

Printed pages: 02

Sub Code:RCA104

Paper Id: **214104**

Roll No:

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MCA
(SEM I) THEORY EXAMINATION 2018-19
COMPUTER ORGANIZATION & ARCHITECTURE

Time: 3 Hours

Total Marks: 70

- Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. **Attempt all questions in brief.** **2 x 7 = 14**

- a. Convert the following.
 - (i) $(1111101)_2 = (?)_{10}$
 - (ii) $(425)_6 = (?)_4$
- b. What is 2D and 2D1/2 memory organization? Explain using figure.
- c. Define interrupt with its types.
- d. Subtract using 2's compliment method
 - (i) $(-42) - (-13)$
 - (ii) $(27) + (-41)$
- e. What is pipelining? Why do we need instruction pipelining?
- f. Explain memory management hardware.
- g. Simplify the Boolean expression using three variable map
 $F(A,B,C) = \sum(0,2,3,4,6)$

SECTION B

2. **Attempt any three of the following:** **7 x 3 = 21**

- a. What are the basic difference between a branch instruction, a call subroutine instruction and program interrupt also Explain micro program sequencer with block diagram
- b. Explain how Booth's algorithms is suitable for signed number multiplication in comparison to conventional shift and add method using booth's multiplication multiply (-23) and (17) .
- c. Difference between isolated input/output and memory input/output? What are the advantages and disadvantages of each?
- d. List out the advantages and limitation of hardwired control unit. Explain the organization of a microprogramed control unit.
- e. Write a program to evaluate the arithmetic statement

$$X = A - B + C * (D * E - F)$$

$$G + H * K$$

- (i) Using general register computer with three address instruction.
- (ii) Using general register computer with two address instruction.
- (iii) Using general register computer with one address instruction.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7
- (a) Explain IEEE standard for floating point representation.? Represent following in IEEE single precision and double precision format
 - a). 179.125810
 - b). 62350.4584
 - (b) Explain the bus arbitration in detail along with its types. What are different types of buses used?
4. Attempt any *one* part of the following: 7 x 1 = 7
- (a) A computer has 16 registers, an ALU with 32 operations, and shifter with eight operations, all connected to a common bus system.
 - (i) Formulate a control word for a micro operation.
 - (ii) Specify the number of bits in each field of the control word and give a general encoding scheme.
 - (iii) Show the bits of control word that specify the micro – operation
 - a). $R4 \leftarrow R5 + R6$
 - b). $R2 \leftarrow R1 - R3$
 - (b) A virtual memory system has an address space of 8k words, a memory space of 4k words and page and block/frame sizes of 1k words. The following page reference changes occur during time interval.
4 2 0 1 2 6 1 4 0 1 0 2 3 5 7
Determine the four pages that are resident in main memory after each page reference change if the replacement algorithm used is
 - (i) FIFO
 - (ii) LRU
 - (iii) OPTIMAL
5. Attempt any *one* part of the following: 7 x 1 = 7
- (a) Explain Addressing modes along with their types. Design 4- bit bi-directional shift register.
 - (b) What is DMA? Explain DMA operation with diagram Also Draw and explain the block diagram of typical DMA controller.
6. Attempt any *one* part of the following: 7 x 1 = 7
- (a) (i) What is cache coherence? How can the problems related to it be solved?
(ii) How many **128x8** RAM chips are needed to provide the memory capacity of 2048 bytes? And how many lines must be decoded for chip select? And specify the size of the decoders.
 - (b) Discuss RISC and CISC architecture in detail. Also explain how data transfer can be controlled using hand shaking technique.
7. Attempt any *one* part of the following: 7 x 1 = 7
- (a) Discuss Flynn's classification of various computer architecture with the help of their functional block diagram.
 - (b) What is parallel processing and its various challenges? Explain any parallel processing mechanism.
