

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER-I • EXAMINATION – WINTER • 2015

Subject Code: 2610004

Date: 01-01-2016

Subject Name: Fundamentals of Computer Organization

Time: 10:30 am - 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.

- Q. 1**
- (a) 1. Prepare a truth table for Boolean expression: (i) $A(BC' + B'C)$ (ii) $X + YZ'$ 02
2. Demorganize $((A+B)' + C')'$ 01
3. Draw the K-map for: 02
- a. $m_5 + m_7 + m_{15} + m_{10} + m_2$ (K-map in W,X,Y,Z)
- b. $m_1 + m_5 + m_7 + m_6 + m_{12} + m_{13} + m_{15} + m_{11}$ (K-map in A,B,C,D)
4. calculate : $(1111)_2 * (11)_2 = (\text{_____})_2$ 02
- $(11011)_2 + (1111)_2 = (\text{_____})_2$
- (b) Perform the following operations:
1. $0001 - 1000$ (Using 2's complement system). 01
2. Prove by perfect induction (i) $(X+Y)(X+Z) = XX + XZ + XY + YZ$ 04
- (ii) $X + X'Y = X + Y$ 01
3. K-Maps have four rows or columns numbered as 00, 01, 11, and 10 and not 00, 01, 10 and 11. Why? 01
4. Convert following: $(251)_{10} = (\text{_____})_2 = (\text{_____})_8 = (\text{_____})_{16}$
- Q.2**
- (a) What are the universal gates? Explain universal gates with circuit and truth table. 07
- (b) Write a Boolean expression SOP form for a 3-input A,B,C gating network that will have outputs 1 for designation m_0, m_1, m_3, m_6 and m_7 and the outputs are 0 for designation m_2, m_4 and m_5 . Draw two level NAND to NAND gate combination network for SOP that corresponds to the simplified expression. 07
- OR**
- (b) Write a short notes on basic components of a digital computers 07
- Q-3**
- (a) Explain RAM? Types of RAM? Which did you select? Why? 05
- (b) Explain characteristics of memory system and explain memory hierarchy. 05
- (c) Explain cache operation, principle of locality and cache hierarchy. 04
- OR**
- Q-3**
- (a) Write short notes on instruction cycle and execution cycle organization of control register. 05
- (b) Explain ROM? Types of ROM? Explain their application. 05
- (c) Explain with examples types of complements method's using binary numbers 04

systems

- Q.4** **(a)** What is a Multiplexer? Explain 4-to-1 line multiplexer. **07**
 (b) What is Flip-Flop? Explain how a JK Flip Flop is made from an RS Flip Flop. **07**

OR

- Q-4** **(a)** Explain RS Flip Flop by giving its characteristic table and the circuit diagram. **04**
 (b) Explain the working of Half-Adder and Full-Adder along with the circuit diagrams. **06**
 (c) What is the purpose of Binary Counter? Explain ripple counter. **04**

- Q.5** **(a)** Draw the block diagram of 8086 Intel microprocessor and explain queue and segment registers. **07**
 (b) Explain instruction format of 8086 microprocessor. **07**

OR

- Q-5** **(a)** Explain logical instruction set of 8086 microprocessor with example. **07**
 (b) Explain different parts of EU in 8086 microprocessor. **07**
