BACHELOR OF INFORMATICS & COMPUTER SCIENCE

ICS 2104: Computer Organization and Architecture

Assignment No. 2   Date Due: **13th July, 2023**

20 Marks

1. Consider two different machines, X & Y, with two different instruction sets, both of which have a clock rate of 200 MHz. The measurements in the table below are recorded on the two machines running a given set of benchmark programs:

Instruction Type	Instruction Count (I_c) (millions)		Cycles per Instruction (CPI)	
	A	**B**	**A**	**B**
Arithmetic and Logic	10	12	1	1
Load and Store	6	10	3	2
Branch	2	2	4	4
Others	4	4	3	3

   Determine the effective CPI, million instructions per second (MIPS) rate, and execution time (CPU) for each machine and comment on the results.   **[6 Marks]**

2. Consider the difference between processors in terms of pipelining i.e. how pipelining is handled from processor 4004 to Pentium series to Celeron, Duo Core, and Intel Core, Core i series.

   [4 Marks]

3. A nonpipeline system takes 100ns to process a task. The same task can be processed in a 5-stage pipeline with a clock cycle of 20ns. Determine the speedup ratio of the pipeline for 100 tasks. What is the theoretical speedup that could be achieved with the pipeline system over a nonpipelined system?   **[3 Marks]**

4. Discuss the concept of RAID as applied in storage system. Your discussion should highlight the general idea and any 4 levels used in the implementation of RAID.   **[5 Marks]**

5. Explain how caches are used to exploit the locality of reference for a performance benefit. Explain for both spatial locality and temporal locality.   **[2 Marks]**