COMSATS University Islamabad, Abbottabad Campus

Department of Computer Science
Mid Term Exam – Spring-25

Class: BSE-5B & 5C | Date: **10/05/2025**

Subject: **Computer Networks** | Total Time Allowed: **90 minutes**

Name:_____ | Total Marks **(20+15+10 = 45)**

Section-A

Marks (5+5+5+5 = 20)

Question #1 short answers: (CLO-01)

a) What is socket and processes communication? (5)

b) What are cookies used for in web applications? Explain their purposes with relevant examples. Additionally, discuss the challenge of maintaining state in web applications and describe how state can be preserved across multiple transactions.(5)

c) Define the role of DASH (Dynamic Adaptive Streaming over HTTP) in network applications. (5)

d) How do Go-Back-N and Selective Repeat function as error-control protocols in computer networks? Explain how each technique ensures reliable data transmission over unreliable or noisy communication channels? (5)

Section-B

Question #2 (CLO-02) **Marks (5+10 = 15)**

a) UDP and TCP use 1s complement for their checksums. Consider you have the two 16 bit words; 1110110001110101 and 1011000111110010.

i. Define the basic functionality of UDP check sum? **(2.5)**

ii. Compute the check sum? (show all work) **(2.5)**

b) **Compute the following.**

i. Suppose a web page has 6 small images and one HTML file. How many TCP connections are required if HTTP is non-persistent, and each object is downloaded sequentially?**(3)**

ii. If each TCP connection setup take 1 RTT and the server is far enough that RTT=100ms, calculate the additional time wasted just for setting up TCP connection for a page with 8 objects using non-persistent HTTP.**(3)**

iii. A web page consists of 1 HTML file and 6 small images. Compare the performance of persistent and non-persistent HTTP connections in this scenario. Assume that each TCP connection setup requires 1 RTT and RTT = 100 ms. Also, assume that each object is requested sequentially. Calculate the total time spent on connection setups for both approaches and discuss which is more efficient and why.**(4)**

Question #3 (CLO-03) **Marks (10)**

Analyze the performance of the Reliable Data Transfer (RDT 3.0) protocol over a 1Gbps link with the following parameters:

- Packet size: 1000 bits
- Propagation delay: 10ms

Calculate the protocol's utilization in a non-pipelined network scenario, where only one packet can be in transit at a time. Then, evaluate the improvement in utilization when using a pipelined approach with a 3-packet window.

CamScanner