***Quiz 1***

***1. Which of the following application-layer protocols runs on top of UDP?*** RIP, **DHCP**, SMTP, FTP | ***2. Which of the following statements is NOT true about the layered architecture in Computer Networking?*** Computer Networking is a simple and small system (F); The remainder of the Computer Networking system remains unchanged when a layer's implementation is modified (T); It makes much easier to change implementation of service provided at each layer (T); It allows us to better understand a large and complex system of Computer Networking (T) | ***3. Which of the following Wireshark features is to recover a file for captured FTP data packets?*** Follow Stream | ***4. Wireshark is a packet sniffer that can be used to capture and analyze network packets.*** True | ***5. Which of the following is the correct display filter that shows all TCP traffic running on port 80 on Wireshark?*** tcp and tcp.port == 80 | ***6. Which of the following is the correct display filter that shows everything but excludes FTP traffic on Wireshark?*** not ftp | ***7. Which of the following is the correct display filter that shows all Web traffic on Wireshark?*** http or https | ***8. You can use the Wireshark feature under which of the following menu items to recover a file for captured FTP data packets?*** Statistics -> conversations | ***9. TCP services are more efficient than UDP services.*** False | **10.** ***Which of the following application-layer protocols is on top of UDP?*** SNMP

***Quiz 2***

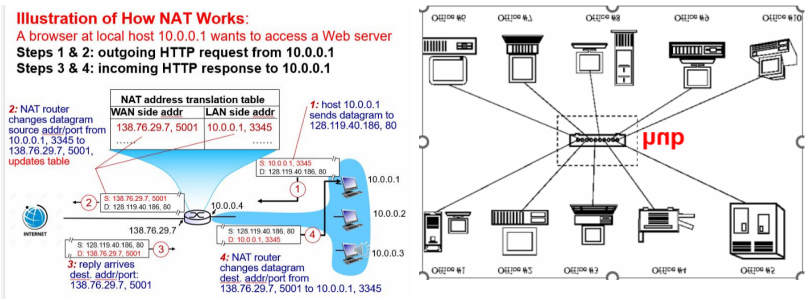
***1. What command is used to lookup DNS information in both Windows and Linux?*** nslookup | ***2. The following are all correct default port numbers of corresponding protocols*** *HTTP: 80, FTP: 20/2, SSH: 25, Telnet: 24, E-mail: 22, HTTPS: 440:* False | ***3. The following are reasons why there is a need for UDP in computer networks EXCEPT FOR:*** Some network services only work in a LAN and the chance of packet loss is small (T); UDP services are less efficient than TCP services (F); Some network services only work in a LAN and congestion control is not needed (T); UDP services are more efficient than TCP services (T) | ***4. How does a Web server know whether a client is new or returned?*** uses information in cookies contained the request message | ***5. Which of the following request methods is NOT available in HTTP 1.0?*** PUT | ***6. In the header of an HTTP request message, what is the purpose to have several lines of Accept Headers?*** gives the browser a chance to tell the Web server what format it wants for resources | ***7. Which of the following statements is TRUE about the HTTP response status code "505 HTTP Version Not Supported"?*** It is a fatal error | ***8. Reservations are immediate and do not require the DHCP lease process to be restarted.*** False | ***9. The following are fields in a UDP header EXCEPT FOR:*** Checksum, Destination port, Packet type, Source port | ***10. Which of the following is NOT TRUE about DNS?*** A domain resource record is a five-tuple (T); A typical DNS database table has six columns (F); The Internet is divided into over 250 top-level domains (T); The primary function of DNS is to map domain names onto resource records (T)

***Quiz 3***

***1. Which of the following is an interface of data communication between the Transport layer (layer 4) and the App layer (layer 5)?*** TSAP, DSAP, NSAP, ASAP | ***2. Which of the following app-layer protocol uses the standard port 443 by default?*** HTTPS | ***3. Which of the following statements is TRUE about TCP connection release?*** Both ends of a TCP connection can always release the connection if the server can receive at least one DR (Disconnect Request) sent from the client, with the help of timers and retransmission (T); A DR (Disconnect Request) should be initiated by the server host (F); Both ends of a TCP connection can always release the connection even if all the DRs (Disconnect Requests) are lost, with the help of timers and retransmission (F); Both ends of a TCP connection can always release the connection even if every DR (Disconnect Request) sent from the client is lost, with the help of timers and retransmission (F) | ***4. _____ allows the sender to send multiple frames before needing the acknowledgements.*** Sliding window | ***5. What is the minimum size of a UDP segment?*** 8 bytes | ***6. What is the minimum size of a TCP segment?*** 20 bytes | ***7. What is the maximum length of an IP packet?*** 65,535 bytes | ***8. What is the size of an IP pseudo-header for IPv4?*** 12 bytes | ***9. Which of the following application-layer protocols always uses UDP services at the transport layer?*** DNS, DHCP, SSH, FTP | ***10. Which of the following app-layer protocols runs on top of TCP?*** DHCP, POP-3, RTP, SNMP | ***11. The maximum size of an IP packet is 65,535 bytes. Since 65,535 − 20 (TCP header) − 20 (IP header) = 65,495, it means that we can always push 65,495 bytes of data into a TCP segment.*** False | ***12. Which of the following flags is TRUE if a TCP segment carries some data?*** FIN, SYN, PSH, ACK | ***13. A TCP segment with the flags SYN = 1 and ACK = 1:*** can ONLY be sent from a server host to a client host | ***14. Which of the following flags in the TCP header is used for congestion control?*** CWR | ***15. Which of the following transport service primitives is ONLY called at the server side?*** DISCONNECT, LISTEN, RECEIVE, SEND | ***16. Which of the following transport service primitives is ONLY called at the client side?*** DISCONNECT, SEND, RECEIVE CONNECT | ***17. For an application with a server and several remote clients calling transport service primitives, a client first executes a CONNECT primitive, and then the server executes a LISTEN primitive.*** False | ***18. After a socket is created, it should be bound to a local address (HOST, PORT) before it can listen to incoming connection requests.*** True | ***19. How an application at layer 5 uses the services at layer 4 in the TCP/IP model?*** through a transport address which is a port number | ***20. A TCP segment with the flags SYN = 1 and ACK = 0:*** is a request message sent from the client

***Quiz 4***

***1. Which of the following statements is NOT true about NAT?*** NAT solves the problem of IPv4 address exhaustion (T); NAT box maps a public IP address to many private IP addresses of local hosts (T); NAT allows many internal hosts to share a single public IP address to access the Internet (T); NAT solves the problem of IPv6 address exhaustion (F) | ***2. IP address hierarchical design can benefit CIDR routing.*** True | ***3. Given the IP address 168.10.31.0/24. Its host address length is:*** 8 | ***4. Given the IP address 216.170.131.0/24. Its network-prefix length is:*** 24 | *5. The TTL field of the IP header is a counter that is used to count the number of hops. When it hits zero, the packet is discarded by the router and the sender is notified.* True | ***6. Total length field of the IP header refers to the length of the data payload carried in the packet.*** False | ***7. The maximum size of the IP header is 60 bytes.*** True | ***8. What type of ICMP message will be sent to the sender of a packet when the value of its TTL field becomes 0?*** Time exceeded | ***9. Which layer of the TCP/IP model is the ICMP protocol implemented?*** Network layer | ***10. Which of the following protocols allows a computer in a coffee shop to access the Internet automatically?*** ICMP, ARP, DHCP, TCP | ***11. Which of the following is a requirement of the IP protocol design?*** Strict sending, tolerant receiving | ***12. Why is a TTL field required in the IP header?*** The time-to-live value instructs a router on the Internet when a packet should be discarded. | ***13. A packet is stored at a router until it has fully arrived. How does the router know that a packet has fully arrived?*** The router need all the above information contained in the three fields of the packet's IP header | ***14. Below is a screenshot of the PPT slide in Chapter 5 (Network Layer) to illustrate how NAT works. Based on this slide, the Web browser running on the local host with IP address 10.0.0.1 is associated with the port number:*** 3345 | ***15. The following are the flaws of the IP protocol EXCEPT FOR:*** Lack of mechanisms for flow control







***Quiz 5***

**1. Hub, switch and router are all layer-2 devices.** False | **2. A switch is intelligent and able to learn the Mac addresses of the network devices connecting to it.** True
**3. A router is a layer 3 device that is able to learn the IP address of a packet.** True | **4. Which of the following is NOT TRUE about a layer-2 switch?** It connects two LANs and makes it a single LAN (T); It operates at layer 2 (T); It connects two different networks as a gateway (F); It is intelligent to learn the Mac addresses of the computers connected to it (T) | **5. Which of the following statements is NOT true about layer-2 switches?** Switches are plug-and-play devices (T); Switches have to process frames only up through layer 2 (T); A network administrator has to configure the switch table at the time of switch installation or when a host is removed from the LAN (F); Switches are full-duplex devices (T) | **6. A switch table is built automatically, dynamically, and autonomously.** True | **7. For each incoming frame received on an interface of a switch, which of the following is NOT stored in the switch table?** the interface from which the frame arrived; the current system time of the switch; the frame's destination MAC address; the frame's source MAC address | **8. Which of the following is NOT true about a switch table?** It is initially empty before the switch is connected with any host in the LAN (T); If a PC is replaced by another PC (with a different adapter), the MAC address of the original PC will be purged from the switch table (T); If every host connected to a switch in the LAN eventually sends a frame, then every host will eventually get recorded in the switch table (T); The MAC address of a host is kept in the switch table even if no frames are received from that host for a long period of time (F) | **9. The forwarding function of a switch determines whether a frame should be forwarded (to some interface) or dropped.** False
**10. Which of the following statements is NOT true about the data payload field of an Ethernet Frame?** The maximum transmission unit (MTU) of Ethernet is 1,500 bytes (T); If it exceeds 1,500 bytes, then the packet will be fragmented (T); An ethernet frame carries the whole IP packet including its header (T); The data payload field of an Ethernet Frame could be empty without any carried data (F) | **11. The CRC field of an Ethernet frame (in its trailer) is used by the sending host to send the generator polynomial to the receiving host.** False
**12. Which of the following statements is NOT true about the 8-byte Preamble field of an Ethernet frame?** The 8th byte of the preamble field indicates the beginning of the Ethernet frame (T); The 8th byte of the preamble field is the first field of an Ethernet frame (T); The values of the first 7 bytes of the preamble could be different (F); The first 7 bytes of the preamble have the same value and serve to synchronize their clocks to the sender's clock (T) | **13. Ethernet LANs with a hub-based star topology are still popular and widely used in today's computer networks.** False
**14. Which of the following is NOT true about layer-2 switches?** A switch operate at layer 2 (T); A switch can learn the MAC addresses of the devices connected to it (T); A switch forwards link-layer frames to the next node (T); A switch can recognize IP addresses of packets (F) | **15. Which of the following statements is NOT true about ARP?** The receiving host has to determine the MAC address of the frame's source host at layer 2 by running ARP (F); It is a layer 2 protocol (T); The sending host has to determine the MAC address of the frame's destination host at layer 2 by running ARP (T); It provides a mapping between IP addresses and MAC addresses (T) | **16. Which of the following functions is NOT implemented at Layer 2?** Sending messages between a client browser and a remote Web server (F); Sending a layer 2 frame over individual links (T); Encapsulating a layer 3 packet into a layer 2 frame (T); Running APR for mapping between IP addresses and MAC addresses (T)
**17. The Data Payload of an Ethernet frame carries the IP packet with its header.** True | **18. The CRC/FCS field of an Ethernet frame header is used by the receiver for error detection.** True

**19. The Preamble field of an Ethernet frame header uses.** 8 bytes | **20. Which of the following is NOT true about the SFD (Start of Frame Delimiter) in an Ethernet frame header?** SFD was designed to break the bit pattern of the preamble and signal the start of the actual frame (T); SFD (Start of Frame Delimiter) is the 8th byte of the preamble (T); SFD is used by a receiver for error detection (F); SFD indicates the beginning of the Ethernet frame (T);

## Quiz 6

**1. Which of the following is NOT an SNMP function?** Remotely configure a Web server (F); Early detection of faults within network devices along with alerts/notifications (T); Monitor all traffic flowing through the networking device (T); Analyzing data collected from devices over long periods of time to identify bottlenecks and performance issues (T)
**2. Given the definition class ::= SEQUENCE {code VisibleString, size INTEGER undergraduate BOOLEAN} Which of the following set of values is compatible with the above ASN.1 structure?** "CPSC6157", 20, FALSE (T); "CPSC6157", "20", FALSE; "CPSC6157", TRUE, 20; CPSC6157, 20, TRUE
**3. Given the definition class ::= SET {code VisibleString, size INTEGER, undergraduate BOOLEAN} Which of the following set of values is NOT compatible with the above ASN.1 structure?** 20, "CPSC6157", FALSE; FALSE, 20, "CPSC6157"; "CPSC6157", FALSE, 30; CPSC6157, 20, FALSE (F)
**4. The underlying transport layer protocol of SNMP is TCP.** False
**5. With the SNMP-based ASN.1 data types, which of the following is NOT a user-defined type?** NetworkAddress, IpAddress, INTEGER, Counter

**6. With the SNMP-based ASN.1 data types, which of the following is NOT a constructor type?** Sequence of, NULL, Sequence, Set
**8. Which of the following statements is TRUE about ASN.1 ?** It is used for analyzing data collected from devices over long periods of time to identify bottlenecks and performance issues; It monitor all traffic flowing through the device; It is a formal language used for data transfer between SNMP managers and their agents; It is used for early detection of faults within network devices along with alerts/notifications
**9. Given the definition class ::= SEQUENCE {code VisibleString, size INTEGER, undergraduate BOOLEAN} Which of the following set of values is compatible with the above ASN.1 structure?** "CPSC4157", "20", FALSE; "CPSC4157", TRUE, 20; "CPSC4157", 30, TRUE (T); CPSC4157, 20, FALSE
**10. Given the definition class ::= SET {code VisibleString, size INTEGER, undergraduate BOOLEAN} Which of the following set of values is NOT compatible with the above ASN.1 structure?** "FALSE", 20, "CPSC6157"; 20, "CPSC6157", FALSE; "CPSC6157", 20, FALSE; "CPSC6157", FALSE, 30;

**App Layer**

1. **What is the content of the first line of an HTTP response message?** Contains the protocol version (e.g., HTTP/1.1), status code (e.g., 200), and status phrase (e.g., OK).
2. **What is the content of the first line of an HTTP request message?** Includes the method (e.g., GET), resource path (e.g., /index.html), and protocol version (e.g., HTTP/1.1).
3. **If the HTTP response status code is 404, what does it mean?** Means "Not Found" — the requested resource isn't available on the server.
4. **What is the purpose of using the Accept Headers in an HTTP request message?** Specifies the media types (e.g., text/html) the client can handle in the response.
5. **What are the advantage of HTTP/1.1 over HTTP/1.0?** Persistent connections, pipelining, host header support, and better caching.
6. **Explain how the HTTP protocol supports for pipelining requests.** Allows multiple requests to be sent on a single connection without waiting for responses, improving efficiency (HTTP/1.1).
7. **Explain how the HTTP protocol supports for client-side caching.** Uses headers like Cache-Control and ETag to store responses locally, reducing server load and speeding up access.
8. **Why is HTTP designed to "stateless"? What does it mean?** Each request is independent, with no server memory of prior requests, simplifying design and scalability.
9. **What is a dynamic web page?** Content generated on-the-fly by a server, often customized (e.g., via scripts or databases).
10. **What is a static web page?** Fixed content served as-is from a file, no server-side processing.
11. **Why is the DNS protocol needed?** Translates human-readable domain names (e.g., google.com) to IP addresses for network communication.
12. **How is the DNS namespace organized?** Hierarchical, tree-like structure (e.g., root > TLDs like .com > domains like google.com).
13. **What is the primary function of DNS?** Resolves domain names to IP addresses.
14. **What is a domain resource record?** Data entry in DNS (e.g., A record) mapping a domain to an IP or other info.
15. **What is done with the DNS protocol resolution?** Process of querying servers to convert a domain name to an IP address.
16. **How does a DNS server work?** Receives a query, checks cache, or forwards it to other servers (recursive/authoritative) to find the IP.
17. **By default, on which port is DNS running?** 53 (UDP for queries, TCP for large transfers).
18. **If there is no cached information about the domain available locally, what does the name server do?** The name server queries an upstream server (e.g., root or TLD server) to resolve the domain.

**Transport Layer**

1. **What is the responsibility of the transport layer?** Manages end-to-end communication, ensuring data delivery between hosts.
2. **What are the services of the transport layer provided to the upper layers?** Reliable data transfer, connection management, error detection, and flow control.
3. **What are the transport-layer primitives that applications can call to transport data for a connection-oriented (TCP) service?** LISTEN, CONNECT, SEND, RECEIVE, and DISCONNECT.
4. **What is a socket? What are the socket primitives?** Endpoint for communication; primitives include socket(), bind(), listen(), accept(), connect(), send(), recv(), and close().
5. **What are the basic steps of a socket server program? What are the basic steps of a socket client program?** Create socket, bind to address/port, listen, accept connection, send/receive data, close. Socket client steps: Create socket, connect to server, send/receive data, close.
6. **When an app wishes to set up a connection to another app running on a remote host, how does it know which one to connect to?** Uses the destination IP address and port number to identify the specific application.
7. **How does an application at the app-layer access the services implemented at the trans-layer?** Via APIs (e.g., sockets) provided by the operating system.
8. **What are the default port numbers used by HTTP, HTTPS, SSH and FTP, respectively?** HTTP: 80, HTTPS: 443, SSH: 22, FTP: 21.
9. **What are the approaches used by TCP to ensure reliability?** Sequence numbers, acknowledgments, retransmissions, and checksums.
10. **What is a TCP sequence number? What is an acknowledgement number? What are they used for?** Marks the order of bytes sent; Acknowledgment number: Confirms bytes received; used for ordering and reliability.
11. **How does TCP Three-way Handshake work?** Client sends SYN, server responds SYN-ACK, client sends ACK to establish a connection.
12. **What are the key differences between TCP and UDP?** TCP is reliable, connection-oriented; UDP is unreliable, connectionless, faster.
13. **What is the length of a UDP header? What is the maximum length of a UDP packet?** 8 bytes; Max UDP packet length: 65,535 bytes (including header).
14. **Give three applications of UDP.** DNS, video streaming, online gaming.
15. **Give six application-layer protocols that are on top of TCP.** HTTP, HTTPS, FTP, SMTP, POP3, IMAP.
16. **What is the length of a TCP header?** 20 bytes (without options).
17. **In a TCP header, what is each of the eight 1-bit flags used for?** URG (urgent data), ACK (acknowledgment), PSH (push data), RST (reset), SYN (synchronize), FIN (finish).
18. **In a TCP header, what is the Window size field used for?** Indicates the amount of data the receiver can accept, used for flow control.
19. **Why is a TCP header more complex than a UDP header?** Includes fields for reliability (sequence, ACK, flags) and flow control, unlike UDP's simpler design for speed.

**Network Layer**

1. **What is the minimum length of an IPv4 header?** 20 bytes (without options).
2. **What is stored in each of the following fields in an IPv4 header? (a) the total length; (b) TTL; (c) MF; (d) Protocol.**
   (a) Total length: Size of the entire packet (header + data), in bytes.
   (b) TTL: Time to Live, number of hops remaining before the packet is discarded.
   (c) MF: More Fragments flag, indicates if more fragments follow (1 = yes, 0 = no/last).
   (d) Protocol: Identifies the next protocol (e.g., 6 for TCP, 17 for UDP).
3. **What is the benefit of having an "options" field in an IPv4 header?** Allows flexibility for special features like routing or timestamps, though rarely used due to complexity.
4. **What is the network prefix length of the IP address 18.0.31.0/24?** 24 bits (indicated by /24).
5. **What is the host address length of the IP address 18.0.31.0/24?** 8 bits (32 total bits - 24 network bits = 8 host bits).
6. **What are the benefits of the hierarchical design of IP addresses?** Efficient routing, scalability, and reduced routing table size.
7. **What is NAT used for? Explain how NAT works using an example.** Maps private IP addresses to a public one for internet access. Example: A home router translates 192.168.1.10 (private) to 203.0.113.1 (public) when accessing a website, reversing it for the response.
8. **What are the commonly used Internet control protocols that works with the IP protocol? Describe each of them.**
   (a) ICMP: Error reporting and diagnostics (e.g., ping).
   (b) IGMP: Manages multicast group membership.
   (c) ARP: Maps IP addresses to MAC addresses in local networks.
9. **If the TTL value of a packet becomes 0, what happens to the packet? What type of ICMP message will be sent back to the sender?** Packet is discarded; an ICMP Time Exceeded message is sent back to the sender.

**Data Link Layer**

10. **What is a hub? Why a packet sent from any computer connected to a hub will reach all the computers connected to the hub?** A simple device that broadcasts all incoming packets to every connected computer. Why all receive: It operates at Layer 1, blindly repeating signals to all ports without filtering.
11. **What is a switch? Why a packet sent from a host connected to a switch will only reach the intended receiving host connected to the switch? What is the Mac address table of a switch used for?** A device that forwards packets only to the intended recipient. Why selective: It uses a MAC address table to learn and map device addresses to ports. MAC table purpose: Tracks which MAC addresses are on which ports for efficient forwarding.
12. **What is the difference and similarity between a hub and a switch?** Both connect devices in a LAN. Difference: Hubs broadcast to all, switches send selectively using MAC addresses.
13. **What is a router? How two hosts in different networks communicate with each other through routers? What is the difference between a router and a bridge? Is a router layer 2 or layer 3 device?** Connects different networks, forwarding packets based on IP addresses. Host communication: Routers use routing tables to pass packets between networks. Router vs. Bridge: Routers (Layer 3) use IP, bridges (Layer 2) use MAC. Layer: Router is Layer 3.
14. **How does a sending host of a packet determine the MAC address of its destination host in computer networking?** The sending host uses ARP (Address Resolution Protocol) to query the destination's MAC address by broadcasting its IP.
15. **What is the length of a MAC address?** 48 bits (6 bytes), typically written as 12 hexadecimal digits (e.g., 00:1A:2B:3C:4D:5E).
16. **What are the differences between a router and a switch?** Router connects networks using IP (Layer 3), switch connects devices within a network using MAC (Layer 2).
17. **What are the differences between a hub and a switch?** Hub broadcasts all traffic (Layer 1), switch forwards selectively based on MAC (Layer 2), improving efficiency and security.
18. **Can a switched LAN directly connect to other networks on the Internet through a switch without using a router?** No, a switch (Layer 2) can't route to external networks; a router (Layer 3) is required for IP-based internet connectivity.
19. **What is a layer-3 switch? What are the advantages of using a layer-3 switch over a router?** A switch with routing capabilities (Layer 3). Advantages over router: Faster packet processing, integrated switching/routing, better for internal network performance.