Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MCA/SEM-1/MCA-101/2011-12

2011

COMPUTER ORGANIZATION AND ARCHITECTURE

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) The SOP form of logical expression is most suitable for designing logic circuits using only

   a) XOR gates b) NOR gates

   c) NAND gates d) OR gates.

   ii) BCD subtraction is performed by using which complement representation ?

   a) 1's b) 2's

   c) 10's d) 9's.

   iii) The r's complement of number N_r is

   a) r – 1's complement + 1

   b) $r^m - N$

   c) both (a) & (b)

   d) none of these.

iv) Floating point representation is the combination of

a) integer and fraction

b) mantissa and exponent

c) long integer and double

d) integer and double.

v) What is the control unit's function in CPU ?

a) To transfer data to primary storage

b) To store program instruction

c) To perform logic operations

d) To decode program instruction.

vi) When race condition occur in SR-flip-flop ?

a) S = 0, R = 0 b) S = 1, R = 0

c) S = 0, R = 1 d) S = 1, R = 1.

vii) The gray code of decimal 7 is

a) 0111 b) 1011

c) 0100 d) 0101.

viii) A demultiplexer has

a) one data input and a number of selection inputs, and they have several outputs

b) one input and one output

c) several inputs and several outputs

d) several inputs and one output.

ix) The interrupt with highest priority in 8085 microprocessor is

a) INTR b) TRAP

c) RST 7·5 d) RST 6·5.

x) Gated *D* latch is called ..... latch.

a) transparent b) transport

c) traverse d) nested.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Draw the diagram of 3-bits Bi-directional shift register using mode control (*M*). When *M* is logic 0 then left shift and right shift for *M* is logic.

3. Differentiate between DRAM and SRAM organization.

4. a) What is truth table ? Why is it called so ?

   b) Why is NAND gate called universal logic gate ? 3 + 2

5. a) Simplify using K-map : $A^{l}B^{l}C + A^{l}BC + AB^{l}C + ABC$

   b) Write some disadvantages of K-map. 3 + 2

6. Design a 4 : 1 multiplexer using NAND gates.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Using K-map method minimize the following expression :

   $F (w, x, y, z) = m \Sigma (1, 5, 6, 12, 13, 14) + d \Sigma (2, 4)$

   b) Implement XOR gate using NAND gate and NAND gate using NOR gate.

   c) Explain the difference between Ring and Johnson counter with proper state diagram and circuit diagram.

   6 + (2 + 2) + 5

8. a) What is Instruction Set ? Write down the program to compute $x = b * c + d/p$ using one address instruction.

   b) What is addressing mode ? Explain different types of addressing mode.

   c) Differentiate between micro programmed control unit and hardwired control unit. (2 + 4) + (2 + 4) + 3

9. a) Discuss the operation of 8085 microprocessor pins :

   ALE, IO/M, HOLD, TRAP, INTR

   b) Describe Von Neuman architecture.

   c) What is microcontroller ? 6 + 6 + 3

10. a) Design a combinational circuit using different logic gates that can convert BCD code to its corresponding excess-3 code.

    b) What is DMA ?

    c) With the help of a diagram discuss how DMA transfer takes place. 6 + 3 + 6

11. Write short notes on any *three* of the following : 3 × 5

    a) DMA controller

    b) Polling *vs* daisy changing bus arbitration

    c) Floating point representation

    d) Cache memory

    e) Ripple counter.