King Saud University College of Computer and Information Sciences Computer Science Department	
Course Code	CSC 329
Course Title	Computer Networks
Section No.	
Semester	Spring 2024
Exam	Homework 1
Date	Submit before May 15th
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Course Learning Outcomes		**Relevant question**	**Full mark**	**Student mark**
CLO 1	**The ability to describe major networking terms, topologies, types, protocols, devices, and components.**			
CLO2	**The ability to explain the main services, type of addressing, and protocols associated with each layer of the OSI model.**			
CLO 3	**The ability to recognize signal types, characteristics, impairments, encoding methods, transmission media.**			
CLO 4	**The ability to recognize the functions and protocols of the data link layer (**framing, error control, flow control, medium access control.)			
CLO 5	**The ability to explain the functions and protocols of the network layer and to describe the different routing approaches:** (datagram , VC , addressing, Routing).			
CLO 6	**The ability to compare the features of network components and to measure and analyze the time performances of a network.**			

Feedback/Comments:

Q1 (1 marks)

1. Determine the correct class of the following IP addresses:

Address	Class?
191.107.2.10	Class B
172.16.16.15	Class B
200.200.5.2	Class C
3.3.57.0	Class A
131.107.2.89	Class B

2. Which address class (es) will allow you to have more than 1000 hosts per network?
   Both class A and Class B

3. Which address class (es) will allow only 254 hosts per network?
   Class C

Q2. (1.5 marks)

A company has a network address of 192.168.1.0 with a subnet mask of 255.255.255.0. The company wants to create 8 subnetworks.

1. Determine the class of this address.
   Class C
2. How many bits must be borrowed from the host portion of the address?
   We must borrow 3 bits.

3. Determine the new network mask.

   255.255.255.224

4. Determine the address of the different subnets?

   Subnet 1: 192.168.1.0

   Subnet 2: 192.168.1.32

   Subnet 3: 192.168.1.64

   Subnet 4: 192.168.1.96

   Subnet 5: 192.168.1.128

   Subnet 6: 192.168.1.160

   Subnet 7: 192.168.1.192

   Subnet 8: 192.168.1.224

5. How many hosts can be connected to each subnet?

   30 useable subnets

Q3. (1 marks)

1. Briefly explain the difference between single-bit errors and burst errors. (3 marks)

   single bit error:

   occurs when only one-bit (0 or 1) flips to the opposite value (1 or 0) during data transmission.

   burst error:

   affects multiple consecutive bits (more than one) in a data stream.

2. Imagine that a noise event causes a burst error to occur that lasts for 1 ms (milli second).
   a. If data is being transmitted at 10 Mbps. How many data bits will be affected?

      Affects 10,000 data bits.

   b. If data is being transmitted at 100Mbps. How many data bits will be affected?

      Affects 100,000 data bits.

Q4. (1.5 marks)

1. What is MAC address? how many bits are used to code the MAC address?

   a-A MAC address (media access control address) is a 12-digit hexadecimal number assigned to each device connected to the network.

   b- MAC addresses are coded with 48 bits.

2. What are ARP and RARP protocols?

   ARP: is a protocol or procedure that connects an ever-changing Internet Protocol (IP) address to a fixed physical machine address

   RARP: is a networking protocol that is used to map a physical (MAC) address to an Internet Protocol (IP) address.

3. Can frames collide in CSMA and how? What is the problem in CSMA that CSMA/CD is trying to resolve?

   a-Yes, Collisions occur when two or more devices transmit data simultaneously.

   b- CSMA/CD adds collision detection and backoff to avoid collisions and improve network performance so it resolves the collisions problem in CSMA.

4. How can CSMA/CA avoid collision?

   By combining carrier sense with random backoff.