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MCS-012

MCA (REVISED)/BCA (REVISED)

Term-End Examination

June, 2019

**MCS-012 : COMPUTER ORGANIZATION AND
ASSEMBLY LANGUAGE PROGRAMMING**

Time : 3 Hours

Maximum Marks : 100

(Weightage 75%)

Note : Question No. 1 is compulsory and carries 40 marks. Attempt any three questions from the rest.

1. (a) Perform the following : 6

- (i) Add (-35) and (-75) number in an 8-bit register using signed 2's complement representation. Also indicate an overflow if any.

(A-7) P. T. O.

- (ii) Convert binary 01001011 into octal and hexadecimal notation.
- (iii) Write BCD equivalent of 256.
- (b) Simplify the following Boolean function in SOP form using K-map : 6
- $$F(A, B, C, D) = \Sigma(0, 3, 7, 9, 13, 15, 18, 21)$$
- and draw the logic diagram.
- (c) Given the 8 bit value 10101101 stored in a register, what are microinstructions required in order to : 6
- (i) Clear to 0 the first 4 bits
 - (ii) Set to 1 the last 4 bits
 - (iii) Complement the first 4 bits
- (d) Assume R2 register having suitable values to perform the micro-operations. Discuss the importance of flags in a computer system. 2

- (e) Draw the block diagram of hardwired control unit and explain how does it work ?- 5
- (f) Explain the use of large register file for RISC machines with the help of an example. 5
- (g) Write an 8086 assembly language program to add five byte numbers stored in an array. The result should be stored in AX register. 6
- (h) Why does DMA have priority over the CPU when both request a memory transfer of data ? 4
2. (a) How is execution of an instruction done ? Draw the flow chart of the instruction cycle. 5
- (b) What are the key features of Von-Neumann Architecture ? 5

- (c) Describe through an example how does a two-way set associative cache mapping scheme work. 6
- (d) Draw an excitation table for RS flip-flop. 4
3. (a) Draw a 4-bit parallel register using D flip-flops and explain its operation. 6
- (b) Categorize the following 8086 assembly language instructions to the instruction types given below : 6

Assembly Instructions	Instruction Type
(1) Move	(i) Data processing instruction
(2) TRAP	(ii) Data transfer instruction

- (3) BRN (iii) Privileges instruction
- (4) DIV (iv) Program control instruction
- (5) STORE
- (6) XOR
- (c) List the important characteristics of instruction set of a basic computer. 4
- (d) What is the difference between the following operations ? 4
- (i) Arithmetic shift and logic shift
- (ii) Logic shift and circular shift
4. (a) Suppose the value of the registers R_1 and R_2 are : 6
- $R_1 = 1101\ 0110$
- $R_2 = 1111\ 1001$

Perform the following operations on R_1 using R_2 :

- (i) Selective Complement
 - (ii) Selective Set
 - (iii) Selective Clear
- (b) What is a multiplexer ? Why is it needed ?
Draw the logic diagram and truth table for a 4×1 multiplexer. 6
- (c) Explain the following 8086 microprocessor addressing modes with the help of an example for each : 6
- (i) Indexed
 - (ii) Register Indirect
 - (iii) Direct
- (d) Discuss the use of a device driver. 2
5. (a) What are the constraints with MOV instruction of 8086 microprocessor ? 3
- (b) List all the features of RISC architectures.

- (c) Draw a general configuration of microprogrammed control unit and discuss its operation. 6
- (d) What is performance degradation in a pipeline ? Explain any *two* possible hardware schemes that can be used in an instruction pipeline in order to minimize the performance degradation caused by instruction branching. 5