

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. $3 \times 5 = 15$

2. Verify the de Morgan's theorem by means of truth table.
3. a) Express the Boolean function $F = AB + A'C$ in a product sum.
b) Express the Boolean function $F = x + y'z$ 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. $3 \times 15 = 45$

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) $(A + (BC)')'$
- ii) $A'BC + AB'C + ABC' + ABC.$
- c) Simplify using K map :
- i) $A + AB$
- ii) $A'B'C + A'BC + AB'C + ABC.$ $3 + 6 + (3 + 3)$
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.
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