**A**

# BRAC UNIVERSITY
## Department of Computer Science and Engineering

Examination : Semester Midterm　　　　　　　　　　　　　　　　Semester: Spring 2025
Duration: **1 Hour 10 Minutes**　　　　　　　　　　　　　　　　　　Full Marks: **45**

<u>CSE421 / EEE465 : Computer Networks</u>
Answer **ALL** questions. (**Pages: 2**)
Figures in the right margin indicate marks.

| Name: | ID: | Section: |
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|---|---|---|
| **Q1**<br>**[CO1]** | A web server using HTTPS has sent a response packet to a client (PC1). The packet is currently at router R3, moving towards PC1. Identify the **source and destination Port, IP, and MAC** Addresses of this response packet. Consider the alphabets as physical addresses and the numbers as logical addresses (given beside the devices in the figure). You need to figure out the port addresses yourself, or you can mention the type of port address used.  | 4 |
| **Q2**<br>**[CO2]** | A university's document submission portal allows students to:<br>　I.　Upload a new assignment.<br>　II.　Update a previously submitted assignment.<br>　III.　Check if an assignment exists on the server without downloading it.<br>**State** HTTP methods should be used for each action, and the method used for action number **(III)** should be explained. | 3<br>+<br>2 |
| **Q3**<br>**[CO2]** | A popular e-commerce website wants to track user preferences and provide personalized product recommendations. **Explain** which field the website can use to do this. Also, **mention** why users should be concerned about their privacy and how they can prevent it. | 2<br>+<br>3 |
| **Q4**<br>**[CO2]** | Your organization changes its web server's IP address daily to enhance security. However, many users report they can no longer access the website consistently, even after refreshing their browsers. **Deduce** why users face this issue from a DNS perspective. | 4 |
| **Q5**<br>**[CO2]** | A real-time emergency notification system is designed to send urgent alerts to users in case of disasters (e.g., earthquakes, fires, or severe weather). These alerts must be processed immediately upon arrival, without delay in the receiver's buffer.<br>**State** which two TCP headers fields should be used here and **explain** their purpose in one line. | 2<br>+<br>3 |
| **Q6**<br>**[CO2]** | A university's online library system hosts digital textbooks on an external web server. Students frequently access these textbooks but experience slow loading times due to high network traffic | 5 |

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| | at the access router, which shows a 91% utilization rate. **Explain why** the access delay is high. | |

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| **Q7** | Dan is browsing an online store and requests a product page with several objects (images, scripts, and stylesheets) to load. It took **50 ms** in total to get the IP address from the local DNS server, and a **persistent** connection was opened between Dan's laptop and the web server. The page consists of **23 objects** (excluding the base HTML file). The first **5 objects** are **6 MB** each, and the remaining **19 objects** are **2 MB** each. | 4 + 3 |
| [CO3] | I.  If the **total RTT** required to receive all objects is **850 ms**, including the DNS RTT to resolve the IP address, **calculate** the **single RTT (in ms)** from Dan's device to the server and back. | |
| [CO3] | II. If the **server's speed is 200 Mbps**, calculate the file transmission time for all objects in **ms**. | |

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| **Q8** | After the TCP handshaking, the client with **RWND=10000 bytes** and the server with **RWND=20000 bytes** transferred the following segments using **selective-repeat** protocol. The ISN of the client is **5678** and the ISN of the server is **1234**. | 4 + 3 + 3 + 3 |

| From | To | Segment Name | Data Size (bytes) | Lost |
|---|---|---|---|---|
| Client | Server | C1 | 546 | No |
| Server | Client | S1 | 786 | No |
| Server | Client | S2 | 685 | **Yes** |
| Server | Client | S3 | 256 | No |
| Client | Server | Ack-1 | | No |
| Server | Client | S2 | 685 | No |
| Client | Server | Ack-2 | | No |

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| [CO3] | I.   | **Calculate** the sequence and the acknowledgment number of the Ack-2 segment sent by the Client. |
| [CO3] | II.  | **Calculate** the receiving window size of the Ack-1 segment. |
| [CO3] | III. | **Calculate** the server's Sf value after sending the second S2 segment. |