

SIMON FRASER UNIVERSITY
SCHOOL OF ENGINEERING SCIENCE

Spring 2019
ENSC 427: COMMUNICATION NETWORKS

Midterm No. 1
Wednesday, February 13, 2019

Duration: 110 minutes. Attempt all problems. Questions are not equally weighted. Please provide detailed answers and include diagrams, graphs, and tables, as needed. Expand all acronyms. Closed book and closed notes. Simple calculators (with no graphing/programming functions) are permitted. PDAs, laptops, and wireless phones are not permitted. Please write legibly. Illegible text will not be graded. Please use a pen (no pencils, please).

1. Computer Networks and the Internet (20 points):
 - (a) List main characteristics of circuit-switched and packet-switched networks.
 - (b) Consider the reference model for packet networks:
 - i. List the names of data units for each layer.
 - ii. Provide examples of protocols used in each layer.
 - iii. List the layers responsible for providing end-to-end and hop-to-hop communications between network elements.
2. Application Layer (15 points):
 - (a) What is the role of the application layer?
 - (b) Provide examples of Internet applications using TCP and applications using UDP. Explain why these applications employ the specified protocol.
 - (c) Describe the DNS application.
3. Transport Layer (20 points):
 - (a) What is reliable data transfer (rdt)?
 - (b) List the mechanisms employed to deal with:
 - i. channel with bit errors
 - ii. duplicate packets
 - iii. channel with errors and loss

4. Transport Layer (15 points):

Use a flow diagram with a sender and a receiver side to describe:

- (a) Stop-and-Wait
- (b) Go-Back-N: assume sender window = 5
- (c) Selective Repeat: assume sender window = 5

5. Transport Layer (10 points):

- (a) What is Round-Trip Time and how is it estimated?
- (b) What is Timeout? How is its value set in TCP?

6. Case Study: Distributed Denial of Service Attacks (20 points):

- (a) What are distributed denial of service (DDoS) attacks?
- (b) List four elements and steps that take place during a DDoS attack.
- (c) Describe simulation topologies and queuing algorithms.
- (d) Summarize main simulation results.