COMSATS University Islamabad, Abbottabad Campus

Department of Computer Science

Midterm Exam

FALL 2025

Class: BSE 6A,6B AND 6C

Subject: Software Construction and Development

Instructor: Hifza Ali

Total Marks: 35

Date: 30th Oct 2025

Name and Registration#

CLO-1	Outline the concepts of software construction and management	Understanding
CLO-2	Illustrate best software construction practices	Applying
CLO-3	Demonstrate the concepts involved in development of concurrent programs.	Applying

Question No 1: **[CLO-1]** **Marks 10**

Discuss the essential Design Principles which must be followed to design A Real-Time Traffic Monitoring and Reporting System which will provide users with live updates on traffic conditions, including congestion levels, accidents, roadblocks, and construction work. It will allow users to report traffic incidents, such as accidents, violations, and other road hazards, with the ability to attach photos or videos as evidence. The users will be able to discuss traffic-related issues, share tips, and collaborate on finding solutions to common problems through a chat service. The system will enable traffic authorities to monitor and manage traffic conditions in real-time, respond to and verify the reported incidents, and dispatch resources effectively. The traffic authorities will send alerts to the users regarding road blocks and traffic jams. The system will offer users optimized route suggestions based on real-time traffic conditions, helping them avoid congested areas and reach their destinations faster. Keep in view the non-functional requirements for the system are High Reusability and Modifiability with the Anticipation of Future Changes.

Question No 2: **[CLO-2]** **Marks 15**

Demonstrate an Object-Oriented Design for the Real-Time Traffic Monitoring and Reporting System identifying the major system classes, objects and methods. The design solution must cover all aspects of the given scenario and be a detailed representation of the system design at the 3rd and 4th level of abstraction combined.

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Question No 3: [CLO-3] Marks 15

You are tasked with developing a server for a simple chat application called "Chatty." The server must allow multiple clients to connect simultaneously. Each message sent by a client should be broadcast to all other currently connected clients. A junior developer on your team has submitted the following pseudo-code for the server's main loop:

```
Main ()
{
//Initialization Code
 Listenfd = Socket();
Bind();
Listen();
For(; ; ) "'{
Connfd= accept();
Recvmessage( //the method will receive message from a client );
Sendmessage(// the method will broadcast the message to all connected users.);
}
}
```

Questions:

1. Explain the fundamental flaw in this pseudo-code and how will you fix it to handle multiple concurrent clients. Elaborate in detail. **(7.5)**
2. Explain the critical flaw in this pseudo-code regarding the descriptor reference count and how will you fix it to handle multiple concurrent clients. Elaborate in detail. **(7.5)**

Good Luck



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