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| **CS-3001 Computer Networks** |
| **Assignment 1 Marks 80** |

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| **Assignment Cover Sheet** | |
| Student name: |  |
| Student ID |  |
| Instructor’s Name: | Salma Kulsoom |
| Deadline: | September 22, 2022 |
| Student declaration: | I declare that:   * This evaluation is my very own work and wherein other’s works or thoughts were used, I even have accurately referenced or stated them * I recognize that plagiarism is a critical offense that could cause disciplinary action. |
| Student signature: |  |

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| Submission Instructions |
| * Submit the handwritten assignment in hard copy. * You do not need to type or print out the assignment. * Do not write questions, just mention the question number and answer it. * Your assignment must be written in a neat and understandable format with a proper cover page. Print this first page and attach it as the first page of your assignment. Cover pages other than this one will not be accepted. * Show complete steps of calculations. * DO NOT copy anything from anyone else as it will result in the cancellation of the assignment |

# Q1. Two terms are frequently used in networking, flow control, and congestion control. Do you think that they are equivalent? How do they differ in the context of connection-oriented and connection-less services? Justify your answer.

**Instructions:** Avoid copying and pasting long theories. Just get understanding from different resources and explain it upon your own level of understanding. There are actually three parts to this question:

* What are flow-control and congestion control. How do they differ from each other? (100-200 words)
* How do flow-control and congestion-control work for connection-oriented and connection-less services? (300-500 words)
* Conclusion: are they really equal or not? (100-200 words)

# Q2. suppose there is only one router(also known as packet switch) between a client and a server. The transmission rate from the client to the router is R1 and the transmission rate from router to host is R2. The router works on a store-and-forward mechanism. Calculate the end-to-end delay required to send a packet of length L from the client to the server. Queueing and propagation delays are negligible here.

**Instruction:** Carefully read the question. It is not too technical. The transmission rate is different between the nodes. Take that into consideration**.**

# Q3. There are five links on the path from host A to host B. Transmission rate of the paths is R1= 1200 Kbs, R2= 2 Mbps, R3= 5 Mpbs, R4= 20 Mbps, and R5= 5Mbps. What is the throughput for a file of size 2 million bits?

**Instructions:** You just have to find out how throughput is calculated when each path has a different transmission rate.

# Q5. The bandwidth of a network is 300 Mbps but due to congestion in the network, only 10,000 frames can be transmitted per minute where each frame carries 5000 bits. Calculate throughput for this network.?

**Instructions:** Take care of units.

# Q6: Series of packets are being transmitted from source to destination. How end-to-end delay is calculated for this network? What are the possible delays?

**Instructions:** Explain with proper formula.

# Q7: Suppose you are going to develop a network standard. Will you use VC (Virtual Circuit) or datagram? Justify your selection.

**Instructions:** Explain with a scenario.

# Q8. Assume the following network scenario in which data travels with the speed of light (299 792 458 m / s).

**What is the transmission delay if**

a)      A sends a 2000 byte packet to B

b)      B sends a 2500 byte packet to D

**What is propagation delay from**

a)      B to D

b)      A to C

**A wants to send a 3000-byte packet to C. B here works on a store-and-forward mechanism. What will be the end-to-end delay for the packet that is traveling from A to C through B?**