Air University

Mid Semester Examinations: Fall 2025

Student ID: 231285

Subjective Part
(To be solved on Answer Books only)

Subject: Parallel and Distributed Computing
Class: BSCYS
Section(s): 5-A&B
Course Code: CS-426

Time Allowed: 2 hours
Max Marks: 50
FM's Name: Eman Munir
FM's Signature: Eman

INSTRUCTIONS

- Attempt responses on the answer book only.
- Nothing is to be written on the question paper.
- Rough work or writing on question paper will be considered as use of unfair means.

	Q. No. 1 (CLO 1)	Marks
a	Your team is developing a simulation app that runs on both RISC-based mobile processors and CISC-based desktop CPUs. During testing, you notice the mobile app runs multiple threads efficiently, but the desktop version occasionally gives inconsistent results when shared data is accessed. i) Explain how differences in RISC vs CISC architecture could influence thread performance and instruction handling.	05 + 05
b	A university cluster computer is being designed for research simulations. The system must handle multiple programs simultaneously, each running different instructions on different datasets. The engineers are debating between shared memory (UMA) and distributed memory (NUMA/message-passing) designs. i) Identify which Flynn's taxonomy model fits this setup and justify your choice. ii) Compare how shared vs distributed memory architectures affect communication and performance in such a parallel system.	05 + 05
	Q. No. 2 (CLO 2)	
	An online multiplayer game uses separate threads for rendering graphics, network communication, and player input. Occasionally, the game lags when data synchronization between these threads fails, leading to delayed visuals and input response. i) Identify the type of concurrency problem being experienced and explain why it occurs. ii) Propose a thread management or synchronization solution (e.g., mutexes, semaphores, or thread pools) that could improve responsiveness and prevent thread blocking.	10

	Q. No. 3 (CLO 3)	Marks
a	A research university runs heavy simulations in its physics department. They have two options: • Cluster Computing: several tightly connected high-performance servers on campus. • *Grid Computing:* volunteer computers across different campuses *connected* via the internet. *i) Explain* which setup would provide more reliability and control, and why. *ii)* Which setup would be more cost-effective but harder to manage, and why?	10
b	A hospital wants to digitize patient records and make them available to doctors remotely. • They are worried about data privacy and government regulations. • They also need scalability for future expansion. i) Which cloud deployment model (Public, Private, Hybrid, or Community) would you recommend and why? *ii)* How does your chosen model balance control, security, and flexibility?	10

**********End of Question Paper**********