COMSATS University Islamabad, Lahore Campus

Midterm Examination– Semester Fall 2022

Course Title:	Data Communications and Computer Networks			Course Code:	CSC339	Credit Hours:	3(2,1)
Course Instructor/s:	Mr. Imran Raza, Dr. Tahir Maqsood			Program Name:	BS Computer Science		
Semester:	5th	Batch:	FA20	Section:	All sections	Date:	17-11-2022
Time Allowed:	**90 Minutes**			**Maximum Marks:**		**50**	
Instructions:	**Return the question paper**						

1. Answer the following short questions: **[20]**

CLO:1; Bloom Taxonomy Level:<Understanding>

a. Calculate the following for the performance optimization of the BitTorrent application: (5)

- What is the probability that Bob has all the chunks that Alice has, given that the numbers of the chunks that Bob and Alice have are denoted by n_b and n_a?
- Remove the conditioning in the previous part to find out the probability that Bob has all the chunks that Alice has, given that Alice has n_a chunks.
- Suppose that each peer in BitTorrent has 5 neighbors. What is the probability that Bob has data that is of interest to at least one of his five neighbors?

b. Some policies for fairness in congestion control are Additive Increase Multiplicative Decrease (AIMD), Additive Increase Additive Decrease (AIAD), Multiplicative Increase Additive Decrease (MIAD), and Multiplicative Increase Multiplicative Decrease (MIMD). Discuss these policies in terms of convergence and stability. (5)

c. Can a computer have two DNS names that fall in different top-level domains? If so, give a plausible example. If not, explain why not. (2.5)

d. Discuss the advantages of using DHTs to create a distributed tracker for the BitTorrent application. For these DHTs, what is the "key" and what is the "value"? (5)

e. In a TCP connection, if the receiver announces a window size of 0, the sender will stop sending and wait for an ACK with a non-zero size. If this ACK gets lost, a deadlock occurs where the sender waits for ACK and the receiver waits for data. How does TCP resolve this deadlock? (2.5)

2.

CLO:1, 2; Bloom Taxonomy Level:<Understanding, Applying>

Consider the Random Early Detection (RED) algorithm with *MinThreshold = 200, MaxThreshold= 300, maximum buffer size =350,* and *maxP= 0.1*. Draw the curve that gives the packet drop probabilities for all values of average queue lengths. Suppose that three packets arrive when the average queue length is *210, 240, and 295*, what is the minimum probability that these will be dropped? What is the minimum probability that a packet will be dropped if the average queue length is *199*?

3. **[5]**

CLO:1, 2; Bloom Taxonomy Level:<Understanding, Applying>

Consider distributing a file of $F = 30$ Gbits to N peers. The server has an upload rate of $u_s = 60$ Mbps, and each peer has a download rate of $d_i = 4$ Mbps and an upload rate of u. For $N = 10$, *100*, and *1,000* and $u = 400$ *Kbps, 700 Kbps*, and *2 Mbps*. [10]

a. Prepare a chart, similar to the one given below, giving the minimum distribution time for each of the combinations of N and u for both client-server and P2P distribution. (5)

b. How many servers are required, in the client-server scenario