REG.NO.:

VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL COMPUTER SCIENCE & ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: E1+TE1

Programme Name & Branch	:	M.TECH INTEGRATED(MIC&MID)
Course Code and Course Name	:	CSI3021 Advanced Computer Architecture
Faculty Name(s)	:	M.THIRUNAVUKKARASAN, SREETHAR S, SURESH A NARMALLI JAYAKRISHNA
Class Number(s)	:	VL2024250101933, VL2024250101951, VL2024250103065, VL2024250101957
Date of Examination	:	17/10/2024
Exam Duration	:	90 minutes Maximum Marks: 50

General instruction(s):

Answer All Questions

Course Outcomes

CO2- Interpret techniques to improve processor's ability to exploit Instruction Level Parallelism.

CO3- Point out how data level and thread level parallelisms is exploited in architectures.

CO4- Identify characteristics and challenges in multiprocessor and multicore architectures.

Q. No	Question	M	CO	BL
1.	Define GPU. Present an outline of graphical processing units. What are the architectural features that distinguish a GPU from a normal CPU? Explain how programming can be performed in GPU with an example.	10	CO2	BL2
2.	Imagine a multi-threaded application that manages access to a shared resource: a printer. Two threads, Thread A and Thread B, are responsible for sending print jobs to the printer. However, if both threads attempt to send a print job at the same time, the print jobs may become mixed up, leading to incomplete or corrupt printouts. To prevent this issue, you need to implement a mutual exclusion mechanism. How would you implement mutual exclusion for Thread A and Thread B to ensure that only one thread can access the printer at any given time? Discuss at least two different methods for achieving this and their pros and cons.	10	CO3	BL3
3.	A research lab is developing a simulation program that takes 100 seconds to run. The team finds that 75% of the program can be parallelized, while 25% must remain sequential. To improve performance, they decide to run the program using 4 processors. Additionally, they are considering running the program on 8 processors to explore further enhancements. The lab is also looking into load balancing techniques to ensure that the workload is evenly distributed among the processors. Using Amdahl's Law, calculate the speedup that can be achieved by running the program on 4 processors and on 8 processors. Additionally, discuss how effective load balancing could further enhance performance.	10	CO4	BL5
4.	(a)Discuss Symmetric Multiprocessing and Asymmetric Multiprocessing in detail (5 Marks) (b) And also specify the Processor Affinity issues with an example. (5 Marks)	10	CO4	BL3
5.	You have a **multi-core system** with **8 cores**. A computational task takes **40 seconds** to complete on a single core. The task can be split into two parts: • **Part 1 (80% of the task):** This part is fully parallelizable and can be evenly distributed across multiple cores. • **Part 2 (20% of the task):** This part is entirely sequential and must be executed on a single core. You are tasked with evaluating the **total time** it would take to complete the task if all 8 cores are utilized, but without using Amdahl's Law directly.	10	CO4	BL5