

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA. Sem-I Examination January 2010

Subject code:610004**Subject Name: Fundamentals of Computer Organization****Date: 23 / 01 / 2010****Time: 12.00 – 2.30 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)** Perform following operations : **07**
- i. $745.81 - 436.62$ (Use 9's Complement Method)
 - ii. $46 - 14$ (Use 8-bit 2's Complement Method)
 - iii. $679.6 + 536.8$ (Use BCD addition)
 - iv. $37 + 28$ (Use XS – 3 Addition Method)
 - v. $10110 - 1011$
 - vi. 1101.11×101.1
 - vii. $11110 / 101$
- (b)** Do as directed :
- i. Convert $(1762.46)_8$ to its equivalent hex number. **01**
 - ii. Convert $(420.6)_8$ to its equivalent decimal number **01**
 - iii. Convert Gray Code 101101 to binary number **01**
 - iv. Detect and correct error in the message 0101101. **01**
(Message is coded in even-parity hamming code)
 - v. Draw a basic structure of digital computer system. **03**
Briefly state purpose of all components.
- Q.2 (a)**
- i. Explain different types of printers. **04**
 - ii. State the De Morgan's theorem for three variables in both the forms and give the proof for one by the method of perfect induction. **03**
- (b)**
- i. Simplify the following Boolean Expressions: **04**
 - a. $A + B[AC + (B + C)D]$
 - b. $(A + B'C)'(AB' + ABC)$
 - ii. Derive a Boolean expression in SOP form for 3-variable majority function. Majority function generates output 1 when number of 1s are more than number of 0s in an input. **03**
- OR**
- (b)**
- i. Reduce the following Boolean expression and draw a logic diagram using AOI logic : **04**
 $[(A' + (A+B)')(B' + (B+C)')]'$
 - ii. Simplify following Boolean functions using 4-variable K-map: **03**
 - a. $F(A,B,C,D) = \Sigma (3,7,11,13,14,15)$
 - b. $F(A,B,C,D) = \Sigma(0,2,4,6,8,10,12,14)$
 - c. $F(A,B,C,D) = \Sigma (m_n)$, where $n : 0$ to 15

Q.3	(a)	i.	Define flip-flop and explain its common characteristics.	02
		ii.	Explain 4-bit register transfer operation.	05
	(b)	i.	Explain Integer representation of numbers in brief.	02
		ii.	Design a combinational circuit for full adder.	05
OR				
Q.3	(a)	i.	Explain concept of clocks and its importance in digital computers.	02
		ii.	Explain 4-bit Binary Counter.	05
	(b)	i.	Explain various components of ALU in brief.	02
		ii.	Explain 4-bit universal register.	05
Q.4	(a)	i.	What is Decoder ? Explain Binary to Octal Converter.	04
		ii.	Write a brief note on RAM and its types.	03
	(b)	i.	Write down Zero address and One address instructions for $X = (A+B)*(C+D)/(E - F)$.	04
		ii.	Explain memory stack.	03
OR				
Q.4	(a)	i.	What is MUX ? Explain 4-to-1 line MUX.	04
		ii.	Write a brief note on ROM and its types.	03
	(b)	i.	A two address instruction is stored in memory at an address designated by symbol W. The address field of instruction (stored at W + 1) is designated by Y. The operand used during execution of instruction is stored at address symbolized Z. An index register contains value X. State ho Z is calculated from other address if addressing mode of instructions is : a) direct b) indirect c) relative d) indexed.	04
		ii.	What is RPN? Explain its importance with suitable example.	03
Q.5	(a)	i.	What are the types of commands that an I/O interface may receive? State their purpose.	02
		ii.	What is Asynchronous Data Transfer? Explain Handshaking method to implement it.	05
	(b)	i.	What is Cache memory? Discuss in brief.	02
		ii.	Computer system needs 512 bytes of RAM and 512 bytes of ROM. RAM chip available is of capacity 128 bytes and ROM chip of capacity 512 bytes. Draw a memory address map for the computer system and also draw a connection structure.	05
OR				
Q.5	(a)	i.	Differentiate Isolated and Memory mapped I/O.	02
		ii.	Explain DMA operation.	05
	(b)	i.	What is Virtual memory? Discuss in brief.	02
		ii.	Write a note on Magnetic Storage Devices.	05
