

Department of Computer Science & Engineering

University of Asia Pacific (UAP)

Program: B.Sc. in Computer Science and Engineering

Final Examination

Spring 2020

3rd Year 2nd Semester

Course Code: CSE 319

Course Title: Computer Networks

Credits: 3.0

Full Marks: 120* (Written)

Duration: 2 Hours

* Total Marks of Final Examination: 150 (Written: 120 + Viva: 30)

Instructions:

1. There are **Four (4)** Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1.
 - a) Suppose you wanted to make communication from your computer to a web server as fast as possible. Would you choose UDP or TCP? Explain your selection with evidence. 10
 - b) Let you have 1TB of a file and need to transfer from A to B. Illustrate the process of moving data from A to B and explain the technology that you have selected for data transmission. 10
 - c) Consider a Distributed Hash Table (DHT) with a mesh overlay technology. Justify the advantages and disadvantages of such a design for a peer-to-peer network. 10
2.
 - a) Blockchain is an open ledger technology that helps to do the business process smoothly. How can blockchain technology introduce a frictionless business environment in a public network? Formulate your answer with the evidence. 15
 - b) Let you want to be an entrepreneur where you want to build the service for small and medium-sized business organizations. How will you build such service for small and medium-sized business organizations with the help of cloud computing? 15
3.
 - a) Alice and Bob reside in two countries. They need to communicate with each other frequently, but the communication channel is not secure. Therefore, it becomes challenging for them to communicate privately by ensuring the necessary security requirements, i.e., authenticity, confidentiality, and integrity of the message during communication. Design a protocol that will make sure the basic security requirements for Alice and Bob. 20
 - b) In public-key cryptography, we use a key pair for the encryption and decryption process. Let a key pair is $(Pk, P'k)$, where Pk is a private key, and $P'k$ is a public key. There is a well-known public-key cryptography algorithm called RSA. In the RSA cryptographic process, it starts from choosing two prime numbers, q and r . For your convenience, a set of prime numbers *prime* are provided to choose q and r from the list.
 $prime = \{5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47\}$
You have to choose prime numbers q and r from the prime numbers set *prime*. Procedure 10

for determining q and r as follows:

It will be selected by your birth month. If your birth month is January, the q and r will be 5 and 7; if February, q and r will be 7 and 11, if March, q and r will be 13 and 17, and so on. Based on the value of q and r , you will follow the RSA steps and complete the encryption and decryption process where the message m is your birth month in number, i.e., for January, it will be 1; for December, it will be 12.

4. a) Sonali Bank invites you to design its corporate network to improve network functionality and management capability. Chief Technical Officer (CTO) of Sonali Bank has decided to build the network based on user types and access policy. As a network designer, you propose the following design idea for the network of Sonali Bank, as listed in Table 1.

Table 1: Sonali Bank Network		
Name	Number of Hosts	Purpose
Branch users	1000	Branch users will use for day to day transactions
Accounts	200	The accounts department will use for their tasks
Corporate	250	Corporate officials will use
Audit	100	The audit team of branch offices will use
Managers	70	Each manager will use for their activities

Complete your proposal by providing the Sonali Bank's details design to choose the base network address from a Class B private IP address block.

- b) Find the shortest path for the following network where the source and destination node will be selected based on your student id. If your id is even, the source node will be A , and the destination node will be I . If your id is odd, the source node will be I , and the destination node will be A . To calculate the x , y , and z , follow the equation (i), (ii), and (iii)

$$x = \text{your birth month} * 4 \text{----- (i)}$$

$$y = \text{your birthday} + 10 \text{----- (ii)}$$

$$z = (x + y) * 2 \text{----- (iii)}$$

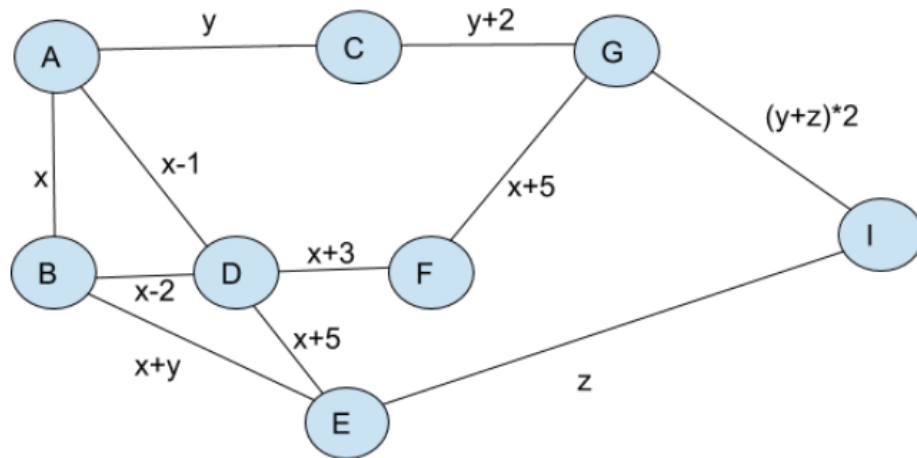


Figure: Network Topology

OR

4. a) Consider the network shown below, and assume that each node initially knows the costs to each of its neighbors based on equation (i), (ii), and (iii). Consider the distance-vector algorithm and show the distance table entries at node z.

$$\begin{aligned}x &= \text{your birth month} * 4 \text{----- (i)} \\y &= \text{your birthday} + 10 \text{----- (ii)} \\z &= (x + y) * 2 \text{----- (iii)}\end{aligned}$$

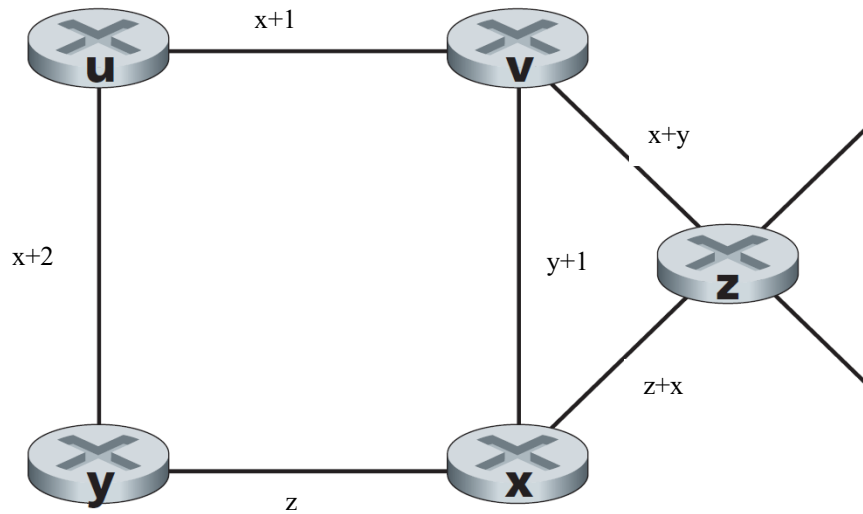


Figure: Network Topology

- b) Suppose there are three routers between a source host and a destination host. Ignoring fragmentation, an IP datagram sent from the source host to the destination host will travel over how many interfaces? How many forwarding tables will be indexed to move the datagram from the source to the destination?