Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MCA/SEM-1/MCA-101/2010-11

2010-11
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) A full subtractor can be designed with a full adder by

      a) only changing the circuit

      b) adding a not with sum input

      c) adding a not with carry input

      d) none of these.

   ii) $(264)_8 = (?)_{10}$

      a) 2640 b) 128

      c) 108 d) 127.

   iii) 2's complement of 100000 is

      a) 011111 b) 100000

      c) 11111 d) 111111.

iv) Gray code for binary 1010 is

a) 1010 b) 0111

c) 0011 d) 1111.

v) $A + AB = ?$

a) A b) $A + B$

c) 1 d) 0.

vi) You have a computer of 2·4 GHz. Here 2·4 is

a) processor task speed b) BUS speed

c) clock rate d) computer speed.

vii) In 8085 micro controller program, every program end with

a) END b) STOP

c) HLT d) HALT.

viii) Which can store data permanently ?

a) Gate b) RAM

c) Register d) Flip-flop.

ix) ALU stands for

a) Arithmetic Logic Unit

b) Address Logic Unit

c) Associative Logic Unit

d) None of these.

x) Which of the following input combinations is not allowed in SR flip-flop ?

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

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

GROUP – B

(Short Answer Type Questions)

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

2. Verify the de Morgan's theorem by means of truth table.

3. a) Express the Boolean function $F = AB + A^{I}C$ in a product sum.

   b) Express the Boolean function $F = x + y^{I} z$ in a sum of product form.

4. a) Add the following numbers using 2's complement method : 3

   + 49 and – 37.

   b) Perform the subtraction using 2's complement method. 2

   11000 – 1101.

5. Convert a JK flip-flop into a D flip-flop. You can use additional circuitry, if required.

6. Obtain a minimal product of sum expression for the function given below :

   $F (w, x.y.z) = \prod (1, 4, 5, 9, 13, 14)$

GROUP – C

(Long Answer Type Questions)

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

7. a) Construct a full subtracter with half adders and an addition gate.

   b) Construct XOR using NAND gates only.

   c) What is truth table ? Why is it called so ?

   d) Design the circuit $AB + BC (B + C)$. 6 + 3 + 3 + 3

8. a) Compare two addressing mode and three addressing mode.

   b) Simplify using boolean algebra :

      i) $\left(A+(BC)^{l}\right)^{l}$

      ii) $A^{l}BC + AB^{l}C + ABC^{l} + ABC$.

   c) Simplify using *K* map :

      i) $A + AB$

      ii) $A^{l}B^{l}C + A^{l}BC + AB^{l}C + ABC$. 3 + 6 + (3 + 3)

9. a) What is bus speed ?

   b) What is PLA ?

   c) Describe basic architecture of a digital computer.

   d) Design the circuit using multiplexer : $F(A,B,C) = \sum(0,1,3,4,8,9,15)$ 2 + 2 + 6 + 5

10. a) What is microcontroller ?

    b) Write a 8085 instruction code for swap two values.

    c) Describe Von Neuman architecture. 3 + 6 + 6

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

    a) Universal gate

    b) DMA controller

    c) ALU

    d) Binary Comparator

    e) Decoder and Encoder.