

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: **01**
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**
