



Department of Computing and Information System
Faculty of Science and Information Technology (FSIT)

Final Examination, Semester: Summer 2025

Program: B.Sc. in Computing and Information System (CIS)

Course Code: CIS131 Course Title: Computer Architecture and Organization

Section: 21_A, 21_B

Teacher: SN, MFH

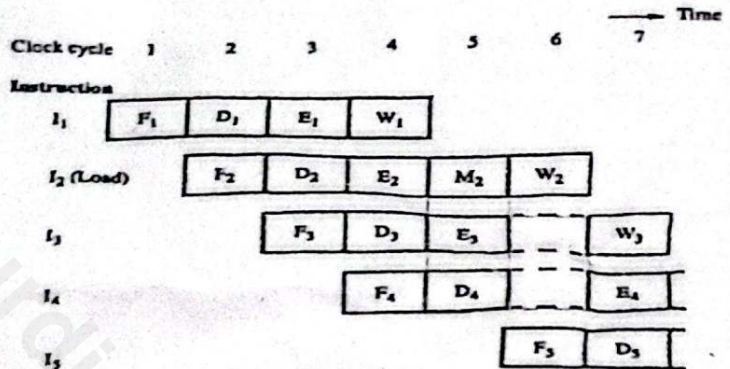
Time: 2 Hours

Total Marks: 40

(Answer all the followings questions sequentially*)

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Sl.	Question	Mark	CLO															
1.	a. Describe your knowledge about computer's basic architecture with briefly description.	5	CLO1 Level 2															
	b. Share the knowledge about virtual memory and classify the types of it? Also mention the reason of using virtual memory.	4																
	c. What do you know about cache memory? Explain how many ways are there for mapping data from main memory to cache memory.	4																
2.	Apply number system techniques to find out a. Multiplication value of 10001_b and 11011_b using number system techniques b. The decimal value of the hexadecimal value $7A5B_b$	2 + 2	CLO1 Level 3															
3.	A benchmark program is run on a 90 MHz processor. The executions, with the following instruction mix and clock cycle count: <table border="1" style="margin: 10px auto; width: 80%;"> <thead> <tr> <th>Instruction</th> <th>Instruction counts</th> <th>Cycles per instructions</th> </tr> </thead> <tbody> <tr> <td>Integer arithmetic</td> <td>35000</td> <td>3</td> </tr> <tr> <td>Data transfer</td> <td>20000</td> <td>2</td> </tr> <tr> <td>Floating point</td> <td>15000</td> <td>2</td> </tr> <tr> <td>Control transfer</td> <td>4500</td> <td>1</td> </tr> </tbody> </table> Determine the effective CPI, MIPS rate and execution time for this above program.	Instruction	Instruction counts	Cycles per instructions	Integer arithmetic	35000	3	Data transfer	20000	2	Floating point	15000	2	Control transfer	4500	1	3	CLO2 Level 4
Instruction	Instruction counts	Cycles per instructions																
Integer arithmetic	35000	3																
Data transfer	20000	2																
Floating point	15000	2																
Control transfer	4500	1																
4.	Apply k-map techniques for find out the minimization of SoP and MPoS of the following function $f(x,y,z) = xy\bar{z} + x\bar{y}\bar{z} + x\bar{y}z + xyz$. Draw the circuit diagram of that minimized - SoP and PoS	6	CLO3 Level 6															
5.	Apply the 0-Operand and 1-Operand instruction operation technique in the computer architectures for the following instruction: $x \leftarrow (a * b + c - d) / (e + f)$	5	CLO4 Level 3															

6.	a. Describe the reasons behind a pipeline being stalled.  Figure: 01 b. From the above figure 01 what kind of problem are there and why?	3	CLO 1 Level 2
7.	Consider a process with 4 stages with 12 instructions $I_1, I_2, I_3, I_4, I_5, \dots, I_{12}$. Each stage takes 5 minutes. - Compute the total clock cycle time required to execute those 12 instructions. (pipeline and non-pipeline both) - Determine the speed up and efficiency achieved by using the pipeline execution over non-pipelining execution. - Determine the throughput for both pipeline and non-pipeline process.	4	CLO2 Level 4