Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What is the name for the distinct units of data that are transmitted from one node on a network to another?
   (a) protocols;
   (b) queries;
   (c) packets;
   (d) signals;
2. (1 point) What layer of the OSI model is in charge of translating network addresses into their physical counterparts and decides how to route data from the sender to the receiver?
   (a) transport;
   (b) network;
   (c) session;
   (d) physical;
3. (1 point) The purpose of this equipment is to convert analog signals into digital signals and vice versa to be transmitted over a computer network:
   (a) modem;
   (b) phone line;
   (c) repeater;
   (d) hub;
4. (1 point) On a TCP header, what field allows the receiving node to determine whether the TCP segment became corrupted during transmission?
   (a) checksum;
   (b) flags;
   (c) hash;
   (d) padding;
5. (1 point) What can be said about TCP/IP?
   (a) TCP/IP comprises several subprotocols;
   (b) TCP/IP comprises only one protocol;
   (c) TCP/IP has been replaced by ARP;
   (d) TCP/IP has been replaced by IPX/SPX;
6. (1 point) Which of the following describes a MAC address?
   (a) it is a globally unique IP address;
   (b) it is a unique address in a broadcast domain;
   (c) it is provided by the manufacturer of the network card;
   (d) it is a logical address;
7. (1 point) Which of the following application protocols is the most appropriate for file transfer?
   (a) SMTP;
   (b) DNS;
   (c) HTTP;
   (d) FTP;
   (e) SSH;
   (f) IMAP;
   (g) POP3;
8. (1 point) Which class of IP address provides a maximum of only 254 host addresses per network?
   (a) class A;
   (b) class B;
   (c) class C;
   (d) class D;
9. (1 point) What does WLAN stand for?
   (a) Wide LAN;
   (b) Wild LAN;
   (c) Web LAN;
   (d) Wireless LAN;
10. (1 point) Network layer protocol that reports on the success or failure of data delivery:
    (a) IP;
    (b) TCP;
    (c) ARP;
    (d) ICMP;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Is there possible to have connection-oriented but unordered protocol?

   .....

2. (2 points) Name the protocol that allows to obtain a host name from an IP address.

   .....

3. (2 points) Name the OSI layer that uses logical addresses.

   .....

4. (2 points) Name the two types of routing table construction (main routing types).

   .....

5. (2 points) Name the notation that allows us to write 1.2.3.0/26.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Give three differences between TCP and UDP.

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   .....

2. (3 points) How do you find the broadcast address from an IP address and netmask?

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3. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the MAN.

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4. (3 points) What is guided communication medium? Give two examples.

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5. (3 points) Give three reasons for using layered protocols.

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   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe NAT and private addresses.
2. (10 points) Describe the structure, characteristics or limitations of the following communication medium:
   (a) twisted pair;
   (b) coaxial cable;
   (c) fiber optics;

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What is the name of the process of subdividing a single class of network into multiple, smaller logical networks, or segments?
   (a) masking;
   (b) segmentation;
   (c) fragmentation;
   (d) subnetting;
2. (1 point) A hierarchical way of associating host names with IP addresses is known as:
   (a) ARP;
   (b) DNS;
   (c) RARP;
   (d) IP;
   (e) LDAP;
3. (1 point) Segmentation of a data stream happens at which layer of the OSI model?
   (a) physical;
   (b) data link;
   (c) network;
   (d) transport;
4. (1 point) What are some of the disadvantages of a star network?
   (a) less secure;
   (b) requires more cable than bus;
   (c) requires more cable than ring;
   (d) less scalable than bus or ring;
5. (1 point) This protocol that belongs to the transport layer of the OSI model is a connectionless transport service:
   (a) TCP;
   (b) UDP;
   (c) IP;
   (d) HTTP;
   (e) ARP;
6. (1 point) What can be said about TCP?
   (a) it is a connectionless protocol;
   (b) it is a connection-oriented protocol;
   (c) it does not use checksums;
   (d) it does not ensure reliable data delivery;
   (e) it provides segmentation and reassembly;
7. (1 point) Which of the following devices are layer 1 devices?
   (a) bridge;
   (b) repeater;
   (c) router;
   (d) switch;
   (e) hub;
8. (1 point) Which of the following services use TCP?
   (a) ARP;
   (b) DNS;
   (c) HTTP;
   (d) ICMP;
   (e) RIP;
9. (1 point) Which fields are contained within an Ethernet frame header?
   (a) source and destination hardware addresses;
   (b) source and destination network addresses;
   (c) error correction code;
   (d) authentication code;
10. (1 point) How many octets are in a valid IPv4 address?
    (a) 16;
    (b) 4;
    (c) 32;
    (d) 8;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer at which routing is implemented.
   .....
2. (2 points) What is the class C private IP address space? (Ex: 1.x.x.x)
   .....
3. (2 points) Name the network topology in which the data flows in only one direction through the physical medium.
   .....
4. (2 points) Name the network type that is deployed for large cities.
   .....

5. (2 points) Do packets encapsulate segments or do segments encapsulate packets?

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Describe full-duplex and half-duplex communication.

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   .....

2. (3 points) Give three examples of distinct applications for which connection-less communication is appropriate.

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3. (3 points) Characterize a client host in a client-server network type.

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4. (3 points) How do you find the network address from an IP address and netmask?

   .....

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5. (3 points) Give the OSI layers in the correct order.

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(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the working principle of link-state routing algorithms.
2. (10 points) Describe the ARP protocol.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) To ensure data integrity further, connection-oriented protocols such as TCP use a:
   (a) digital signature;
   (b) digital certificate;
   (c) symmetric encryption algorithm;
   (d) checksum;
2. (1 point) Which of the following types of connections can use full duplex?
   (a) hub to hub;
   (b) switch to switch;
   (c) host to host;
   (d) switch to hub;
   (e) switch to host;
3. (1 point) Which of the following are benefits in using fiber cabling?
   (a) reliability;
   (b) requires special equipment;
   (c) throughput;
   (d) low security levels;
4. (1 point) What are some of the advantages of a star network?
   (a) fault-tolerant;
   (b) requires less cable than bus;
   (c) requires less cable than ring;
   (d) it can easily be changed, isolated, or interconnected with other networks;
5. (1 point) What can be said about TCP?
   (a) it does not use checksums;
   (b) it is a connectionless protocol;
   (c) it provides flow control;
   (d) it does not ensure reliable data delivery;
6. (1 point) What is the core protocol responsible for logical addressing for TCP/IP?
   (a) MAC;
   (b) TCP;
   (c) ARP;
   (d) IP;
7. (1 point) Which OSI layer provides translation of data?
   (a) application;
   (b) presentation;
   (c) session;
   (d) transport;
   (e) data link;
8. (1 point) The IP address 127.0.0.1 is also known as:
   (a) loopback address;
   (b) broadcast address;
   (c) multicast address;
   (d) class A broadcast address;
9. (1 point) Which of the following statements is true?
   (a) subnet masks are assigned only to devices from a class A network;
   (b) devices are assigned a subnet mask only if they belong to a subnetted network;
   (c) devices are always assigned a subnet mask;
   (d) subnet masks are assigned only to devices from a class A or B network;
10. (1 point) A part of a network is also known as:
    (a) LAN;
    (b) segment;
    (c) ethernet;
    (d) route;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that divides the transmitted bit stream into frames.

   .....

2. (2 points) Name the device that creates one big collision domain and one large broadcast domain.

   .....

3. (2 points) Is there possible to have connection-less but reliable protocols?

   .....

4. (2 points) Is the DNS naming system a flat naming system or a hierarchical one?

   .....

5. (2 points) Name the network topology in which there is a device that could become a central (single) point of failure.

.....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is shared communication medium? Give two examples.

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2. (3 points) What is the bit length, expression form, and structure of an IP version 4 address?

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3. (3 points) What is static routing?

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4. (3 points) Give the reason for using ports in the case of TCP and UDP.

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5. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the WAN.

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(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe segmentation and reasembly in the case of TCP protocol.
2. (10 points) Describe the functions and working principle of the router.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) Which of the following are unique characteristics of half-duplex Ethernet when compared to full-duplex Ethernet?
   (a) half-duplex operates in a shared collision domain;
   (b) half-duplex operates in a private collision domain;
   (c) half-duplex has higher effective throughput;
   (d) half-duplex has lower effective throughput;
   (e) half-duplex operates in a private broadcast domain;
2. (1 point) Which of the following statements is true regarding a switch?
   (a) it creates a single collision domain and a single broadcast domain;
   (b) it creates separate collision domains but one broadcast domain;
   (c) it creates separate collision domains and separate broadcast domains;
3. (1 point) To what layer of the OSI model does the Internet Protocol (IP) belong?
   (a) network;
   (b) transport;
   (c) data link;
   (d) application;
4. (1 point) A node initiates data exchange based on logical addresses through what OSI layer?
   (a) transport;
   (b) physical;
   (c) network;
   (d) application;
5. (1 point) What can be said about IP?
   (a) IP is a reliable protocol;
   (b) IP is an unreliable protocol;
   (c) IP is a connection-oriented protocol;
   (d) IP is a connectionless protocol;
6. (1 point) Which of the following terms refers to a protected connection for data exchange between two parties?
   (a) link;
   (b) session;
   (c) traffic;
   (d) medium;
7. (1 point) Which of the following application protocols are appropriate for email sending?
   (a) SMTP;
   (b) DNS;
   (c) HTTP;
   (d) FTP;
   (e) SSH;
   (f) IMAP;
   (g) POP3;
8. (1 point) On a TCP header, what field indicates how many segments the sender can issue to a receiver without acknowledgment?
   (a) acknowledge number;
   (b) window;
   (c) reserved;
   (d) checksum;
9. (1 point) What are the purposes for segmentation with a bridge?
   (a) add more broadcast domains;
   (b) create more collision domains;
   (c) add more bandwidth for users;
   (d) allow more broadcast for users;
   (e) reduce collisions within a broadcast domain;
10. (1 point) What types of signals are typically used by Wireless LANs?
    (a) infrared;
    (b) radiofrequency (RF);
    (c) UTP;
    (d) laser;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layers that the Ethernet specification describes?
   .....
2. (2 points) Name the device that splits a large broadcast domain into smaller ones.
   .....
3. (2 points) Name the OSI layer that uses hardware addresses.
   .....

4. (2 points) Name the method used to split one large network class into smaller network ranges.

   .....

5. (2 points) Name the protocol that allows to obtain the IP address from a hardware address?

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Describe the concept of network architecture.

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   .....
   .....

2. (3 points) What is the bit length, expression form, and structure of an IP version 6 address?

   .....
   .....
   .....

3. (3 points) Give three examples of distinct applications for which unreliable communication is appropriate.

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   .....

4. (3 points) Give the TCP/IP layers in the correct order.

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   .....
   .....

5. (3 points) What is dynamic routing?

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   .....
   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the functions and working principle of the switch.
2. (10 points) Describe the UDP PDU.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) You want to use full-duplex Ethernet instead of half-duplex. Which of the following will be benefits on your network?
   (a) you will have more collision domains;
   (b) you will have less broadcast domains;
   (c) it should be faster;
   (d) it will eliminate the need of switches;
2. (1 point) What can be said about subnet masks?
   (a) they can be expressed using hexadecimal notation;
   (b) they are composed of four octets;
   (c) they are composed of three octets;
   (d) they can be expressed using octal notation;
3. (1 point) What can be said about ARP?
   (a) ARP creates an ARP cache for efficiency;
   (b) ARP creates an ARP table for security;
   (c) ARP does not create a MAC-to-IP table;
   (d) ARP table and ARP cache are two completely different things;
4. (1 point) What IP address will you use to send a message to all devices connected to your network segment?
   (a) 0.0.0.0;
   (b) 127.0.0.1;
   (c) 255.0.0.0;
   (d) 255.255.255.255;
5. (1 point) Transport layer protocols that establish a connection with another node before they begin transmitting data are known as:
   (a) connectionless protocols;
   (b) syn-oriented protocols;
   (c) connection-oriented protocols;
   (d) ack-oriented protocols;
6. (1 point) What layer of the OSI model is responsible for accepting data from the session layer and managing end-to-end delivery of data?
   (a) data link;
   (b) presentation;
   (c) transport;
   (d) network;
7. (1 point) Which of the following devices are layer 3 devices?
   (a) bridge;
   (b) repeater;
   (c) router;
   (d) switch;
   (e) hub;
8. (1 point) The physical layout of a computer network is known as:
   (a) protocol;
   (b) topology;
   (c) backbone;
   (d) segment;
9. (1 point) Which of the following are layers in the TCP/IP model?
   (a) transport;
   (b) application;
   (c) presentation;
   (d) host to network;
   (e) internet;
   (f) session;
10. (1 point) What is the result of segmenting a network with a bridge?
    (a) it increases the number of collision domains;
    (b) it decreases the number of collision domains;
    (c) it increases the number of broadcast domains;
    (d) it decreases the number of broadcast domains;
    (e) it makes smaller collision domains;
    (f) it makes larger collision domains;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the network type that exibits high latency at the end nodes.
   .....
2. (2 points) Name the OSI layer that uses frames.
   .....
3. (2 points) Name the device that creates smaller collision domains and one large broadcast domain.
   .....

4. (2 points) What is the class B private IP address space? (Ex: 1.2.3.x or 1.x.x.x/y)

   .....

5. (2 points) Do packets encapsulate datagrams or do datagrams encapsulate packets?

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Give three examples of usages for cross-over cables.

   .....

   .....

   .....

2. (3 points) Give three ways in which the OSI model and the TCP/IP model are the same.

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   .....

3. (3 points) What is the bit length, expression form, and structure of a MAC address?

   .....

   .....

   .....

4. (3 points) Give five examples of network topologies.

   .....

   .....

   .....

5. (3 points) What is the 127.0.0.1 address used for? How about 255.255.255.255?

   .....

   .....

   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Compare the OSI and TCP/IP models.
2. (10 points) Describe the Data Link frame.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What transport layer protocol does a client use to broadcast a DHCP discover packet?
   (a) ARP;
   (b) TCP;
   (c) IP;
   (d) UDP;
2. (1 point) A process socket local address is equal to:
   (a) port number + IP address;
   (b) IP address;
   (c) Port number;
   (d) IP address + hostname + port number;
3. (1 point) Which of the following devices are layer 2 devices?
   (a) bridge;
   (b) repeater;
   (c) router;
   (d) switch;
   (e) hub;
4. (1 point) What can be said about IP addresses within a LAN?
   (a) two devices can share the same IP address;
   (b) exactly two devices can share an IP address at a time;
   (c) exactly one device can use an IP address at a time;
   (d) several devices can share the same IP address;
5. (1 point) What is the topology that consists of a single cable connecting all nodes on a network without intervening connectivity devices?
   (a) ring;
   (b) star;
   (c) ring-star;
   (d) bus;
6. (1 point) What type of cable consists of a copper core, metal shielding, and a jacket?
   (a) fiber-optic;
   (b) coaxial;
   (c) UTP;
   (d) twisted-pair;
7. (1 point) Which of the following is true regarding layer 2 switches?
   (a) a switch is a hub with more ports;
   (b) a switch is a multiport bridge;
   (c) switches learn IP addresses from each frame source IP address;
   (d) switches learn MAC addresses from each frame source MAC address;
8. (1 point) Network layer protocol that obtains the MAC (physical) address of a host, or node, then creates a database that maps the MAC address to the host's IP (logical) address:
   (a) ARP;
   (b) UDP;
   (c) IP;
   (d) DNS;
   (e) RARP;
9. (1 point) Which of the following are reasons for breaking up a network into two segments with a router?
   (a) to create fewer broadcast domains;
   (b) to create more broadcast domains;
   (c) to create one large broadcast domain;
10. (1 point) PDUs at the OSI network layer are called?
    (a) transport;
    (b) frame;
    (c) packet;
    (d) segment;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that uses packets.

   .....

2. (2 points) Can a single IP address have multiple DNS names?

   .....

3. (2 points) What is the class A private IP address space? (Ex: 1.2.x.x)

   .....

4. (2 points) Name the protocol that allows to obtain the hardware address from an IP address?

   .....

5. (2 points) Do frames encapsulate packets or do packets encapsulate frames?

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Give three examples of usages for straight-through cables.

   .....
   .....
   .....

2. (3 points) Describe the concept of network topology.

   .....
   .....
   .....

3. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the LAN.

   .....
   .....
   .....

4. (3 points) Give three reasons for using layered protocols.

   .....
   .....
   .....

5. (3 points) Give three differences between TCP and UDP.

   .....
   .....
   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the working principle of distance vector dynamic routing algorithms.
2. (10 points) Describe the five classes of network addresses.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) The device inside a computer that connects a computer to the network media, thus allowing it to communicate with other computers:
   (a) motherboard;
   (b) fax;
   (c) bus;
   (d) NIC;
2. (1 point) Which are the transport layer protocols in the TCP/IP suite?
   (a) TCP;
   (b) ARP;
   (c) IP;
   (d) UDP;
   (e) HTTP;
3. (1 point) What protocol is used to find the hardware address of a local device?
   (a) RARP;
   (b) ARP;
   (c) IP;
   (d) ICPM;
   (e) BootP;
4. (1 point) Protocols on this layer coordinate and maintain connections between two nodes on the network:
   (a) application;
   (b) presentation;
   (c) data link;
   (d) session;
5. (1 point) What will a NIC on an Ethernet do in case of a collision?
   (a) it will immediately stop transmitting;
   (b) it will keep transmitting;
   (c) it will wait for 10 minutes before transmitting again;
   (d) it will wait for 2 minutes before transmitting again;
6. (1 point) What kind of transport layer protocols are more useful in situations where data must be transferred quickly?
   (a) connectionless protocols;
   (b) syn-oriented protocols;
   (c) connection-oriented protocols;
   (d) ack-oriented protocols;
7. (1 point) Which of the following describe router functions?
   (a) packet switching;
   (b) collision prevention;
   (c) packet filtering;
   (d) broadcast domain enlargement;
   (e) internetwork communication;
   (f) broadcast forwarding;
   (g) path selection;
8. (1 point) What is the name of the protocol that allows a client to send a broadcast message with its MAC address and receive an IP address in reply?
   (a) ARP;
   (b) RARP;
   (c) DNS;
   (d) RDNS;
   (e) RevMAC;
9. (1 point) What are the main functions of layer 2 switching (switch)?
   (a) address learning;
   (b) routing;
   (c) forwarding and filtering;
   (d) creating network loops;
   (e) loop avoidance;
   (f) IP addressing;
10. (1 point) Which of the following services use UDP?
    (a) SMTP;
    (b) DNS;
    (c) ARP;
    (d) ICMP;
    (e) RIP;
    (f) HTTP;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the device that uses hardware addresses to filter the network traffic?

.....

2. (2 points) Name the OSI layer that determines which route through the networks to use.

   .....

3. (2 points) Name the network topology in which there is no need for additional network devices.

   .....

4. (2 points) Name the type of communication from one entity to all the others?

   .....

5. (2 points) Name the protocol that is used to implement the traceroute utility? (It is also used by routers to inform hosts of differenet events.)

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) How do you find the broadcast address from an IP address and netmask?

   .....

   .....

   .....

2. (3 points) Describe full-duplex and half-duplex communication.

   .....

   .....

   .....

3. (3 points) Characterize a server host in a client-server network type.

   .....

   .....

   .....

4. (3 points) Give three examples of distinct applications for which connection-less communication is appropriate.

   .....

   .....

   .....

5. (3 points) How do you find the network address from an IP address and netmask?

   .....

   .....

   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe sequencing in the case of TCP protocol.
2. (10 points) Describe the pure ALOHA and slotted ALOHA algorithms. Compare their maximum throughput.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What layer of the OSI model serves as a translator for system applications?
   (a) transport;
   (b) session;
   (c) presentation;
   (d) network;
2. (1 point) What are some of the disadvantages of a ring topology?
   (a) it does not scale well;
   (b) a single malfunctioning workstation can disable the entire network;
   (c) it is very flexible;
   (d) it is a bidirectional topology;
3. (1 point) What is a valid IPv4 address example?
   (a) 144.92.254.253;
   (b) 144-92-43-178;
   (c) 144.92.256.176;
   (d) 144,92,43,178;
4. (1 point) On what layer of the OSI model does TCP operate?
   (a) physical;
   (b) data link;
   (c) session;
   (d) transport;
5. (1 point) A special 32-bit number that, when combined with a device's IP address, informs the rest of the network about the segment or network to which the device is attached:
   (a) subnet mask;
   (b) ARP address;
   (c) MAC address;
   (d) DNS mask;
6. (1 point) A computer on the network that requests resources or services from another computer on a network:
   (a) server;
   (b) connectivity device;
   (c) client;
   (d) database server;
7. (1 point) What is the name of the process of determining the best communication path over a computer network?
   (a) routing;
   (b) path finding;
   (c) linking;
   (d) connecting;
8. (1 point) What connectivity device enables multiple nodes to simultaneously transmit and receive data over different network segments?
   (a) hub;
   (b) repeater;
   (c) switch;
   (d) amplifier;
9. (1 point) What can be said about IP?
   (a) IP is a reliable protocol;
   (b) IP operates a the data link layer of the OSI model;
   (c) IP is based on IPX;
   (d) IP contains a header checksum field;
   (e) IP checksum also verifies the integrity of the message;
10. (1 point) Which of the following application protocols are appropriate for email receiving?
    (a) SMTP;
    (b) DNS;
    (c) HTTP;
    (d) FTP;
    (e) SSH;
    (f) IMAP;
    (g) POP3;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the type of communication between exact two entities?

   .....

2. (2 points) Name the OSI layer that segments and reassembles data into a data stream.

   .....

3. (2 points) Name the network type that exibits hight bandwidth at the end nodes.

   .....

4. (2 points) Name the OSI layer that uses logical addresses.

   .....

5. (2 points) Name the network topology in which the data flows in only one direction through the physical medium.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is guided communication medium? Give two examples.

   .....

   .....

   .....

2. (3 points) Characterize a client host in a client-server network type.

   .....

   .....

   .....

3. (3 points) Give the OSI layers in the correct order.

   .....

   .....

   .....

4. (3 points) What is the bit length, expression form, and structure of an IP version 4 address?

   .....

   .....

   .....

5. (3 points) Give five examples of network topologies.

   .....

   .....

   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the ICMP protocol.
2. (10 points) Describe the star network topology. (Characteristics, devices, general working principle.)

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) Which of the following is a layer 2 protocol used to maintain a loop-free network?
   (a) VTP;
   (b) STP;
   (c) RIP;
   (d) CDP;

2. (1 point) What type of transmission allows one device to send data to a specific group of devices (not necessarily the entire network segment)?
   (a) unicasting;
   (b) broadcasting;
   (c) multicasting;
   (d) point-to-point;

3. (1 point) When data is encapsulated, which is the correct order?
   (a) data, frame, packet, segment, bit;
   (b) segment, data, packet, frame, bit;
   (c) data, segment, packet, frame, bit;
   (d) data, segment, frame, packet, bit;

4. (1 point) What is the physical topology where every node on the network is connected through a central device, such as a hub or switch?
   (a) bus;
   (b) ring;
   (c) star;
   (d) bus-ring;

5. (1 point) What can be said about UDP?
   (a) TCP is more secure than UDP;
   (b) UDP is more reliable than TCP;
   (c) UDP also uses checksums;
   (d) TCP produces more transmission overhead than UDP;

6. (1 point) What is the address range of a class B network address in binary?
   (a) 01...;
   (b) 110...;
   (c) 10..;
   (d) 0...;
   (e) 111...;

7. (1 point) What protocols belong to the transport layer of the OSI model?
   (a) IP;
   (b) TCP;
   (c) ICMP;
   (d) ARP;
   (e) UDP;
   (f) HTTP;

8. (1 point) A computer on the network that manages shared resources:
   (a) client;
   (b) server;
   (c) workstation;
   (d) client software;

9. (1 point) Regarding the OSI model, routers belong to the:
   (a) physical layer;
   (b) data link layer;
   (c) session layer;
   (d) network layer;

10. (1 point) What does a switch do when a frame is received on an interface and the destination hardware address is unknown?
    (a) forwards the packet to the first available link;
    (b) drops the frame;
    (c) broadcasts to the network with the frame;
    (d) queries the name server for the name resolution;
    (e) sends a message to the originating station asking for name resolution;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the protocol that allows to obtain a host name from an IP address.
   .....
2. (2 points) Name the layer at which data is formatted, encoded and converted to be used for use on the network.
   .....
3. (2 points) Name the two types of routing table construction (main routing types).
   .....

4. (2 points) Name the device that creates one big collision domain and one large broadcast domain.

   .....

5. (2 points) What is the class C private IP address space? (Ex: 1.x.x.x)

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is dynamic routing?

   .....
   .....
   .....

2. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the MAN.

   .....
   .....
   .....

3. (3 points) Give the reason for using ports in the case of TCP and UDP.

   .....
   .....
   .....

4. (3 points) Give three examples of usages for straight-through cables.

   .....
   .....
   .....

5. (3 points) Give three ways in which the OSI model and the TCP/IP model are the same.

   .....
   .....
   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe subnetting.
2. (10 points) Describe the IP version 6 PDU.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) For the OSI model, each layer from the source node communicates with which layer on the destination node(s):
   (a) the same layer;
   (b) the layer below;
   (c) the layer above;
   (d) any higher layer;
2. (1 point) The address/number on a host where an application or service makes itself available to incoming or outgoing data is also known as:
   (a) IP address;
   (b) MAC address;
   (c) NIC address;
   (d) port;
3. (1 point) What does CSMA/CD stand for?
   (a) Carrier Service Multiple Access with Collision Detection;
   (b) Carrier Sense Multiple Access with Collision Avoidance;
   (c) Carrier Sense Multiple Access with Collision Detection;
   (d) Control Sense Multiple Access with Collision Direction;
4. (1 point) What is the network topology where each node is connected to the two nearest nodes so that the entire network forms a circle?
   (a) bus;
   (b) ring;
   (c) star;
   (d) bus-star;
5. (1 point) Which protocol will you use to automate the IP configuration (IP address, netmask, default gateway, DNS server)?
   (a) SMTP;
   (b) SNMP;
   (c) DHCP;
   (d) ARP;
6. (1 point) How many layers does the OSI model have for network communications?
   (a) 10;
   (b) 5;
   (c) 7;
   (d) 4;
7. (1 point) What can be said about TCP/IP?
   (a) TCP/IP comprises several subprotocols;
   (b) TCP/IP comprises only one protocol;
   (c) TCP/IP has been replaced by ARP;
   (d) TCP/IP has been replaced by IPX/SPX;
8. (1 point) On a TCP header, what field allows the receiving node to determine whether the TCP segment became corrupted during transmission?
   (a) checksum;
   (b) flags;
   (c) hash;
   (d) padding;
9. (1 point) Which of the following describes a MAC address?
   (a) it is a globally unique IP address;
   (b) it is a unique address in a broadcast domain;
   (c) it is provided by the manufacturer of the network card;
   (d) it is a logical address;
10. (1 point) What does WLAN stand for?
    (a) Wide LAN;
    (b) Wild LAN;
    (c) Web LAN;
    (d) Wireless LAN;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that specifies voltage, wire speed, pinout cables, and moves bits between devices.
   .....
2. (2 points) Is there possible to have connection-oriented but unordered protocol?
   .....
3. (2 points) Name the network type that is deployed for large cities.
   .....
4. (2 points) Do packets encapsulate segments or do segments encapsulate packets?
   .....

5. (2 points) Name the OSI layers that the Ethernet specification describes?

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is the 127.0.0.1 address used for? How about 255.255.255.255?

   .....
   .....
   .....

2. (3 points) Describe the concept of network architecture.

   .....
   .....
   .....

3. (3 points) Give three examples of usages for cross-over cables.

   .....
   .....
   .....

4. (3 points) Give three examples of distinct applications for which unreliable communication is appropriate.

   .....
   .....
   .....

5. (3 points) Give three differences between TCP and UDP.

   .....
   .....
   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the IP version 4 PDU.
2. (10 points) Describe the functions and service primitives of the following OSI layers:
   (a) network;
   (b) transport;
   (c) session;
   (d) presentation;

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) On what network topology are the devices responsible for relaying data from one point to another?
   (a) star;
   (b) bus;
   (c) ring;
2. (1 point) What protocol allows TCP/IP to interconnect multiple networks?
   (a) TCP;
   (b) IP;
   (c) UDP;
   (d) ARP;
3. (1 point) Acknowledgements, sequencing, and flow control are characteristic of which OSI layer?
   (a) layer 2;
   (b) layer 3;
   (c) layer 4;
   (d) layer 7;
4. (1 point) Which class of IP address provides a maximum of only 254 host addresses per network?
   (a) class A;
   (b) class B;
   (c) class C;
   (d) class D;
5. (1 point) The purpose of this equipment is to convert analog signals into digital signals and vice versa to be transmitted over a computer network:
   (a) modem;
   (b) phone line;
   (c) repeater;
   (d) hub;
6. (1 point) Which of the following services use TCP?
   (a) ARP;
   (b) DNS;
   (c) HTTP;
   (d) ICMP;
   (e) RIP;
7. (1 point) What is true about a ring topology?
   (a) like a bus topology, data does not stop at its destination;
   (b) like a bus topology, it also needs terminators;
   (c) it is an active topology;
   (d) it is bidirectional;
8. (1 point) What is the name for the distinct units of data that are transmitted from one node on a network to another?
   (a) protocols;
   (b) queries;
   (c) packets;
   (d) signals;
9. (1 point) Network layer protocol that reports on the success or failure of data delivery:
   (a) IP;
   (b) TCP;
   (c) ARP;
   (d) ICMP;
10. (1 point) What layer of the OSI model usually manages data encryption and decryption?
    (a) presentation;
    (b) session;
    (c) data link;
    (d) physical;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that uses hardware addresses.

   .....

2. (2 points) Is there possible to have connection-less but reliable protocols?

   .....

3. (2 points) Name the network topology in which there is a device that could become a central (single) point of failure.

   .....

4. (2 points) Name the notation that allows us to write 1.2.3.0/26.

   .....

5. (2 points) Name the device that splits a large broadcast domain into smaller ones.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is shared communication medium? Give two examples.

   .....
   .....
   .....

2. (3 points) Describe the concept of network topology.

   .....
   .....
   .....

3. (3 points) Give the TCP/IP layers in the correct order.

   .....
   .....
   .....

4. (3 points) What is the bit length, expression form, and structure of a MAC address?

   .....
   .....
   .....

5. (3 points) How do you find the broadcast address from an IP address and netmask?

   .....
   .....
   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the routing process and routing table in the case of IP.
2. (10 points) Describe the Flag bytes with byte stuffing framing method.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What is the name of the process of subdividing a single class of network into multiple, smaller logical networks, or segments?
   (a) masking;
   (b) segmentation;
   (c) fragmentation;
   (d) subnetting;
2. (1 point) Which of the following devices are layer 1 devices?
   (a) bridge;
   (b) repeater;
   (c) router;
   (d) switch;
   (e) hub;
3. (1 point) What can be said about TCP?
   (a) it is a connectionless protocol;
   (b) it is a connection-oriented protocol;
   (c) it does not use checksums;
   (d) it does not ensure reliable data delivery;
   (e) it provides segmentation and reassembly;
4. (1 point) What are the TCP/IP protocols that run at the transport layer of the OSI model and provides reliable data delivery services?
   (a) UDP;
   (b) IP;
   (c) TCP;
   (d) ARP;
   (e) HTTP;
5. (1 point) A hierarchical way of associating host names with IP addresses is known as:
   (a) ARP;
   (b) DNS;
   (c) RARP;
   (d) IP;
   (e) LDAP;
6. (1 point) Which of the following application protocols is the most appropriate for file transfer?
   (a) SMTP;
   (b) DNS;
   (c) HTTP;
   (d) FTP;
   (e) SSH;
   (f) IMAP;
   (g) POP3;
7. (1 point) What are some of the disadvantages of a star network?
   (a) less secure;
   (b) requires more cable than bus;
   (c) requires more cable than ring;
   (d) less scalable than bus or ring;
8. (1 point) Segmentation of a data stream happens at which layer of the OSI model?
   (a) physical;
   (b) data link;
   (c) network;
   (d) transport;
9. (1 point) Which fields are contained within an Ethernet frame header?
   (a) source and destination hardware addresses;
   (b) source and destination network addresses;
   (c) error correction code;
   (d) authentication code;
10. (1 point) To ensure data integrity further, connection-oriented protocols such as TCP use a:
    (a) digital signature;
    (b) digital certificate;
    (c) symmetric encryption algorithm;
    (d) checksum;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer at which routing is implemented.

   .....

2. (2 points) Is the DNS naming system a flat naming system or a hierarchical one?

   .....

3. (2 points) Name the device that creates smaller collision domains and one large broadcast domain.

   .....

4. (2 points) Name the protocol that allows to obtain the IP address from a hardware address?

   .....

5. (2 points) Name the OSI layer that supports flow control and sequencing.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Give three examples of distinct applications for which connection-less communication is appropriate.

   .....

   .....

   .....

2. (3 points) Characterize a server host in a client-server network type.

   .....

   .....

   .....

3. (3 points) What is static routing?

   .....

   .....

   .....

4. (3 points) What is the bit length, expression form, and structure of an IP version 6 address?

   .....

   .....

   .....

5. (3 points) Characterize a client host in a client-server network type.

   .....

   .....

   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Compare ADSL and Cable
2. (10 points) Describe the working principle of token ring.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) How many octets are in a valid IPv4 address?
   (a) 16;
   (b) 4;
   (c) 32;
   (d) 8;
2. (1 point) Which of the following are benefits in using fiber cabling?
   (a) reliability;
   (b) requires special equipment;
   (c) throughput;
   (d) low security levels;
3. (1 point) This protocol that belongs to the transport layer of the OSI model is a connectionless transport service:
   (a) TCP;
   (b) UDP;
   (c) IP;
   (d) HTTP;
   (e) ARP;
4. (1 point) Which of the following types of connections can use full duplex?
   (a) hub to hub;
   (b) switch to switch;
   (c) host to host;
   (d) switch to hub;
   (e) switch to host;
5. (1 point) What are some of the advantages of a star network?
   (a) fault-tolerant;
   (b) requires less cable than bus;
   (c) requires less cable than ring;
   (d) it can easily be changed, isolated, or interconnected with other networks;
6. (1 point) What layer of the OSI model is in charge of translating network addresses into their physical counterparts and decides how to route data from the sender to the receiver?
   (a) transport;
   (b) network;
   (c) session;
   (d) physical;
7. (1 point) Which OSI layer provides translation of data?
   (a) application;
   (b) presentation;
   (c) session;
   (d) transport;
   (e) data link;
8. (1 point) What can be said about TCP?
   (a) it does not use checksums;
   (b) it is a connectionless protocol;
   (c) it provides flow control;
   (d) it does not ensure reliable data delivery;
9. (1 point) What is the core protocol responsible for logical addressing for TCP/IP?
   (a) MAC;
   (b) TCP;
   (c) ARP;
   (d) IP;
10. (1 point) Which of the following statements is true?
    (a) subnet masks are assigned only to devices from a class A network;
    (b) devices are assigned a subnet mask only if they belong to a subnetted network;
    (c) devices are always assigned a subnet mask;
    (d) subnet masks are assigned only to devices from a class A or B network;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer which is responsible for creating, managing and terminating the dialogue.

   .....

2. (2 points) What is the class B private IP address space? (Ex: 1.2.3.x or 1.x.x.x/y)

   .....

3. (2 points) Name the network type that exibits high latency at the end nodes.

   .....

4. (2 points) Do packets encapsulate datagrams or do datagrams encapsulate packets?

   .....

5. (2 points) Can a single IP address have multiple DNS names?

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the MAN.

   .....

   .....

   .....

2. (3 points) What is dynamic routing?

   .....

   .....

   .....

3. (3 points) Give the OSI layers in the correct order.

   .....

   .....

   .....

4. (3 points) Give three reasons for using layered protocols.

   .....

   .....

   .....

5. (3 points) What is guided communication medium? Give two examples.

   .....

   .....

   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the TCP segment.
2. (10 points) Describe the Ethernet frame.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) The IP address 127.0.0.1 is also known as:
   (a) loopback address;
   (b) broadcast address;
   (c) multicast address;
   (d) class A broadcast address;
2. (1 point) Transport layer protocols that establish a connection with another node before they begin transmitting data are known as:
   (a) connectionless protocols;
   (b) syn-oriented protocols;
   (c) connection-oriented protocols;
   (d) ack-oriented protocols;
3. (1 point) What IP address will you use to send a message to all devices connected to your network segment?
   (a) 0.0.0.0;
   (b) 127.0.0.1;
   (c) 255.0.0.0;
   (d) 255.255.255.255;
4. (1 point) Which of the following are unique characteristics of half-duplex Ethernet when compared to full-duplex Ethernet?
   (a) half-duplex operates in a shared collision domain;
   (b) half-duplex operates in a private collision domain;
   (c) half-duplex has higher effective throughput;
   (d) half-duplex has lower effective throughput;
   (e) half-duplex operates in a private broadcast domain;
5. (1 point) What are the purposes for segmentation with a bridge?
   (a) add more broadcast domains;
   (b) create more collision domains;
   (c) add more bandwidth for users;
   (d) allow more broadcast for users;
   (e) reduce collisions within a broadcast domain;
6. (1 point) To what layer of the OSI model does the Internet Protocol (IP) belong?
   (a) network;
   (b) transport;
   (c) data link;
   (d) application;
7. (1 point) What can be said about IP?
   (a) IP is a reliable protocol;
   (b) IP is an unreliable protocol;
   (c) IP is a connection-oriented protocol;
   (d) IP is a connectionless protocol;
8. (1 point) A part of a network is also known as:
   (a) LAN;
   (b) segment;
   (c) ethernet;
   (d) route;
9. (1 point) Which of the following application protocols are appropriate for email sending?
   (a) SMTP;
   (b) DNS;
   (c) HTTP;
   (d) FTP;
   (e) SSH;
   (f) IMAP;
   (g) POP3;
10. (1 point) What can be said about ARP?
    (a) ARP creates an ARP cache for efficiency;
    (b) ARP creates an ARP table for security;
    (c) ARP does not create a MAC-to-IP table;
    (d) ARP table and ARP cache are two completely different things;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that uses frames.
   .....
2. (2 points) Do frames encapsulate packets or do packets encapsulate frames?
   .....
3. (2 points) What is the class A private IP address space? (Ex: 1.2.x.x)
   .....
4. (2 points) Name the OSI layer that uses packets.
   .....

5. (2 points) Name the device that uses hardware addresses to filter the network traffic?

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the WAN.

   .....

   .....

   .....

2. (3 points) How do you find the network address from an IP address and netmask?

   .....

   .....

   .....

3. (3 points) Describe full-duplex and half-duplex communication.

   .....

   .....

   .....

4. (3 points) Give the reason for using ports in the case of TCP and UDP.

   .....

   .....

   .....

5. (3 points) Give three examples of usages for straight-through cables.

   .....

   .....

   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the RARP protocol.
2. (10 points) Describe DNS.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) Which of the following devices are layer 3 devices?
   (a) bridge;
   (b) repeater;
   (c) router;
   (d) switch;
   (e) hub;
2. (1 point) On a TCP header, what field indicates how many segments the sender can issue to a receiver without acknowledgment?
   (a) acknowledge number;
   (b) window;
   (c) reserved;
   (d) checksum;
3. (1 point) You want to use full-duplex Ethernet instead of half-duplex. Which of the following will be benefits on your network?
   (a) you will have more collision domains;
   (b) you will have less broadcast domains;
   (c) it should be faster;
   (d) it will eliminate the need of switches;
4. (1 point) What layer of the OSI model is responsible for accepting data from the session layer and managing end-to-end delivery of data?
   (a) data link;
   (b) presentation;
   (c) transport;
   (d) network;
5. (1 point) Which of the following statements is true regarding a switch?
   (a) it creates a single collision domain and a single broadcast domain;
   (b) it creates separate collision domains but one broadcast domain;
   (c) it creates separate collision domains and separate broadcast domains;
6. (1 point) Which of the following terms refers to a protected connection for data exchange between two parties?
   (a) link;
   (b) session;
   (c) traffic;
   (d) medium;
7. (1 point) What types of signals are typically used by Wireless LANs?
   (a) infrared;
   (b) radiofrequency (RF);
   (c) UTP;
   (d) laser;
8. (1 point) The physical layout of a computer network is known as:
   (a) protocol;
   (b) topology;
   (c) backbone;
   (d) segment;
9. (1 point) What transport layer protocol does a client use to broadcast a DHCP discover packet?
   (a) ARP;
   (b) TCP;
   (c) IP;
   (d) UDP;
10. (1 point) Which of the following devices are layer 2 devices?
    (a) bridge;
    (b) repeater;
    (c) router;
    (d) switch;
    (e) hub;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that uses logical addresses.

   .....

2. (2 points) Name the type of communication from one entity to all the others?

   .....

3. (2 points) Name the network type that exibits hight bandwidth at the end nodes.

   .....

4. (2 points) Name the protocol that allows to obtain the hardware address from an IP address?

   .....

5. (2 points) Name the method used to split one large network class into smaller network ranges.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the LAN.

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2. (3 points) Give five examples of network topologies.

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3. (3 points) Give three examples of usages for cross-over cables.

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4. (3 points) What is the bit length, expression form, and structure of an IP version 4 address?

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5. (3 points) Give three ways in which the OSI model and the TCP/IP model are the same.

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(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the functions and service primitives, and give two examples of protocols for the following TCP/IP layers:
   (a) network;
   (b) transport;
2. (10 points) Describe the ring network topology. (Characteristics, devices, general working principle.)

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What can be said about IP addresses within a LAN?
   (a) two devices can share the same IP address;
   (b) exactly two devices can share an IP address at a time;
   (c) exactly one device can use an IP address at a time;
   (d) several devices can share the same IP address;
2. (1 point) A node initiates data exchange based on logical addresses through what OSI layer?
   (a) transport;
   (b) physical;
   (c) network;
   (d) application;
3. (1 point) Which of the following are layers in the TCP/IP model?
   (a) transport;
   (b) application;
   (c) presentation;
   (d) host to network;
   (e) internet;
   (f) session;
4. (1 point) PDUs at the OSI network layer are called?
   (a) transport;
   (b) frame;
   (c) packet;
   (d) segment;
5. (1 point) Network layer protocol that obtains the MAC (physical) address of a host, or node, then creates a database that maps the MAC address to the host's IP (logical) address:
   (a) ARP;
   (b) UDP;
   (c) IP;
   (d) DNS;
   (e) RARP;
6. (1 point) What can be said about subnet masks?
   (a) they can be expressed using hexadecimal notation;
   (b) they are composed of four octets;
   (c) they are composed of three octets;
   (d) they can be expressed using octal notation;
7. (1 point) The device inside a computer that connects a computer to the network media, thus allowing it to communicate with other computers:
   (a) motherboard;
   (b) fax;
   (c) bus;
   (d) NIC;
8. (1 point) What type of cable consists of a copper core, metal shielding, and a jacket?
   (a) fiber-optic;
   (b) coaxial;
   (c) UTP;
   (d) twisted-pair;
9. (1 point) Which of the following is true regarding layer 2 switches?
   (a) a switch is a hub with more ports;
   (b) a switch is a multiport bridge;
   (c) switches learn IP addresses from each frame source IP address;
   (d) switches learn MAC addresses from each frame source MAC address;
10. (1 point) What is the result of segmenting a network with a bridge?
    (a) it increases the number of collision domains;
    (b) it decreases the number of collision domains;
    (c) it increases the number of broadcast domains;
    (d) it decreases the number of broadcast domains;
    (e) it makes smaller collision domains;
    (f) it makes larger collision domains;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the type of communication between exact two entities?

   .....

2. (2 points) Name the OSI layer that determines which route through the networks to use.

   .....

3. (2 points) Name the network topology in which there is no need for additional network devices.

   .....

4. (2 points) Name the protocol that is used to implement the traceroute utility? (It is also used by routers to inform hosts of differenet events.)

   .....

5. (2 points) Name the device that creates one big collision domain and one large broadcast domain.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is shared communication medium? Give two examples.

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   .....

2. (3 points) Give three differences between TCP and UDP.

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   .....

3. (3 points) Give three examples of distinct applications for which unreliable communication is appropriate.

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4. (3 points) Describe the concept of network architecture.

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   .....
   .....

5. (3 points) Give the TCP/IP layers in the correct order.

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   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe NAT and private addresses.
2. (10 points) Describe the structure, characteristics or limitations of the following communication medium:
   (a) twisted pair;
   (b) coaxial cable;
   (c) fiber optics;

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What is the topology that consists of a single cable connecting all nodes on a network without intervening connectivity devices?
   (a) ring;
   (b) star;
   (c) ring-star;
   (d) bus;
2. (1 point) Which of the following are reasons for breaking up a network into two segments with a router?
   (a) to create fewer broadcast domains;
   (b) to create more broadcast domains;
   (c) to create one large broadcast domain;
3. (1 point) A process socket local address is equal to:
   (a) port number + IP address;
   (b) IP address;
   (c) Port number;
   (d) IP address + hostname + port number;
4. (1 point) What connectivity device enables multiple nodes to simultaneously transmit and receive data over different network segments?
   (a) hub;
   (b) repeater;
   (c) switch;
   (d) amplifier;
5. (1 point) Which of the following application protocols are appropriate for email receiving?
   (a) SMTP;
   (b) DNS;
   (c) HTTP;
   (d) FTP;
   (e) SSH;
   (f) IMAP;
   (g) POP3;
6. (1 point) What is the name of the protocol that allows a client to send a broadcast message with its MAC address and receive an IP address in reply?
   (a) ARP;
   (b) RARP;
   (c) DNS;
   (d) RDNS;
   (e) RevMAC;
7. (1 point) Protocols on this layer coordinate and maintain connections between two nodes on the network:
   (a) application;
   (b) presentation;
   (c) data link;
   (d) session;
8. (1 point) A special 32-bit number that, when combined with a device's IP address, informs the rest of the network about the segment or network to which the device is attached:
   (a) subnet mask;
   (b) ARP address;
   (c) MAC address;
   (d) DNS mask;
9. (1 point) What kind of transport layer protocols are more useful in situations where data must be transferred quickly?
   (a) connectionless protocols;
   (b) syn-oriented protocols;
   (c) connection-oriented protocols;
   (d) ack-oriented protocols;
10. (1 point) What is a valid IPv4 address example?
    (a) 144.92.254.253;
    (b) 144-92-43-178;
    (c) 144.92.256.176;
    (d) 144,92,43,178;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that segments and reassembles data into a data stream.

   .....

2. (2 points) Name the protocol that allows to obtain a host name from an IP address.

   .....

3. (2 points) Name the network topology in which the data flows in only one direction through the physical medium.

   .....

4. (2 points) Is there possible to have connection-oriented but unordered protocol?

   .....

5. (2 points) What is the class C private IP address space? (Ex: 1.x.x.x)

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is the 127.0.0.1 address used for? How about 255.255.255.255?

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   .....

2. (3 points) Characterize a host in a peer-to-peer network type.

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3. (3 points) How do you find the broadcast address from an IP address and netmask?

   .....

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   .....

4. (3 points) Characterize a server host in a client-server network type.

   .....

   .....

   .....

5. (3 points) What is dynamic routing?

   .....

   .....

   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the working principle of link-state routing algorithms.
2. (10 points) Describe the ARP protocol.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) Which of the following services use UDP?
   (a) SMTP;
   (b) DNS;
   (c) ARP;
   (d) ICMP;
   (e) RIP;
   (f) HTTP;

2. (1 point) What will a NIC on an Ethernet do in case of a collision?
   (a) it will immediately stop transmitting;
   (b) it will keep transmitting;
   (c) it will wait for 10 minutes before transmitting again;
   (d) it will wait for 2 minutes before transmitting again;

3. (1 point) What protocol is used to find the hardware address of a local device?
   (a) RARP;
   (b) ARP;
   (c) IP;
   (d) ICPM;
   (e) BootP;

4. (1 point) What are some of the disadvantages of a ring topology?
   (a) it does not scale well;
   (b) a single malfunctioning workstation can disable the entire network;
   (c) it is very flexible;
   (d) it is a bidirectional topology;

5. (1 point) What layer of the OSI model serves as a translator for system applications?
   (a) transport;
   (b) session;
   (c) presentation;
   (d) network;

6. (1 point) Which of the following describe router functions?
   (a) packet switching;
   (b) collision prevention;
   (c) packet filtering;
   (d) broadcast domain enlargement;
   (e) internetwork communication;
   (f) broadcast forwarding;
   (g) path selection;

7. (1 point) A computer on the network that requests resources or services from another computer on a network:
   (a) server;
   (b) connectivity device;
   (c) client;
   (d) database server;

8. (1 point) What are the main functions of layer 2 switching (switch)?
   (a) address learning;
   (b) routing;
   (c) forwarding and filtering;
   (d) creating network loops;
   (e) loop avoidance;
   (f) IP addressing;

9. (1 point) Which are the transport layer protocols in the TCP/IP suite?
   (a) TCP;
   (b) ARP;
   (c) IP;
   (d) UDP;
   (e) HTTP;

10. (1 point) What is the name of the process of determining the best communication path over a computer network?
    (a) routing;
    (b) path finding;
    (c) linking;
    (d) connecting;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that combines bits into bytes, bytes into frames, and provides error detection.

   .....

2. (2 points) Name the two types of routing table construction (main routing types).

   .....

3. (2 points) Name the OSI layer that uses hardware addresses.

   .....

4. (2 points) Name the device that splits a large broadcast domain into smaller ones.

   .....

5. (2 points) Is the DNS naming system a flat naming system or a hierarchical one?

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Give three examples of distinct applications for which connection-less communication is appropriate.

   .....

   .....

   .....

2. (3 points) What is the bit length, expression form, and structure of an IP version 6 address?

   .....

   .....

   .....

3. (3 points) What is the bit length, expression form, and structure of a MAC address?

   .....

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   .....

4. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the MAN.

   .....

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   .....

5. (3 points) Characterize a client host in a client-server network type.

   .....

   .....

   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe segmentation and reasembly in the case of TCP protocol.
2. (10 points) Describe the functions and working principle of the router.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What can be said about IP?
   (a) IP is a reliable protocol;
   (b) IP operates a the data link layer of the OSI model;
   (c) IP is based on IPX;
   (d) IP contains a header checksum field;
   (e) IP checksum also verifies the integrity of the message;
2. (1 point) On what layer of the OSI model does TCP operate?
   (a) physical;
   (b) data link;
   (c) session;
   (d) transport;
3. (1 point) Which of the following is a layer 2 protocol used to maintain a loop-free network?
   (a) VTP;
   (b) STP;
   (c) RIP;
   (d) CDP;
4. (1 point) What type of transmission allows one device to send data to a specific group of devices (not necessarily the entire network segment)?
   (a) unicasting;
   (b) broadcasting;
   (c) multicasting;
   (d) point-to-point;
5. (1 point) What protocols belong to the transport layer of the OSI model?
   (a) IP;
   (b) TCP;
   (c) ICMP;
   (d) ARP;
   (e) UDP;
   (f) HTTP;
6. (1 point) What is the address range of a class B network address in binary?
   (a) 01...;
   (b) 110...;
   (c) 10..;
   (d) 0...;
   (e) 111...;
7. (1 point) On a TCP header, what field allows the receiving node to determine whether the TCP segment became corrupted during transmission?
   (a) checksum;
   (b) flags;
   (c) hash;
   (d) padding;
8. (1 point) What can be said about UDP?
   (a) TCP is more secure than UDP;
   (b) UDP is more reliable than TCP;
   (c) UDP also uses checksums;
   (d) TCP produces more transmission overhead than UDP;
9. (1 point) How many layers does the OSI model have for network communications?
   (a) 10;
   (b) 5;
   (c) 7;
   (d) 4;
10. (1 point) What is the physical topology where every node on the network is connected through a central device, such as a hub or switch?
    (a) bus;
    (b) ring;
    (c) star;
    (d) bus-ring;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the layer at which data is formatted, encoded and converted to be used for use on the network.

   .....

2. (2 points) Do packets encapsulate segments or do segments encapsulate packets?

   .....

3. (2 points) Name the network type that is deployed for large cities.

   .....

4. (2 points) Name the OSI layers that the Ethernet specification describes?

   .....

5. (2 points) Name the network topology in which there is a device that could become a central (single) point of failure.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is shared communication medium? Give two examples.

   .....

   .....

   .....

2. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the WAN.

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   .....

3. (3 points) Give the OSI layers in the correct order.

   .....

   .....

   .....

4. (3 points) What is static routing?

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   .....

   .....

5. (3 points) Give three reasons for using layered protocols.

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   .....

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(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Compare the OSI and TCP/IP models.
2. (10 points) Describe the functions and working principle of the switch.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) Which of the following describes a MAC address?
   (a) it is a globally unique IP address;
   (b) it is a unique address in a broadcast domain;
   (c) it is provided by the manufacturer of the network card;
   (d) it is a logical address;
2. (1 point) Regarding the OSI model, routers belong to the:
   (a) physical layer;
   (b) data link layer;
   (c) session layer;
   (d) network layer;
3. (1 point) What can be said about TCP/IP?
   (a) TCP/IP comprises several subprotocols;
   (b) TCP/IP comprises only one protocol;
   (c) TCP/IP has been replaced by ARP;
   (d) TCP/IP has been replaced by IPX/SPX;
4. (1 point) What does a switch do when a frame is received on an interface and the destination hardware address is unknown?
   (a) forwards the packet to the first available link;
   (b) drops the frame;
   (c) broadcasts to the network with the frame;
   (d) queries the name server for the name resolution;
   (e) sends a message to the originating station asking for name resolution;
5. (1 point) What is the network topology where each node is connected to the two nearest nodes so that the entire network forms a circle?
   (a) bus;
   (b) ring;
   (c) star;
   (d) bus-star;
6. (1 point) For the OSI model, each layer from the source node communicates with which layer on the destination node(s):
   (a) the same layer;
   (b) the layer below;
   (c) the layer above;
   (d) any higher layer;
7. (1 point) Which protocol will you use to automate the IP configuration (IP address, netmask, default gateway, DNS server)?
   (a) SMTP;
   (b) SNMP;
   (c) DHCP;
   (d) ARP;
8. (1 point) A computer on the network that manages shared resources:
   (a) client;
   (b) server;
   (c) workstation;
   (d) client software;
9. (1 point) Which of the following services use TCP?
   (a) ARP;
   (b) DNS;
   (c) HTTP;
   (d) ICMP;
   (e) RIP;
10. (1 point) What does WLAN stand for?
    (a) Wide LAN;
    (b) Wild LAN;
    (c) Web LAN;
    (d) Wireless LAN;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer at which routing is implemented.
   .....
2. (2 points) Name the notation that allows us to write 1.2.3.0/26.
   .....
3. (2 points) Is there possible to have connection-less but reliable protocols?
   .....
4. (2 points) Name the OSI layer that specifies voltage, wire speed, pinout cables, and moves bits between devices.
   .....

5. (2 points) Name the device that creates smaller collision domains and one large broadcast domain.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) How do you find the network address from an IP address and netmask?

   .....
   .....
   .....

2. (3 points) What is guided communication medium? Give two examples.

   .....
   .....
   .....

3. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the LAN.

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   .....

4. (3 points) Give the reason for using ports in the case of TCP and UDP.

   .....
   .....
   .....

5. (3 points) Give the TCP/IP layers in the correct order.

   .....
   .....
   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the UDP PDU.
2. (10 points) Describe the pure ALOHA and slotted ALOHA algorithms. Compare their maximum throughput.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) Network layer protocol that reports on the success or failure of data delivery:
   (a) IP;
   (b) TCP;
   (c) ARP;
   (d) ICMP;
2. (1 point) What does CSMA/CD stand for?
   (a) Carrier Service Multiple Access with Collision Detection;
   (b) Carrier Sense Multiple Access with Collision Avoidance;
   (c) Carrier Sense Multiple Access with Collision Detection;
   (d) Control Sense Multiple Access with Collision Direction;
3. (1 point) What protocol allows TCP/IP to interconnect multiple networks?
   (a) TCP;
   (b) IP;
   (c) UDP;
   (d) ARP;
4. (1 point) What is the name of the process of subdividing a single class of network into multiple, smaller logical networks, or segments?
   (a) masking;
   (b) segmentation;
   (c) fragmentation;
   (d) subnetting;
5. (1 point) When data is encapsulated, which is the correct order?
   (a) data, frame, packet, segment, bit;
   (b) segment, data, packet, frame, bit;
   (c) data, segment, packet, frame, bit;
   (d) data, segment, frame, packet, bit;
6. (1 point) What is true about a ring topology?
   (a) like a bus topology, data does not stop at its destination;
   (b) like a bus topology, it also needs terminators;
   (c) it is an active topology;
   (d) it is bidirectional;
7. (1 point) What is the name for the distinct units of data that are transmitted from one node on a network to another?
   (a) protocols;
   (b) queries;
   (c) packets;
   (d) signals;
8. (1 point) The purpose of this equipment is to convert analog signals into digital signals and vice versa to be transmitted over a computer network:
   (a) modem;
   (b) phone line;
   (c) repeater;
   (d) hub;
9. (1 point) Which class of IP address provides a maximum of only 254 host addresses per network?
   (a) class A;
   (b) class B;
   (c) class C;
   (d) class D;
10. (1 point) Which of the following types of connections can use full duplex?
    (a) hub to hub;
    (b) switch to switch;
    (c) host to host;
    (d) switch to hub;
    (e) switch to host;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that divides the transmitted bit stream into frames.
   .....
2. (2 points) Name the protocol that allows to obtain the IP address from a hardware address?
   .....
3. (2 points) What is the class B private IP address space? (Ex: 1.2.3.x or 1.x.x.x/y)
   .....
4. (2 points) Can a single IP address have multiple DNS names?
   .....

5. (2 points) Name the OSI layer which is responsible for creating, managing and terminating the dialogue.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is the bit length, expression form, and structure of an IP version 4 address?

   .....

   .....

   .....

2. (3 points) Give three examples of usages for cross-over cables.

   .....

   .....

   .....

3. (3 points) Give five examples of network topologies.

   .....

   .....

   .....

4. (3 points) Give three examples of distinct applications for which unreliable communication is appropriate.

   .....

   .....

   .....

5. (3 points) Give three differences between TCP and UDP.

   .....

   .....

   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the working principle of distance vector dynamic routing algorithms.
2. (10 points) Describe the Data Link frame.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) This protocol that belongs to the transport layer of the OSI model is a connectionless transport service:
   (a) TCP;
   (b) UDP;
   (c) IP;
   (d) HTTP;
   (e) ARP;
2. (1 point) A hierarchical way of associating host names with IP addresses is known as:
   (a) ARP;
   (b) DNS;
   (c) RARP;
   (d) IP;
   (e) LDAP;
3. (1 point) What layer of the OSI model usually manages data encryption and decryption?
   (a) presentation;
   (b) session;
   (c) data link;
   (d) physical;
4. (1 point) Which of the following application protocols is the most appropriate for file transfer?
   (a) SMTP;
   (b) DNS;
   (c) HTTP;
   (d) FTP;
   (e) SSH;
   (f) IMAP;
   (g) POP3;
5. (1 point) On what network topology are the devices responsible for relaying data from one point to another?
   (a) star;
   (b) bus;
   (c) ring;
6. (1 point) What can be said about TCP?
   (a) it is a connectionless protocol;
   (b) it is a connection-oriented protocol;
   (c) it does not use checksums;
   (d) it does not ensure reliable data delivery;
   (e) it provides segmentation and reassembly;
7. (1 point) Which of the following devices are layer 1 devices?
   (a) bridge;
   (b) repeater;
   (c) router;
   (d) switch;
   (e) hub;
8. (1 point) Which fields are contained within an Ethernet frame header?
   (a) source and destination hardware addresses;
   (b) source and destination network addresses;
   (c) error correction code;
   (d) authentication code;
9. (1 point) To ensure data integrity further, connection-oriented protocols such as TCP use a:
   (a) digital signature;
   (b) digital certificate;
   (c) symmetric encryption algorithm;
   (d) checksum;
10. (1 point) Which of the following are benefits in using fiber cabling?
    (a) reliability;
    (b) requires special equipment;
    (c) throughput;
    (d) low security levels;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that supports flow control and sequencing.

   .....

2. (2 points) Name the network type that exibits high latency at the end nodes.

   .....

3. (2 points) What is the class A private IP address space? (Ex: 1.2.x.x)

   .....

4. (2 points) Do frames encapsulate packets or do packets encapsulate frames?

   .....

5. (2 points) Name the OSI layer that provides logical addressing that routers will use for path determination.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) Describe full-duplex and half-duplex communication.

   .....
   .....
   .....

2. (3 points) Characterize a host in a peer-to-peer network type.

   .....
   .....
   .....

3. (3 points) How do you find the broadcast address from an IP address and netmask?

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   .....

4. (3 points) Give three ways in which the OSI model and the TCP/IP model are the same.

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5. (3 points) Characterize a server host in a client-server network type.

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(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the ICMP protocol.
2. (10 points) Describe the five classes of network addresses.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What are some of the advantages of a star network?
   (a) fault-tolerant;
   (b) requires less cable than bus;
   (c) requires less cable than ring;
   (d) it can easily be changed, isolated, or interconnected with other networks;

2. (1 point) How many octets are in a valid IPv4 address?
   (a) 16;
   (b) 4;
   (c) 32;
   (d) 8;

3. (1 point) Acknowledgements, sequencing, and flow control are characteristic of which OSI layer?
   (a) layer 2;
   (b) layer 3;
   (c) layer 4;
   (d) layer 7;

4. (1 point) What are the TCP/IP protocols that run at the transport layer of the OSI model and provides reliable data delivery services?
   (a) UDP;
   (b) IP;
   (c) TCP;
   (d) ARP;
   (e) HTTP;

5. (1 point) On a TCP header, what field indicates how many segments the sender can issue to a receiver without acknowledgment?
   (a) acknowledge number;
   (b) window;
   (c) reserved;
   (d) checksum;

6. (1 point) What layer of the OSI model is in charge of translating network addresses into their physical counterparts and decides how to route data from the sender to the receiver?
   (a) transport;
   (b) network;
   (c) session;
   (d) physical;

7. (1 point) What are the purposes for segmentation with a bridge?
   (a) add more broadcast domains;
   (b) create more collision domains;
   (c) add more bandwidth for users;
   (d) allow more broadcast for users;
   (e) reduce collisions within a broadcast domain;

8. (1 point) Which of the following application protocols are appropriate for email sending?
   (a) SMTP;
   (b) DNS;
   (c) HTTP;
   (d) FTP;
   (e) SSH;
   (f) IMAP;
   (g) POP3;

9. (1 point) The IP address 127.0.0.1 is also known as:
   (a) loopback address;
   (b) broadcast address;
   (c) multicast address;
   (d) class A broadcast address;

10. (1 point) To what layer of the OSI model does the Internet Protocol (IP) belong?
    (a) network;
    (b) transport;
    (c) data link;
    (d) application;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Do packets encapsulate datagrams or do datagrams encapsulate packets?
   .....

2. (2 points) Name the device that uses hardware addresses to filter the network traffic?
   .....

3. (2 points) Name the OSI layer that uses logical addresses.
   .....

4. (2 points) Name the network type that exibits hight bandwidth at the end nodes.

   .....

5. (2 points) Name the type of communication between exact two entities?

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is dynamic routing?

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   .....
   .....

2. (3 points) What is the 127.0.0.1 address used for? How about 255.255.255.255?

   .....
   .....
   .....

3. (3 points) Describe the concept of network topology.

   .....
   .....
   .....

4. (3 points) Give three examples of usages for straight-through cables.

   .....
   .....
   .....

5. (3 points) What is the bit length, expression form, and structure of a MAC address?

   .....
   .....
   .....

(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe sequencing in the case of TCP protocol.
2. (10 points) Describe the star network topology. (Characteristics, devices, general working principle.)

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What are some of the disadvantages of a star network?
   (a) less secure;
   (b) requires more cable than bus;
   (c) requires more cable than ring;
   (d) less scalable than bus or ring;
2. (1 point) What IP address will you use to send a message to all devices connected to your network segment?
   (a) 0.0.0.0;
   (b) 127.0.0.1;
   (c) 255.0.0.0;
   (d) 255.255.255.255;
3. (1 point) Which OSI layer provides translation of data?
   (a) application;
   (b) presentation;
   (c) session;
   (d) transport;
   (e) data link;
4. (1 point) Which of the following statements is true?
   (a) subnet masks are assigned only to devices from a class A network;
   (b) devices are assigned a subnet mask only if they belong to a subnetted network;
   (c) devices are always assigned a subnet mask;
   (d) subnet masks are assigned only to devices from a class A or B network;
5. (1 point) What can be said about TCP?
   (a) it does not use checksums;
   (b) it is a connectionless protocol;
   (c) it provides flow control;
   (d) it does not ensure reliable data delivery;
6. (1 point) What can be said about IP?
   (a) IP is a reliable protocol;
   (b) IP is an unreliable protocol;
   (c) IP is a connection-oriented protocol;
   (d) IP is a connectionless protocol;
7. (1 point) The address/number on a host where an application or service makes itself available to incoming or outgoing data is also known as:
   (a) IP address;
   (b) MAC address;
   (c) NIC address;
   (d) port;
8. (1 point) A part of a network is also known as:
   (a) LAN;
   (b) segment;
   (c) ethernet;
   (d) route;
9. (1 point) Which of the following devices are layer 3 devices?
   (a) bridge;
   (b) repeater;
   (c) router;
   (d) switch;
   (e) hub;
10. (1 point) What can be said about ARP?
    (a) ARP creates an ARP cache for efficiency;
    (b) ARP creates an ARP table for security;
    (c) ARP does not create a MAC-to-IP table;
    (d) ARP table and ARP cache are two completely different things;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the protocol that allows to obtain the hardware address from an IP address?
   .....
2. (2 points) Name the method used to split one large network class into smaller network ranges.
   .....
3. (2 points) Name the OSI layer that uses frames.
   .....
4. (2 points) Name the type of communication from one entity to all the others?
   .....

5. (2 points) Name the network topology in which there is no need for additional network devices.

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) What is the bit length, expression form, and structure of an IP version 6 address?

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   .....
   .....

2. (3 points) Give three examples of distinct applications for which connection-less communication is appropriate.

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3. (3 points) Describe the concept of network architecture.

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   .....

4. (3 points) What is static routing?

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   .....
   .....

5. (3 points) What is guided communication medium? Give two examples.

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(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the Flag bytes with byte stuffing framing method.
2. (10 points) Describe the IP version 4 PDU.

(Total: 20 points.)

Student .....

Part 1: Choose the correct answer (there can be one or more).

1. (1 point) What layer of the OSI model is responsible for accepting data from the session layer and managing end-to-end delivery of data?
   (a) data link;
   (b) presentation;
   (c) transport;
   (d) network;
2. (1 point) You want to use full-duplex Ethernet instead of half-duplex. Which of the following will be benefits on your network?
   (a) you will have more collision domains;
   (b) you will have less broadcast domains;
   (c) it should be faster;
   (d) it will eliminate the need of switches;
3. (1 point) What is the core protocol responsible for logical addressing for TCP/IP?
   (a) MAC;
   (b) TCP;
   (c) ARP;
   (d) IP;
4. (1 point) Transport layer protocols that establish a connection with another node before they begin transmitting data are known as:
   (a) connectionless protocols;
   (b) syn-oriented protocols;
   (c) connection-oriented protocols;
   (d) ack-oriented protocols;
5. (1 point) Which of the following devices are layer 2 devices?
   (a) bridge;
   (b) repeater;
   (c) router;
   (d) switch;
   (e) hub;
6. (1 point) Which of the following statements is true regarding a switch?
   (a) it creates a single collision domain and a single broadcast domain;
   (b) it creates separate collision domains but one broadcast domain;
   (c) it creates separate collision domains and separate broadcast domains;
7. (1 point) What can be said about IP addresses within a LAN?
   (a) two devices can share the same IP address;
   (b) exactly two devices can share an IP address at a time;
   (c) exactly one device can use an IP address at a time;
   (d) several devices can share the same IP address;
8. (1 point) What types of signals are typically used by Wireless LANs?
   (a) infrared;
   (b) radiofrequency (RF);
   (c) UTP;
   (d) laser;
9. (1 point) The physical layout of a computer network is known as:
   (a) protocol;
   (b) topology;
   (c) backbone;
   (d) segment;
10. (1 point) Segmentation of a data stream happens at which layer of the OSI model?
    (a) physical;
    (b) data link;
    (c) network;
    (d) transport;

(Total: 10 points.)

Part 2: Describe or give a very short answer to the following questions.

1. (2 points) Name the OSI layer that determines which route through the networks to use.

   .....

2. (2 points) Is there possible to have connection-oriented but unordered protocol?

   .....

3. (2 points) Is the DNS naming system a flat naming system or a hierarchical one?

   .....

4. (2 points) Name the protocol that is used to implement the traceroute utility? (It is also used by routers to inform hosts of differenet events.)

   .....

5. (2 points) What is the class C private IP address space? (Ex: 1.x.x.x)

   .....

(Total: 10 points.)

Part 3: Describe or give a short answer to the following questions.

1. (3 points) How do you find the network address from an IP address and netmask?

   .....
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2. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the WAN.

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3. (3 points) Give three differences between TCP and UDP.

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4. (3 points) Characterize the spread, bandwidth, latency, error rate, scalability and administrability of the LAN.

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5. (3 points) Give three examples of usages for cross-over cables.

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(Total: 15 points.)

Part 4: Describe in detail the following subjects.

1. (10 points) Describe the IP version 6 PDU.
2. (10 points) Describe the routing process and routing table in the case of IP.

(Total: 20 points.)
