Review on Computer Networks

MCQ

1. **A communication protocol defines**
    a. Message format
    b. Message order
    c. Actions based on received messages
    d. Actions based on transmitted messages
    e. All of the above
2. **Which of the following is NOT correct about dial-up networks**
    a. Shared medium
    b. Uses existing phone infrastructure
    c. Very low speed
    d. Keeps line busy
    e. None of the above
3. **Which of the following is NOT correct about ADSL**
    a. Uses phone infrastructure
    b. Is a dedicated medium
    c. Upload and download speeds are the same
    d. High speed up to 8Mbps
    e. None of the above
4. **Which of the following is NOT correct about Cable access network**
    a. Uses Coax cable
    b. Does not require a modem
    c. High dedicated speed up to 30
    d. Uses FDM to divide bandwidth
    e. b and c
5. **Which of the following is NOT correct about FTTH**
    a. Uses a twisted pair cable from splitter to home
    b. Uses a twisted pair cable from central office to home
    c. Uses three types of technology Active, Passive and hybrid
    d. Can't be used to carry TV signal
    e. All of the above
6. **Which of the following is NOT correct about HTTP**
    a. Stateless
    b. Use port 90
    c. In-band
    d. Connection-oriented
    e. None of the above
7. **Which of the following is NOT correct about FTP**
    a. Remains state
    b. Out-of-band
    c. None-Persistent
    d. Use port 21
    e. None of the above
8. **Which of the following are email protocols**
    a. UDP, TCP
    b. HTTP, SMTP

c. DNS, POP3
d. SMTP, POP3
e. IP, IMAP

9. Which of the following is NOT a component of a network application

a. A process
b. A message
c. A protocol
d. A user agent
e. None of the above

10. Which of the following is NOT an elastic network application

a. File transfer
b. Interactive games
c. Instant messaging
d. Video clips
e. b and d

11. Which of the following is NOT a DNS service

a. Hostname to IP address translation
b. host aliasing
c. IP address to MAC translation
d. Load distribution
e. b and c

12. All of the following are client server applications except

a. Email
b. File transfer
c. Bit torrent
d. Cookies
e. Youtube

13. The transport layer has two protocols

a. IP & TCP
b. HTTP & TCP
c. TCP & UDP
d. HTTP & UDP
e. None of the above

14. Which of the following is NOT true about TCP

a. Best effort transfer
b. Flow control
c. Congestion control
d. Connection oriented
e. None of the above

15. Which of the following application does not typically uses TCP

a. Skype
b. Web
c. Remote terminal access
d. Email
e. File transfer

16. UDP is used because

a. It is has no connection delay
b. It has no congestion control
c. It has small header

d. Easy no state maintenance
e. All of the above

17. The header of a UDP segment is

a. 64 B
b. 64 b
c. 4 B
d. 4 b
e. None of the above

18. A UDP segment has the following fields except:

a. Src Prt #
b. Checksum
c. Header length
d. Dest Prt #
e. None of the above

19. The header length of a TCP segment (in bytes) is

a. 10
b. 15
c. 20
d. 25
e. 30

20. Which of the following is NOT correct about a client-server model

a. Server is always on
b. Server has a fixed IP
c. Client communicate with server
d. Server farms can be used for scaling
e. Client communicate with other clients from time to time

21. Which of the following is NOT correct

a. HTTP uses TCP
b. FTP uses UDP
c. SMTP uses TCP
d. DNS uses UDP
e. Telnet uses TCP

22. In non-persistent http, requesting 2 objects from the server costs us

a. 3RTT and 2 transmission times
b. 3RTT and 3 transmission times
c. 4RTT and 3 transmission times
d. 4RTT and 4 transmission times
e. 4RTT and 2 transmission times

23. Which of the following is not among the hierarchy of DNS

a. Root server
b. Local server
c. TLD server
d. Authoritative server
e. None of the above

24. In a router, data forwarding means

a. Finding the correct output port
b. Finding the correct switch
c. Moving data from an input port to any output port
d. Moving data from an input port to an appropriate output port

e. All of the above

25. The network layer provides a connection between

a. Two processes
b. Two hosts
c. A host and a router
d. A router and a host
e. None of the above

26. In IPv4, the datagram header is _____long and the IP address is _____long

a. 20 byte, 32 bit
b. 32 byte, 32 bit
c. 16 byte, 128 bit
d. 40 byte, 64 bit
e. 8 byte, 16 bit

27. In an IP header, the 16-bit identifier is used for

a. Identifying the sending host
b. Identifying the receiving host
c. Identifying the receiving port
d. Reassembly of a fragmented packet
e. None of the above

28. In IP header, time to live (TTL) is

a. The number of seconds before the packet is dropped
b. The number of hops before the packet is dropped
c. The milliseconds before the packet is dropped
d. The number of minutes before a packet is dropped
e. None of the above

29. IP fragmentation and reassembly is used because

a. IP datagrams are always too big
b. IP datagrams are always too small
c. We use packet switching
d. We use virtual circuit
e. MTU is different from one link to the other

30. Which of the following is NOT correct about subnets

a. All hosts can be reached without a router in a subnet
b. All hosts share the least significant n bits
c. All hosts share the most significant n bits
d. Can be visualized by detaching all interfaces from hosts and routers
e. None of the above

31. DHCP is used to

a. Assign port numbers to different applications
b. Help routing in a NAT
c. Assign IP addresses in a NAT
d. Assign IP addresses in a normal subnet
e. c and d

32. If the following are entries in a forwarding table of a router: 00010: 2, 0101:4, 00111:3, and 0001:1. The value in an arriving packet' header was 00111001, which port will the router send the packet to?

a. 1
b. 2
c. 3
d. 4

e. Any of the above

33. The maximum length of an IP datagram is

a. 2^8
b. 2^10
c. 2^12
d. 2^16
e. 2^18

34. If the address of a subnet is a.b.c.d/18, the max number of hosts in this subnet is

a. 2^10
b. 2^12
c. 2^14
d. 2^16
e. 2^18

35. If the NAT translation table is as follows and the following packet 230.41.5.6, 903 arrived at the NAT router, which host will get the packet

230.41.5.6, 901	10.0.0.1, 80
230.14.5.7, 902	10.0.0.2, 80
230.41.5.6, 903	10.0.0.3, 80
230.4.51.7, 903	10.0.0.1, 20
230.4.15.56, 905	10.0.0.3, 20

a. 10.0.0.1
b. 10.0.0.2
c. 10.0.0.3
d. 10.0.0.4
e. Can't be determined

36. The following DHCP message is a

src : 0.0.0.0, 68
dest.: 255.255.255.255,67
yiaddr: 0.0.0.0
transaction ID: 654

a. A discover message
b. A request message
c. An ack message
d. An offer message
e. Can't be determined

37. The link layer provides connection between

a. Two processes
b. Two hosts
c. A host and a router
d. Two adjacent nodes
e. None of the above

38. The link layer packet is called

a. A segment
b. A datagram
c. A frame
d. A message
e. None of the above

39. The link layer is mostly implemented in

a. Hosts only
b. Routers only
c. Links only
d. Links and routers
e. Network adaptors of hosts and routers

40. The protocols used in link layer are called

a. RIP
b. MAC
c. BGP
d. OSPF
e. None of the above

41. The header of a UDP segment is

a. 64 B
b. 64 b
c. 4 B
d. 4 b
e. None of the above

42. What would be the checksum value of 1101, 0011 and 1010:

a. 0100
b. 0101
c. 1111
d. 1011
e. None of the above

43. When the channel is reliable, we need the following mechanism

a. Checksum
b. Retransmission
c. Timer
d. –ve ack
e. None of the above

44. Which of the following is not correct about TCP

a. Point to point
b. Connection oriented
c. Pipelined
d. Semi-duplex
e. Provides flow control

45. The size of the necessary section of a TCP header is

a. Variable in length
b. 20 B
c. 12 B
d. 8 B
e. 16 B
f. None of the above

46. MAC address is ---------- long

a. 32 bits
b. 48 bits
c. 64 bits
d. 128 bits
e. None of the above

True/False

1. Resource sharing is one of the advantages of computer networks. T
2. The use of two wires twisted together helps reduce crosstalk and electromagnetic induction. T
3. Insulation layer in coaxial cable helps minimize interference and distortion. T
4. Fiber-optic cables are affected by electromagnetic radiation. F
5. Coaxial cables transfer data much faster than fiber-optic cables. F
6. Bluetooth cover a wide range of distance for data transfer. F
7. Wi-Fi uses IEEE 802.11 protocol while Wi-Max uses IEEE 802.16 protocol. T
8. Wi-Max covers wider range of distance than Wi-Fi but has smaller bit rate transfer. T
9. Wired LANs are most likely to be based on Ethernet technology. T
10. LAN connects computers in a wide geographically area. F
11. WAN operates at slower rate than LAN, but covers wider geographical area. T
12. The Internet is a network of networks. T
13. A protocol is not considered as a network component. F
14. In the Internet, hosts are connected together directly through one communication link. F
15. Hosts form the core part of the Internet.
16. DSL, High speed LAN, and wireless access are examples for network access provided by ISP. T
17. Skype is an example of client-server application. F
18. File transfer uses peer-to-peer model. F
19. UPD provides reliable data transfer. F
20. TCP provides congestion control. T
21. In circuit-switching, users share network resources. F
22. In circuit switching, the bandwidth is divided into pieces using FDM or TDM. T
23. In statistical multiplexing, packets have a fixed pattern. F
24. In packet switching, network resources are reserved for each user. F
25. Packet switching allows more users to use network and efficiently utilize BW. T
26. A protocol defines the format and the order of messages exchanged between hosts. T
27. Modularization and standardization are advantages for network layer structure. T
28. Queuing delay can vary from packet to packet. T
29. A queue forms when the arrival rate of packets is less than the transmission rate. F
30. Packet loss occurs when packets arrive to a full queue. T
31. Network layer handles reliable data transfer. F
32. Link layer divides data into segments. F
33. Network layer determines the route and IP address of the destination. T
34. P2P architecture has always on servers. F
35. In client-server architecture the server has a permanent IP address. T
36. In client-server architecture clients communicate directly with each other. F
37. P2P is highly scalable but difficult to manage. T
38. Throughput cannot exceed network bandwidth. F
39. Two processes communicate with each other through their sockets. T
40. A process is uniquely identified by the IP address. F
41. *ipconfig* command is used to get computer's IP address. T
42. UDP requires handshaking. F
43. Most Internet applications use UDP. F
44. HTTP is a stateless protocol. T
45. HTML is the main object in the web page. T
46. A web browser is the client-side in a web application. T
47. HTTP use port 81 to communicate. F

48. Non-persistent HTTP transfer more than one object in a single TCP connection. F
49. A Web cache can substantially reduce the response time for a client request. T
50. Cookies preserve privacy. F
51. FTP is in-band protocol. F
52. FTP uses port 20 to transfer data. T
53. SMTP is a pull protocol. F
54. DNS uses centralized database to store mapping information. F
55. Transport layer provide logical communication between processes running on different hosts. T
56. The packets formed in the transport layer are called datagrams. F
57. Transport layers protocols run within network core. F
58. A routing algorithm updates the forwarding table of the router. T
59. TCP provides delay guarantees. F
60. UDP is a best effort protocol. T
61. TCP segment has 8 byte header. F
62. Two Key Network-Layer Functions are forwarding and routing. T
63. IP is a best effort protocol. T
64. Datagram network provides network-layer connection service. F
65. In IPv6 datagram, the IP address field is 32-bit long. F
66. IPv6 uses fragmentation when the datagram size exceeds MTU. F
67. IPv4 datagram has a header of 20-bit long. F
68. Tunneling is used to achieve IPv4/IPv6 compatibility. T
69. Link layer is mostly software implemented. F
70. Link layer protocols are implemented in the network adapter. T
71. Link layer is responsible for data transfer from host-to-host. F
72. Data packets in link layers are called datagrams. F
73. The link layer protocols are called medium access protocol. T
74. MAC address changes when a node moves to another LAN. F
75. In Internet all links employ the same MAC protocol. F
76. Audio and video applications are loss-tolerant. T
77. File transfer and telnet require 100% reliable data transfer. T
78. Multimedia applications are elastic applications. F
79. Email and file transfer are bw sensitive applications. F
80. NAT is used to convert LAN IP addresses of a subnet into one WAN IP address. T
81. HTTP and SMTP are out-of-band protocols that use ports 80 and 25. F

Completion

1. Checksum field in transport layer segment is used for error detection
2. In IPv6 datagram, the header is 40 bytes long
3. The network layer relies on routers to provide services
4. MAC address is 48 bit and is represented in hexadecimal notation
5. Controller is a special purpose chip that implements most of link layer services
6. A route is the path taken by packets from the source to the dest.
7. The method used for IP addressing is called Classless Inter Domain Routing (CIDR)
8. Network applications are the services that a computer network makes available to the users.
9. Bluetooth uses IEEE 802.15 Protocol.
10. A router is a network device that forwards datagrams in the network using IP address.
11. URL has two components: host name and file path
12. A process is a program running within a host with an API called a socket
13. A client is an end system that requests and receives a service from a sever.

14. Wi-Fi uses IEEE 802.11 protocol.
15. A peer has both client processes and server processes on the same host.
16. Fiber optics are the fastest wired communication media.
17. A protocol is a set of rules that control the transmission of information within the Internet.
18. A computer network is a collection of computers and devices connected by communications channels.
19. Twisted pair, coaxial cables, and fiber optics are wired media used in computer networks.
20. The transmission speed of fiber optics is hundreds of times faster than for coaxial cables and thousands of times faster than for twisted-pair wire
21. WiFi, WiMax, and Bluetooth are examples of wireless network technology.
22. PAN is a computer network used for communication among IT devices close to one person.
23. HAN is a residential network used for communication between digital devices in a home.
24. LAN is a network that connects computers in a building, or closely positioned group of buildings.
25. LANs are most likely to be based on Ethernet technology
26. WAN is a computer network that covers a large geographic area such as a city or a country.
27. Bit rate or transmission rate is the amount of information that can flow through a communication link in a given period of time
28. A host is a device connected to the internet and uses it to communicate.
29. The Internet structure consists of network edge, network core, and access network
30. The Internet edge consists of hosts or end systems
31. The network core includes routers and links.
32. Access network is the communication mean provided by ISP to connect hosts to edge routers such as MODEMs
33. A server is an end system that provides services to a client.
34. A peer is an end system that is not a pure client nor a pure server.
35. Examples of client-server applications are email, Web and File transfer
36. Examples of P2P applications are bit torrent and skype
37. A peer acts as a client when it requests a file; and as a server when it sends a file to another peer
38. TCP provides the following transport services handshaking, reliability, flow control and congestion control
39. Handshaking means that the client program and server program send control packets to each other before sending the real data to prepare for packet transmission.
40. Reliability means to deliver data without error, loss, and in the proper order
41. Reliability is achieved using retransmission and acknowledgement
42. Flow control makes sure that neither side of a connection overwhelms the other side by sending too many packets too fast.
43. Congestion control diminishes the rate at which packets are pumped to the network.
44. TCP is used by most network applications such as email, Web and File transfer
45. UDP is used by some network applications such as DNS, Internet telephony and skype
46. Public telephone is an example for circuit switching while Internet is an example for packet switching.
47. Store and forward transmission means that the router must receive the entire packet, store it in its input buffer, before it can begin to transmit the first bit of the packet onto the outbound link.
48. Processing delay is the time required to examine the packet's header and determine where to direct the packet.
49. Queuing delay is the time for which a packet waits router's queue to be transmitted onto the outbound link
50. Transmission delay is the amount of time required to push all of the packet's bits into the outbound link.
51. Propagation delay is time required for a bit to propagate from the beginning of the link to destination router.
52. An Internet application is composed of two communicating processes, protocol, user agent, and messages
53. A process is a program running within a host.
54. Client process initiates communication and runs on the client side.
55. Server process waits to be contacted and runs on the server side.
56. A peer has both client processes and server processes on the same host.

57. In web applications the two communicating processes are called web browser and web server
58. A socket is an API between the application layer and the transport layer.
59. HTTP defines how messages are passed between Web browser and Web server.
60. SMTP defines how messages are passed between sending mail servers and receiving mail server.
61. A web page is a document consisting of a base HTML file and several referenced objects.
62. Web browser is a user agent for the Web that displays to the user the requested Web pages.
63. Web server houses Web objects, each addressable by a URL.
64. RTT time for a small packet to travel from client to server and back.
65. Cookies a way for authentication for sites to keep track of users without user name and password
66. Proxy is a network entity that satisfies HTTP client request without involving original server.
67. SMTP, IMAP and POP are examples of mail access protocol.
68. The major component of email are user agent, SMTP, sending server and receiving server
69. DNS translate host name in URL to IP address
70. The classes of DNS servers are root, TLD and authoritative
71. DNS uses UDP protocol on port 53
72. A transport layer segment consists of data/message and header
73. Transport layer uses TCP and UDP protocols
74. In the network layer segments are encapsulated to form a datagram
75. Source port no. and Dest. Port no. fields in transport layer segment are used for mux and demux
76. Checksum field in transport layer segment is used for error detection
77. Network layer uses IP protocol
78. At the receiver, transport layer extracts messages from segments
79. At the receiver, network layer extracts segments from datagrams
80. A segment is a chunk of data with header
81. Network layer provides logical communication between hosts
82. Reliability means transfer data without error, without loss, and in order
83. Services that are not available in TCP and UDP are security, min. bw and max. delay
84. A UDP socket is identified by src. port no. and dest. port no.
85. A TCP socket is identified by src. IP add, dest IP add, src. port no and dest. port no.
86. TCP protocol stores app data in a buffer
87. Hosts and routers are called nodes
88. Communication channels that connect adjacent nodes are called links
89. Link layer packet is called a frame
90. Ethernet, 802.11 and PPP are examples of MAC protocols
91. SW and HW meet at link layer
92. In TDMA, FDMA, and CDMA, channel bandwidth is partitioned among the nodes.
93. Forwarding means move packets from router's input link interface to appropriate router output link interface
94. Routing means determine route taken by packets from source to dest.
95. Routing algorithm updates forwarding tables of the routers.
96. Forwarding table maps the dest. address of the packet to the appropriate output link interface of the router.
97. NAT is used to convert local IP addresses of a subnet into one IP address.
98. DHCP is used to dynamically create IP addresses for the hosts in the internet

Problems

1. Suppose that a web page consists of a base HTML file and 5 JPEG images, and that all objects reside on the same server. If RTT = 2 msec and file transmission time is 1 sec, compute the total time required to transfer this web page in the following cases:

   ANSWER

   n= 6, RTT = 2 msec, file transfer time = 1000 msec

a) *Non-persistent connection*
Response time = n*(2RTT + file transmission time)

b) *Non-persistent connection with pipelining*
Response time = n*RTT + RTT+ file transmission time = (n+1) RTT + file transmission time

c) *Persistent*
Response time = RTT +n*(RTT+ file transmission time) =

d) *Persistent with pipelining*
Response time = 2RTT + file transmission time

2. Data is transmitted from node A to node B on a route of three links with the following setup: Packet size= 8500bits, transmission rate of the links 1Mbps, link lengths are 1500, 2500 and 3500 Km, Signal speed = 270000 Km/s. Find its transmission delay, propagation delay and end-to-end delay.

ANSWER

L = 8500 bits, R=1Mbps, d=3500 Km, s=270000 Km/s
*transmission delay = 3 * L/R = 3 * 8500/ 1 * 10^6 =* ***25.5 ms***
propagation delay = d1+d2+d3/s = (1500 +2500 + 3500) / 270000 = ***27.78 ms***
end-to-end delay = 25.5 + 27.78 = ***53.28 ms***