University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination Fall 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.

Q. 1   XYZ ISP corporation shares n Gbps access link to provide Internet connectivity for its customers. They have a standard internet package, which is 10 Mbps@500 BDT per month. In addition, the administrator of the XYZ ISP observes that 80% of the time access link is idle.
n = *Your birthday.*

    a)   When circuit switching is used, how many users can be supported, and how much money can ISP earn?   (5)

    b)   Can the XYZ ISP provide more connections based on the above scenario that you have found in question number a? How? Let the ISP administrator identifies that 250% more users can be connected than the circuit switching techniques with the standard internet package. Calculate the probability that at any given time, all active users are transmitting simultaneously.   (5+10)

Q. 2   Mr. X is an independent consultant who provides consultancy services for subnetwork designing. Janata Bank Bangladesh Limited (JBBL) is searching for a resource person who can provide the consultancy service to increase its network reliability. JBBL needs to manage its branches by their geographic location that they can effectively monitor the network performance.   (20)

Mr. X has identified that JBBL could break its network into eight subnetworks based on eight-divisions of Bangladesh. However, each division has its requirements for the hosts. From the analysis, Mr. X has discovered that the Dhaka division requires the maximum number of hosts. Table 1 describes the Union Councils in each division, and for one union council, at least i hosts are required for that particular subnetwork.

Table 1: Bangladesh Divisions' data

Division	Number of Districts	Number of Union Councils
Barisal	6	333
Chittagong Division	11	949
Dhaka Division	13	1,248
Khulna Division	10	270
Mymensingh Division	4	350
Rajshahi Division	8	558
Rangpur Division	8	536
Sylhet Division	4	334

Based on the above and the following requirements, design the network as Mr. X will design for the JBBL.

Let the number of union council in each division is *u*; then

> *i* = *u* x *your birth month* (for example: For Barisal Division *u* = 333 and your birth month is April; then *i* = 333 x 4 = 1332)

To calculate the subnetwork packages, choose the base network address from Class A if your student id is odd otherwise choose Class B private addresses.

Q. 3   a)   Consider a TCP connection between Host A and Host B. Suppose that the TCP segments traveling from Host A to Host B have source port number is "your id" and destination port number is "your birth day". Identify the source and destination port numbers for the segments traveling from Host B to Host A.   (5)

  b)   Suppose a process in Host C has a UDP socket with port number 6789. Suppose both Host A and Host B each send a UDP segment to Host C with destination port number 6789. Will both of these segments be directed to the same socket at Host C? If so, how will the process at Host C discover that these two segments originated from two different hosts?   (10)

c)   Explain why an application developer might choose to run an application over UDP rather than TCP.   (5)

Or

Q. 4   A network bottleneck refers to a discrete condition in which data flow is limited by computer or network resources. The flow of data is controlled according to the bandwidth of various system resources. If the system working on a network delivers a higher volume of data than what is supported by the network's existing capacity, then a network bottleneck will occur.   (20)

In web access, we may face a bottleneck between the web server and the client. Figure 1 illustrates a bottleneck scenario between an institutional network and a web server. What is your proposal to improve the bottleneck scenario for the institutional network? Explain with evidence and example.

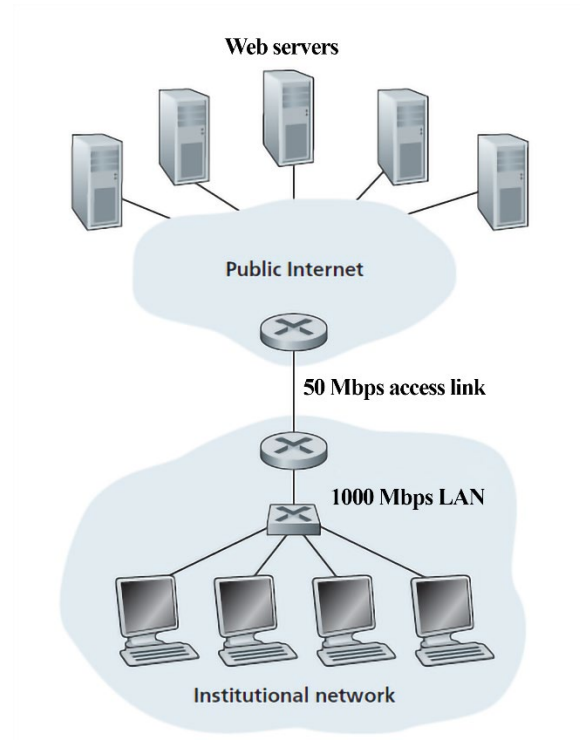**Web servers**

Public Internet

50 Mbps access link

1000 Mbps LAN

Institutional network

Figure 1: Bottleneck scenario