Question Paper

Exam Date & Time: 04-Jun-2022 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
II SEMESTER B.Sc.(Applied Sciences) in Engg.
END SEMESTER THEORY EXAMINATION-MAY/JUNE 2022

COMPUTER ORGANIZATION AND ARCHITECTURE [ICS 123 - S2]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Missing data if any suitably assumed.

1)		Explain the functional units of a computer. Give a sequence of machine instructions for Adding the contents of memory location A to those of location B, and place the answer in location C.	(4)
	A)		
	B)	Write 8-bit 1s and 2s complement representations for i) -1 (ii) -99. Also perform -5 + (-2) and -7-(+1) using 2's complement representation	(4)
	C)	Explain the following addressing modes with an example for each. i) Relative mode ii) Auto decrement mode	(2)
2)		Explain the two ways of assigning byte addresses across words. Show how the value 12345678 is stored in memory starting from word address 8000 in both the assignments when the word comprises of 16 bits	(2)
	A)		
	B)	What are GPU's? Explain important functionalities of GPU in detail.	(3)
	C)	Differentiate between RISC and CISC instructions. Write a RISC program that computes E=A X B + C X D.	(5)
3)		Explain the horizontal microinstruction with a neat diagram.	(2)
	A)		
	B)	Identify and explain the sequence of events during control unit operation of fetch cycle using an example. Show the contents of the registers involved in this operation at each event and give the symbolic representation of the sequence of events.	(5)

	C)	What is a Program status word? Explain the fields in the Program status word.	(3)
4)		Explain how the different components required to identify a word in the cache is calculated in various Cache Mapping techniques with an example for each.	(5)
	A)		
	B)	A disk unit has 25 recording surfaces. It has a total of 16,000 cylinders. There is an average of 200 sectors per track. Each sector contains 512 bytes of data. What is the maximum number of bytes that can be stored in this unit? What is the data transfer rate in bytes per second at a rotational speed of 7200 rpm?	(2)
	C)	Consider a long sequence of accesses to a disk with an average seek time of 4 ms and an average rotational delay of 2 ms. The average size of a block being accessed is 4K bytes. The data transfer rate from the disk is 34 Mbytes/sec. Assuming that the data blocks are randomly located on the disk, estimate the average percentage of the total time occupied by seek operations and rotational delays.	(3)
5)		Explain the use of DMA controllers in a computer system with a neat diagram.	(3)
	A)		
	B)	Explain the sequence of events involved in handling an interrupt request from a single device.	(2)
	C)	Consider two numbers A=125.125 and B=12.625 and perform the following operations. i. Convert the above numbers to binary and store it in IEEE floating point representations. ii. Perform A X B Store the result in IEEE 32-bit format.	(5)

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