:

Network A: Starts with 20 systems and may go maximum up to 100

Network B : 150 systems

Network C : Every month 20 systems will be added.

Give an appropriate supernet mask for the organization network to handle the situation for next three years.

- (a) 255.255.255.0 (b) 255.255.0.0
 (c) 255.255.252.0 (d) 255.255.0.252

19. Match the following

List-I (Protocols)	List-II (Port number)
P. DNS	1. 23
Q. DHCP	2. 53
R. IMAP	3. 67
S. POP3	4. 68
	5. 110
	6. 143

Codes: P Q R S

- (a) 3 4 5 6
 (b) 2 3 5 6
 (c) 2 4 6 5
 (d) 1 3 6 5

20. Using the IP address 12.14.14.22/22, identify which of the following statements are true. Choose the appropriate answer.

- (a) This address and mask will yield a total of 1022 usable hosts per network, with 16,384 usable sub networks
 (b) This is a class A address with 22 bits masked for subnetting, which will yield 8 host bits for a total of 1024 hosts per network, with 64 total sub networks
 (c) This is a class A address that is using 14 bits for subnetting, and leaving 8 host bits
 (d) There are 22 bits masked with this class B IP address, offering us 8 host bits for a total of 1020 hosts per network, with 64 total sub networks

21. While establishing TCP connection, sender and receiver have decided to have 48 KB as window size. To control congestion, congestion widow is set to one MSS = 1 KB. At one point of time when TCP is in slow start phase, receiver has received 8 acknowledgements. How many number of packets would be transmitted in next communication?

Assume no error or lost packets in communication

- (a) 8 (b) 16
 (c) 24 (d) 18

22. Which one of the following is included in a packet header to ensure that data split over several packets is reassembled in the correct order?

- (a) checksum (b) sequence number
 (c) packet number (d) source address

23. Slow start and multiplicative decrease both are the solutions of

- (a) silly window syndrome
 (b) congestion control
 (c) leaky bucket
 (d) none of these

24. Which of the following is the functionalities of TCP timers?

- (a) retransmission (b) persistence
 (c) keep alive (d) all of these

25. Karn's algorithm is used in calculation by the timer.

- (a) retransmission
 (b) persistence
 (c) keep alive
 (d) time waited

26. Which of the following is NOT a function of TCP?

- (a) binding physical addresses to IP address
 (b) reassembling segments
 (c) acknowledging receipt of segments
 (d) retransmission of segments

27. The following is a dump of UDP header in the hexadecimal format :
5EFA00FD001C3297
What is the total length of user datagram? Is the packet from client to server or vice versa?
 (a) 30 bytes and packet is going from client to server
 (b) 28 bytes and packet is going from client to server
 (c) 30 bytes and packet is going from server to client
 (d) 28 bytes and packet is going from server to client
28. If size of a TCP segment is 1KB and header length value is 6, the sequence number = 3500, given that URG flag = 1 and URG pointer = 45, then what is the total size of data, number of bytes of urgent data, sequence numbers of urgent data.
 (a) Data size = 1024B, Urgent data = 45B, Sequence no. 3500-3544
 (b) Data size = 1000B, Urgent data = 45B, Sequence no. 1024-1069
 (c) Data size = 1024B, Urgent data = 46B, Sequence no. 1024-1070
 (d) Data size = 1000B, Urgent data = 46B, Sequence no. 3500-3545
29. Wrap around time in TCP depends on
 (a) Sequence number bits
 (b) Bandwidth
 (c) Both (a) and (b)
 (d) None
30. Which of the following is true about TCP?
 (i) It is a byte oriented port to port communication.
 (ii) It uses a combination of SR and Go-back N for flow control
 (iii) Its connections are link to link full duplex.
 (iv) It uses piggy backing whenever possible
 (a) (i), (iii) and (iv) (b) (i), (ii), and (iv)
 (c) (ii), (iii) and (iv) (d) All are true
31. If RTT = 45 sec, NRTT = 60 sec., $\alpha = 0.9$ and initial deviation = 8sec.
Then timeout is
 (a) 80.5sec (b) 81.3sec
 (c) 82.5sec (d) 80.0sec
32. What is the value of symmetric key in the diffie-hellmen protocol if A and B want to exchange the key.
Given that A chooses $X_A = 3$ and B chooses $X_B = 7$, $\alpha = 7$, $P = 23$
 (a) 17 (b) 21
 (c) 13 (d) 10
33. Given that the maximum lifetime of a segment is 30sec and link capacity is 500 Mbps.
The number of bits required to avoid wrap around during this time is
 (a) 10 bits (b) 23 bits
 (c) 30 bits (d) 31 bits
34. Consider a token ring with a data rate of 250 Mbps, a ring latency of 120 μ sec and 500 bit packets. Assume N hosts wants to transmit and each holds the token for a maximum of frame transmission time. The efficiency of the token ring is
 (a) $\frac{N}{7N+6}$ (b) $\frac{50N}{7N+6}$
 (c) $\frac{50N}{N+6}$ (d) $\frac{N}{N+6}$
35. If bandwidth of token ring is 48 Mbps and token holding time is 5ms, then minimum and maximum payload in bytes are
 (a) 46,24000 (b) 0,30000
 (c) 21,19982 (d) 0,29979
36. Calculate the effective throughput for transferring a 1000 KB file using TCP slow start congestion control technique. Given the round trip time is 100ms and maximum segment size is 1460 bytes. Assume there are no losses and both the bandwidth and the receiver window size is infinite.
 (a) 5MBps (b) 10Mbps
 (c) 1MBps (d) 1Mbps

37. 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 first and second segments are 750 and 870 respectively. The first segment was lost, but second was received correctly by the receiver. Let X be the amount of data carried in first segment(in Bytes), Y be the ACK number sent by the receiver.
The value of X and Y respectively are :
(a) 120 and 870 (b) 120 and 990
(c) 750 and 990 (d) 120 and 750
38. The transport layer protocols used for real time multimedia, FTP, 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
39. The packets of 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
40. In TCP, the sequence number given to a segment is sequence number of _____ byte.
(a) First byte (b) Last byte
(c) Middle byte (d) None of these
41. In public key and private key cryptography, if 'A' has P_{A_1} and P_{A_2} as public and private keys respectively and if 'B' has P_{B_1} and P_{B_2} as public key and private keys respectively, if 'A' wants to send a message to 'B' securely then 'A' will use which key for encryption.
(a) P_{A_1} (b) P_{A_2}
(c) P_{B_1} (d) P_{B_2}
42. In a IP datagram, a TCP segment is present. Header length field in IP datagram is 5. Total length of IP datagram is 1000B. Header length field in TCP header is 7. Then what is the size of TCP data present in the datagram.
(a) 988 (b) 952
(c) 964 (d) 900
43. Assume the receiver capacity is 16 mss. If the slow start phase starts with 1 mss and no congestion is detected until maximum receiver capacity is reached. After how many RTT's maximum receiver capacity is reached?
(a) 9 (b) 10
(c) 11 (d) 12
44. When a datagram is fragmented which of the following field may change?
(a) Fragment offset
(b) More fragment (MF) flag
(c) Total length
(d) All of the above
45. Suppose a TCP connection is transferring a file of 5000 bytes. The first byte is numbered 10,001. What are the sequence numbers for 3rd segment if data are sent in five segments, each carrying 1000 bytes ?
(a) 12,000
(b) 12,001
(c) 13,000
(d) Can not be determined
46. What is the value of the receiver window for host A if the receiver, host B, has a buffer size of 5000 B and 1000B of received and unprocessed data?
(a) 5000B (b) 1000B
(c) 4000B (d) None
47. What is the size of the window for host A if the value of receiver window is 3000B and the value of congestion window is 3500B.
(a) 3000B (b) 3500B
(c) 500B (d) None
48. In a connection the size of congestion window is 3000B and the size of receiver window is 5000B. The host has sent 2000B which has not been acknowledged. How many more bytes can be sent?
(a) 3000B (b) 5000B
(c) 2000B (d) 1000B

49. TCP is sending data at 1MBps. If the sequence number starts with 7000, how long does it takes before the sequence number goes back to zero.
 (a) $7\mu\text{sec}$. (b) 1000sec.
 (c) 4096sec. (d) 4295sec.
50. A client uses TCP to send data to a server. The data are 16B. Calculate the efficiency of this transmission at the TCP level.
 (a) 80% (b) 44%
 (c) 100% (d) 72%
51. A client uses TCP to send data to a server. The client generate the 16B data to send. The segment generated by the client is forwarded to the network layer of the client. Calculate the efficiency of this transmission at the network layer.
 (a) 22% (b) 44%
 (c) 29% (d) 100%
52. A client uses TCP to send data to a server. The data are 16B. Calculate the efficiency of the transmission at data link layer.
 (a) 22% (b) 29%
 (c) 44% (d) None
53. To make the initial sequence number a random number, most systems starts the counter at 1 during bootstrap and increment the counter by 64,000 every 0.5 sec.
 How long does it take for the counter to wrap around?
 (a) 67.1×10^3 sec. (b) 33.5×10^3 sec.
 (c) 134×10^3 sec. (d) None
54. 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 true
 (c) (i) and (ii) are false, but (iii) is true
 (d) (i), (ii) and (iii) are false

55. Which of the following statements are TRUE?

S1 : TCP handles both congestion and flow control

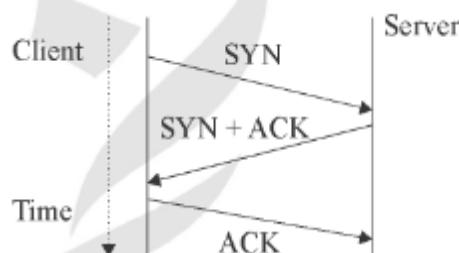
S2 : UDP handles congestion but not flow control

S3 : Fast retransmit deals with congestion but not flow control

S4 : Slow start mechanism deals with both congestion and flow control

- (a) S1, S2 and S3 only
 (b) S1, and S3 only
 (c) S3, and S4 only
 (d) S1, S3 and S4 only

56. The three way handshake for TCP connection establishment is shown below.



Which of the following statements are TRUE?

S1: Loss of SYN + ACK from the server will not establish a connection

S2: Loss of ACK from the client cannot establish the connection

S3: The server moves LISTEN → SYN_RCVD → SYN_SENT → ESTABLISHED in the state machine on no packet loss

S4: The server moves LISTEN → SYN_RCVD → ESTABLISHED in the state machine on no packet loss.

- (a) S2 & S3 only (b) S1 and S4 only
 (c) S1 & S3 only (d) S2 and S4 only

57. In the slow start phase of the TCP congesting control algorithm, the size of the congestion window
- Does not increase
 - Increases linearly
 - Increases quadratically
 - Increases exponentially
58. Consider the following statements.
- TCP connections are full duplex.
 - TCP has no option for selective acknowledgment
 - TCP connections are message streams.
- Only I is correct
 - Only I and II are correct
 - Only II and III are correct
 - All of I, II and III are correct
59. Consider the following statement about the routing protocols, Routing Information Protocol (RIP)and Open Shortest Path First (OSPF) in an IPv4 network.
- RIP uses distance vector routing
 - RIP packets are sent using UDP
 - OSPF packets are sent using TCP
 - OSPF operation is based on link-state routing
- Which of the statements above are CORRECT?
- I and IV only
 - I, II and III only
 - I, II and IV only
 - II, III and IV only
60. Consider a TCP client and a TCP sever running on two different machines. After completing data transfer, the TCP client calls close to terminate the connection and a FIN segment is sent to the TCP server. Server-side TCP responds by sending an ACK, which is received by the client-side TCP. As per the TCP connection state diagram (RFC 793), in which state does the client-side TCP connection wait for the FIN from the server-side TCP?
- LAST-ACK
 - TIME-WAIT
 - FIN-WAIT-1
 - FIN-WAIT-2
61. Consider the following statements regarding the slow start phase of the TCP congestion control algorithm. Note that $cwnd$ stands for the TCP congestion window and MSS denotes the Maximum Segment size.
- The $cwnd$ increases by 2 MSS on every successful acknowledgment.
 - The $cwnd$ approximately doubles on every successful acknowledgement.
 - The $cwnd$ increases by 1 MSS every round trip time.
 - The $cwnd$ approximately doubles every round trip time.
- Which one of the following is correct ?
- Only (ii) and (iii) are true
 - Only (i) and (iii) are true
 - Only (iv) is true
 - Only (i) and (iv) are true
62. Match the following :
- | | |
|---------------------------------|-----------------------------|
| Field | P. UDP Header's Port Number |
| Q. Ethernet MAC Address | R. IPv6 Next Header |
| S. TCP Header's Sequence Number | T. Length in bits |
- Length in bits**
- 48
 - 8
 - 32
 - 16
- P-III, Q-IV, R-II, S-I
 - P-II, Q-I, R-IV, S-III
 - P-IV, Q-I, R-II, S-III
 - P-IV, Q-I, R-III, S-II
63. A sender is employing public key cryptography to send a secret message to a receiver. Which one of the following statements is TRUE?
- Sender encrypts using receiver's public key
 - Sender encrypts using his own public key
 - Receiver decrypts using sender's public key
 - Receiver decrypts using his own public key

64. Consider the three commands : PROMPT, HEAD and RCPT. Which of the following options indicate a correct association of these commands with protocols where these are used?
- HTTP, SMTP, FTP
 - FTP, HTTP, SMTP
 - HTTP, FTP, SMTP
 - SMTP, HTTP, FTP
65. Count to infinity is a problem associated with
- link state routing protocol.
 - distance vector routing protocol.
 - DNS while resolving host name.
 - TCP for congestion control.
66. HELO and PORT, respectively, are commands from the protocols
- FTP and HTTP
 - TELNET and POP3
 - HTTP and TELNET
 - SMTP and FTP
67. Which one of the following uses UDP as the transport protocol?
- HTTP
 - Telnet
 - DNS
 - SMTP
68. The minimum positive integer p such that $3^p \bmod 17 = 1$ is
- 5
 - 8
 - 12
 - 16
69. Consider the following clauses:
- Not inherently suitable for client authentication.
 - Not a state sensitive protocol.
 - Must be operated with more than one server.
 - Suitable for structured message organization
 - May need two ports on the serve side for proper operation.
- The option that has the maximum number of correct matches is
70. The total number of keys require for a set of n individuals to be able to communicate with each other using secret key and public key crypto systems, respectively are:
- $n(n - 1)$ and $2n$
 - $2n$ and $((n(n - 1))/2)$
 - $((n(n - 1))/2)$ and $2n$
 - $((n(n - 1))/2)$ and n
71. In the RSA public key cryptosystem, the private and public keys are (e, n) and (d, n) respectively, where $n = p * q$ and p and q are large primes. Besides, n is public and p and q are private. Let M be an integer such that $0 < M < n$ and $\phi(n) = (p - 1)(q - 1)$. Now consider the following equations.
- $M' = M^e \bmod n$
 $M = (M')^d \bmod n$
 - $ed \equiv 1 \bmod n$
 - $ed = 1 \bmod \phi(n)$
 - $M' = M^e \bmod \phi(n)$
 $M = (M')^d \bmod \phi(n)$
- Which of the above equations correctly represent RSA cryptosystem?
- I and II
 - I and III
 - II and IV
 - III and IV
72. Which one of the following is not a client-server application?
- Internet chat
 - Web browsing
 - E-mail
 - Ping

73. 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
- m1 : HTTP m2:SMTP m3:POP
 - m1 : SMTP m2:FTP m3:HTTP
 - m1 : SMTP m2:POP m3:HTTP
 - m1 : POP m2:SMTP m3:IMAP
74. The transport layer protocols used for real time multimedia, file transfer, DNS and email respectively are
- TCP, UDP, UDP and TCP
 - UDP, TCP, TCP and UDP
 - UDP, TCP, UDP and TCP
 - TCP, UDP, TCP and UDP
75. Using public key cryptography, X adds a digital signature σ to message M, encrypts $\langle M, \sigma \rangle$, and sends it to Y, where it is decrypted. Which one of the following sequence of keys is used for the operations?
- Encryption: X's private key followed by Y's private key; Decryption : X's public key followed by Y's public key
 - Encryption : X's private key followed by Y's private key; Decryption : X's public key followed by Y's private key
 - Encryption : X's public key followed by Y's private key; Decryption : Y's public key followed by X's private key
 - Encryption : X's private key followed by Y's public key; Decryption : Y's private key followed by X's public key
76. Which of the following are used to generate a message digest by the network security protocols?
- | | |
|------------------|------------------|
| (P) RSA | (Q) SHA-1 |
| (R) DES | (S) MD5 |
| (a) P and R only | (b) Q and R only |
| (c) Q and S only | (d) R and S only |
77. Which one of the following is TRUE about the interior gateway routing protocols – Routing Information Protocol (RIP) and Open Shortest Path First (OSPF)
- RIP uses distance vector routing and OSPF uses Link state routing
 - OSPF uses distance vector routing and RIP uses link state routing
 - Both RIP and OSPF use link state routing
 - Both RIP and OSPF use distance vector routing
78. 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?
- HTTP, FTP
 - HTTP, TELNET
 - FTP, SMTP
 - HTTP, SMTP
79. Suppose that everyone in a group of N people wants to communicate secretly with the N-1 others using symmetric key cryptographic system. The communication between any two persons should not be decodable by the others in the group. The number of keys required in the system as a whole to satisfy the confidentiality requirement is
- $2N$
 - $N(N - 1)$
 - $N(N - 1)/2$
 - $(N - 1)^2$
80. Consider that B wants to send a message m that is digitally signed to A. Let the pair of private and public keys for A and B be denoted by K_x^- and K_x^+ for $x = A, B$, respectively. Let $K_x(m)$ represent the operation of encrypting m with a key K_x and $H(m)$ represent the message digest. Which one of the following indicates the CORRECT way of sending the message m along with the digital signature to A?
- $\{m, K_B^+(H(m))\}$
 - $\{m, K_B^-(H(m))\}$
 - $\{m, K_A^-(H(m))\}$
 - $\{m, K_A^+(H(m))\}$

81. Anarkali digitally signs a message and sends it to Salim. Verification of the signature by Salim requires.
- Anarkali's public key
 - Salim's public key
 - Salim's private key
 - Anarkali's private key
82. 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.
- HTTP GET request, DNS query, TCP SYN
 - DNS query, HTTP GET request TCP SYN
 - DNS query, TCP SYN, HTTP GET request
 - TCP SYN, DNS query, HTTP GET request
83. In a RSA cryptosystem, a participant A uses two prime numbers $p = 13$ and $q = 17$ to generate her public and private keys. If the public key of A is 35, then the private key of A is _____.
- 15
 - 12
 - 11
 - 13
84. In an RSA cryptosystem, the value of the public modulus parameter n is 3007. If it is also known that $\phi(n) = 2880$, where $\phi()$ denotes Euler's Totient Function, then the prime factor of n which is greater than 50 is _____.
- 50
 - 97
 - 37
 - 20

○○○

ENGINEERS ACADEMY

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ANSWER KEY

1. Ans. (c)
2. Ans. (d)
3. Ans. (d)
4. Ans. (c)
5. Ans. (c)
6. Ans. (c)
7. Ans. (d)
8. Ans. (d)
9. Ans. (b)
10. Ans. (b)
11. Ans. (b)
12. Ans. (b)
13. Ans. (a)
14. Ans. (d)
15. Ans. (b)
16. Ans. (b)
17. Ans. (a)
18. Ans. (c)
19. Ans. (c)
20. Ans. (a)
21. Ans. (b)
22. Ans. (b)
23. Ans. (b)
24. Ans. (d)
25. Ans. (a)
26. Ans. (a)
27. Ans. (b)
28. Ans. (d)
29. Ans. (c)
30. Ans. (b)
31. Ans. (b)
32. Ans. (d)
33. Ans. (d)
34. Ans. (d)
35. Ans. (d)
36. Ans. (c)
37. Ans. (d)
38. Ans. (c)
39. Ans. (b)
40. Ans. (a)
41. Ans. (c)
42. Ans. (b)
43. Ans. (c)
44. Ans. (d)
45. Ans. (b)
46. Ans. (c)
47. Ans. (a)
48. Ans. (d)
49. Ans. (d)
50. Ans. (b)
51. Ans. (b)
52. Ans. (a)
53. Ans. (b)
54. Ans. (b)
55. Ans. (d)
- Appropriate RTT estimation algorithm is used to set the timeout value of a TCP connection. Hence, the other statements regarding timeout values are incorrect.
- S1 is true because TCP has its congestion control and flow control mechanisms.
- UDP itself does not have any flow control or congestion control mechanism. Therefore S2 is false.
- Fast retransmit and fast recovery are part of TCP congestion control algorithms. Therefore S3 is True.
- In slow start algorithm we use congestion and advertised windows and these act as flow control window.
- The congestion windows flow control imposed by the sender while the advertised window is flow control imposed by receiver.
- ∴ S4 is True.

56. *Ans. (c)*

Initially server is in LISTEN mode when a SYN is received, the server sends SYN+Ack and goes to SYN_RCVD state. When ack from client is received it moves to ESTABLISHED state.

\therefore S3 is false and S4 is true.

The loss of SYN+Ack from server will not allow the client to move to ESTABLISHED state.

Hence connection can not be established.

57. *Ans. (d)*

In the slow-start (additive) phase of the TCP congestion control algorithm, the size of congestion window increases exponentially TCP acts the window size as follows allowed-window = min (receiver_advertisement, congestion-window)

In slow-start (additive) phase whenever starting traffic on a new connection or increasing traffic after a period of congestion, start the congestion window at the size of a single segment and increases the congestion window by one segment each time an acknowledgment arrives.

58. *Ans. (a)*

TCP is a byte stream protocol. Hence III is false. TCP can use both selective ACK and Cumulative Acknowledgment. Hence II is false. TCP connection are full duplex.

\therefore Statement I is correct.

59. *Ans. (c)*

RIP uses distance vector routing

RIP packets are sent using UDP

OSPF doesn't use UDP or TCP and sends directly via IP

OSPF operation is based on LSR

60. *Ans. (d)*

Option(d) is correct.

61. *Ans. (c)*

cwnd approximately doubles every round trip time.

62. *Ans. (c)*

UDP header port = 16 bit

MAC address = 48 bit

IPV₆ next header = 8 bit

TCP sequence no = 32 bit

63. *Ans. (a)*

In public key cryptography if sender used receiver's public key for encryption then the decryption of message is possible only by using private key of receiver.

Hence 1st is true and remaining are false.

If sender encrypts using his own public key then no one except the sender can decrypt it and only sender known his private key no one else.

64. *Ans. (b)*

RCPT : Recipient to, As the name suggest it is used in SMTP (Simple Mail Transfer protocol).

HEAD : This is used in HTTP to get the meta-information, to decide the category of packet.

Prompt : Turns off prompting for individual files when using the mget or mput commands.

65. *Ans. (b)*

In distance vector routing the count-to-infinity problem happens when a router is unable to reach an adjoining network. A second router, 1 hop away from the first router, thinks that the unreachable network is 2 hops away. Meanwhile, the first router then updates its records to say it is 3 hops away from the unreachable network based on the fact it is 1 hop from the second router, which says it is 2 hops from the unreachable network. The routers continue incrementing their hop count until the maximum (15), "infinity", is reached.

66. *Ans. (d)*

HELO: Initiates a conversation with the mail server. When using this command you can specify your domain name so that the mail server knows who you are. The PORT command is sent by an FTP client to establish a secondary connection (address and port) for data to travel over.

67. *Ans. (c)*

Domain Name System (DNS) maps a name onto an IP address, an application program calls a library procedure called the resolver, passing name as a parameter. The resolver sends a UDP packet to a local DNS server, which then looks up the name and returns the IP address to the resolver, which then returns it to caller. So DNS uses transport layer protocol UDP.

68. *Ans. (d)*

By Fermat's theorem, 3^{17-1} modulo 17 = 1.

So $p = 16$.

69. *Ans. (d)*

IMAP : It distributes mail boxes across multiple servers.

FTP : Requires two ports : 20 and 21 for FTP-data and FTP-control respectively.

HTTP : HTTP is a stateless protocol. Hence not a state sensitive protocol.

DNS : This protocol maintains its database in a structured and hierarchical manner.

SMTP : Intersect standard for e-mail transmission and not suitable for client server communication.

70. *Ans. (c)*

For private key cryptography for communication between each pair of individuals on secret key will be required.

If an individual wants to communicate with other $n - 1$ individuals he should have $n - 1$ secret keys, so the total number of secret keys for private encryption is $(n*(n - 1))/2$.

For public key encryption each individual needs to have a public and private key, the total keys required in $2*n$.

71. *Ans. (b)*

I and III equations correctly represent RSA cryptosystem.

72. *Ans. (d)*

Internet chat, web browsing and e-mail are client-server application. Ping is a utility. It is mainly used to check the connection between two computers, there is a chance both are client or one is client and another server. In chat system first user authentication required and it requires server.

73. *Ans. (c)*

SMTP is typically used by user clients for sending mails. POP is used by clients for receiving mails. Checking mails in web browser is a simple HTTP process..

74. *Ans. (c)*

UDP: Transport layer protocol which is unreliable but fast .

TCP : Transport layer connection oriented protocol which is secure and reliable but comparatively slow.

So for real time multimedia we need fast processing so UDP is suitable for it.

For file transfer we need security so TCP is suitable for file transfer.

DNS always use UDP.

For email we need security so uses TCP.

Option (c) is correct.

75. *Ans. (d)*

The message over the network should be encrypted by y's public key.

So order of encryption is x's private key and y's public key.

On receiving the encrypted message, y will decrypt it using its private key and x's public key for signature.

So order of decrypting is y's private key followed by x's public key.

So (d) correct answer.

76. *Ans. (c)*

SHA-1 and MD5 are used to generate a message digest.

77. *Ans. (a)*

RIP uses distance vector routing

OSPF uses link state routing

78. *Ans. (a)*

HTTP and FTP protocols can use multiple TCP connections between the same client and the server. FTP uses data and control connections used with two separate TCP connections.

79. *Ans. (c)*

Every pair of nodes need a separate key. There are ${}^N C_2$ pairs required for N people .

$$\therefore {}^n C_2 = \frac{N(N-1)}{2} \text{ keys are required.}$$

80. *Ans. (b)*

IN digital signature Message is digested represented $H(n)$ and encrypted with sender's private key i.e., $K_B(H(m))$ to create sign and send it along with the original message m. So, the correct answer is $\{m, K_B(H(m))\}$.

81. *Ans. (a)*

Verification or authorization can be done by encrypting sender's private key and decrypting at receiver with sender's public key.

82. *Ans. (c)*

DNS query, TCP SYN, HTTP GET request.

83. *Ans. (c)*

$$p = 13, q = 17$$

$$K_u = \{e, u\} = \{35\}$$

$$K_r = d = ?$$

RSA steps

$$1. p = 13 \quad q = 17$$

$$2. n = 13 \times 17$$

$$\phi(n) = (p - 1)(q - 1)$$

$$= 12 \times 16 = 192$$

$$d = ?$$

$$e = 35$$

$$\text{So } (e \times d) \bmod \phi(n) = 1$$

$$(35 \times d) \bmod 192 = 1$$

$$d = 11$$

84. *Ans. (b)*

$$\text{Given } n = 3007$$

$$\text{As per RSA } p = 31$$

$$q = 97$$

$$n = p \times q = 31 \times 97 = 3007$$

$$\text{Given } \phi(n) = (p-1)(q-1) = 30 \times 96 = 2880$$

So Prime factor greater than 50 is 97

