Enrolment No. /Seat No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA – SEMESTER I- EXAMINATION –WINTER-2024

Subject Code: MC01094021 Date: 10/01/2025
Subject Name: Fundamental of Computer Organization
Time:10:30 AM TO 01:00 PM Total Marks: 70
Instructions:

1. **Attempt all questions.**
2. **Make Suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of simple calculators and non-programmable scientific calculators are permitted.**

Q.1 **(a)** Do as directed:

1. Draw the block diagram of a digital computer **02**
2. Draw the circuit diagram for the expression F = AB + A'C **01**
3. Give the complement for the expressions: **02**
   F = AB + C'D' + B'D
4. Determine by the means of truth table the validity of De Morgan's theorem for three variables: (ABC)' = A'+B'+C' **02**

(b) Perform the following operations:

1. Convert the given binary 101110.0101 to decimal, octal and hexadecimal. **03**
2. Perform the following addition 10010 + 10011 **02**
3. Represent the number 8620 using BCD and excess-3 code. **02**

Q.2 **(a)** What are Gates? Mention their names, graphic symbols, algebraic functions and truth tables for all the gates. **07**

(b) Given the Boolean function
F = xy'z + x'y'z + xyz

a. List the truth table of the function **01**
b. Draw the logic diagram using the original expression **02**
c. Simplify the expression using Boolean Algebra properties **01**
d. List the truth table of the simplified expression and show it it's the same. **01**
e. Draw the logic diagram of the simplified expression. **02**

OR

(b) Given the truth table: **07**

x	y	z	F1
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

a. Obtain the simplified functions in SOP
b. Obtain the simplified functions in POS

Q.3 **(a)** Write a short account on Instruction cycle. **07**

(b) Write a brief note on Shift Micro-operations. **07**

OR

Q.3 **(a)** What is Bus? Explain Address Bus, Data Bus and Control Bus. **07**

(b) Write a brief note on Logic Micro-operations. **07**

Q.4 **(a)** Write a short note on Binary Adder-Subtractor along with its circuit diagram. **05**

The adder-subtractor circuit has the following values for input M and data inputs A and B. In the given case below find the values of S_3, S_2, S_1, S_0, C_4. **02**

	M	A	B
a	0	0111	0110
b	0	1000	1001

(b) Simplify the following Boolean function using 4 variable K Map **07**

$F(A, B, C, D) = \sum (3, 7, 11, 13, 14, 15)$

OR

Q.4 **(a)** Design a 8-Bit Binary Incrementer. Also draw its combinational circuit diagram. **07**

Q.4 **(b)** Simplify the following Boolean function using 4 variable K Map **07**

$F(A, B, C, D) = \sum (0, 1, 2, 3, 7, 8, 10)$

$d(A, B, C, D) = \sum (5, 6, 11, 15)$

Q.5 **(a)** Write a short note on semiconductor RAM memories **07**

(b) Write a short note various addressing modes **07**

OR

Q.5 **(a)** List and explain classes of Interrupts. **07**

(b) Write a short note on secondary memory storage devices. **07**

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