

University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination Spring 2020

Program: B.Sc. Engineering (3rd Year/2nd Semester)

Course Code: CSE 319

Course Title: Computer Networks

Credit: 3.00

Time: 1.00 Hours

Full Marks: 60

Instructions: There are Four Questions. Answer three questions including Q-1 and Q-2. All questions carry equal marks.

All questions are based on your registration ID. Therefore, to answer the question, you have to use your registration ID and other necessary information.

- Q.1 During this lockdown, we have to stay at home and use the internet to communicate with each other. We are living in different regions of the country, and the Internet Service Provider (ISP) of each area provides different speeds to its customers. Suppose you are Host A, and your friend is Host B, and between A and B, there are three communication links, namely, $R1$, $R2$, and $R3$. The speed of the connection depends on your registration ID, and you have to calculate the link speed based on the following equations:

$$\begin{aligned} R1 &= (\text{your Id}) \bmod 49 \text{ mbps} \\ R2 &= (R1 + \text{your birth day}) \text{ mbps} \\ R3 &= \frac{R1 + R2}{2.0} \text{ mbps} \end{aligned}$$

For example, your id is 14201041 and birthday is 12 April, then $R1 = (14201041) \bmod 49 = 8 \text{ Mbps}$; $R2 = 8 + 12 = 20 \text{ Mbps}$; $R3 = (8 + 20) / 2 = 14 \text{ Mbps}$

Based on the above scenario, answer the following questions:

- a) Assume that there is no other traffic in the network, what is the throughput between you and your friend for file transfer? (8)
- b) Suppose you want to send a zip file, which is the double size in Gigabit (Gb) of your birth year (i.e., for the birth year 2001, the file size will be 4002 Gb) to your friend. How long will it take to transfer from you to your friend? (12)
- Q.2 a) You and your friend want to transfer data, and both are decided on the following data transmission properties which should be incorporated in the transport layer service: (10)
- no bit errors; no packet loss; encryption at the sender and decryption at the receiver.

Now design the Finite State Machine (FSM) for you and for your friend.

- b) Due to coronavirus and lockdown, most people stay at home and use the internet for necessary communications. However, many people are watching movies and videos, which have increased the traffic on the network. In this situation, what will you propose to improve the performance of the network? Explain with evidence. (10)

- Q. 3 a) Suppose IP address of your computer is as your registration ID (**exception for id number 17201100, you will use 17201122**), i.e., 14.20.10.41 where the network mask is based on the following formula
Netmask = 16+your birth month; for example, your birth month is April, and the netmask will be 16+4=20. Therefore, the address will be 14.20.10.41/20. Now do the following: (5+5)
- Find the broadcast address of the network
 - The address range of the network

- b) In data transmission, it is necessary to check the data at the receiving end that it has any error or not. Suppose we want to send your registration id (14201041), and it is breaking into two parts A=1420; B=1041. Now we will convert it into binary based on the following rules: (10)
- The number between 0 to 4 will be binary 1
The number between 5 to 9 will be binary 0
Therefore, A and B will be A=1111; B= 1111
However, now you have to send the data and do the process that at the receiving side we can detect if there is any error or not.

Or

- Q. 4 You are appointed as the network designer of the University of Asia Pacific. From your experience, you have identified that for better performance of the network, it should break in small LANs based on functionality. Therefore, you have planned to set the individual LAN for each department, and it is described in Table 1. To calculate each department's subnetwork address packages, choose the base network address from your registration id's first six numbers (considering your id is 14201010) for the first three octets as like 14.20.10, and for the last octet, choose 0 with the subnet mask 23, i.e., 14.20.10.0/23. (20)

Table 1: Requirements of each LAN

Department	Number of Hosts
CSE	100
CSE	150
CE	130
Architecture	70
Pharmacy	32
Admin	15