

Roll No. :

Total No of Questions : 9] [Total No. of Pages : 7

67007-N

MCA 1st Semester (Regular)

Examination, March-2022

(MCA 2 Year Programme)

(w.e.f. 2020-21)

Paper-20MCA21C4

**DIGITAL DESIGN AND COMPUTER
ARCHITECTURE**

Time : Three Hours] [Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note :- Attempt five questions in all, selecting one question from each Unit. Q No. 1 is compulsory. All questions carry equal marks

1. (i) Differentiate between LSB, MSB, Nibble and Byte.

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- (ii) Explain how Non-weighted Codes can be implemented.
- (iii) Write down the working principle of magnitude comparator as a combination circuit.
- (iv) What do you mean by the controlled buffer register ?
- (v) How an address may be different from an effective address ?
- (vi) Define Control Word (CPU). Also write down its structure.
- (vii) Brief out the Character Oriented Protocol used for serial communication.
- (viii) Write down any four prime applications of SIMD array processors.

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Unit-1

2. (i) Find the decimal equivalent of the following sign magnitude represented binary numbers :
 - (a) 1111
 - (b) 001000
 - (c) 101100
 - (d) 110110
- (ii) Write down the algorithm and hardware requirements for implementing addition and subtraction of numbers in signed 2's complement representation.
3. (i) Convert the following Binary Numbers to the Octal Numbers :
 - (a) 11001110001.000101111001
 - (b) 111110001.10011001101

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(c) 010100110

(d) 11011001

- (ii) How Don't Care conditions can be used in simplifying the Boolean Functions ?
Solve the following with (d) as Don't Care : $f(a, b, c) = \Sigma(0,2,6)$ and $d(a, b, c) = \Sigma(1,3,5)$

Unit-II

4. (i) Draw the block diagram of a 4×1 line MUX circuit and also explain its operation by means of its functional table.
(ii) Define the term Latch. Detail out the working of J-K flip-flop with at least one application.

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5. (i) Discuss how synchronous counters work differently from asynchronous counters.

- (ii) Explain in detail the working principle of Up/Down Counter with the help of diagram and functional table.

Unit-III

6. (i) Explain all the categories in which computer instructions can be classified with at least two examples of each category.

- (ii) Explain in detail the assembly language program structure. Also define the meaning and working of pseudo instructions in assembly language.

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7. (i) Elaborate various steps performed during instruction cycle. Explain how these steps can be re-sequenced and re-structured to achieve parallelism.
- (ii) Discuss any two scenarios where CISC architectures are preferred over RISC architectures. Also mention the features of CISC architecture to support your answer.

Unit-IV

8. (i) Detail out the working of Daisy Chaining Priority technique used for resolving the priority among interrupts.
- (ii) Draw the labeled diagram of DMA controller and explain its working in terms of burst transfer and cycle stealing.

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9. (i) How pipeline architecture supports parallel processing ? Explain the working and implementation of arithmetic pipeline to support your answer
- (ii) Explain how and why memory interleaving is required by the pipeline and vector architecture for better efficiency.

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