Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA- Ist SEMESTER–EXAMINATION – MAY/JUNE - 2012

Subject code: 610004 Date: 01/06/2012

Subject Name: Fundamentals of Computer Organization

Time: 02:30 pm – 05:00 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)**	i.	$(542.24)_8 - (655.52)_8$ (Use 7's Complement Method)	**02**
		ii.	Given that $(37)_{10} = (101)_b$. Find the value of b.	**01**
		iii.	Convert $(172)_8$ to GRAY code.	**02**
		iv.	Perform 255 – 473 in XS - 3 code.	**02**
	(b)	i.	Add 1010.11 + 1101.10 + 1001.11 + 1111.11	**01**
		ii.	Convert $(587.75)_{10}$ to ($)_8$, ($)_2$, ($)_{16}$.	**02**
		iii.	Demorganize ((AB)'+A'+AB)'.	**02**
		iv.	What is a BCD code? What are its advantages & disadvantages?	**02**
Q.2	**(a)**	i.	Prove A + BC = (A+B)(A+C). (Use Boolean laws)	**02**
		ii.	What is RAM? Differentiate different types of RAM.	**02**
		iii.	Find the values of binary variables A,B,C,D by solving the set of Following Simultaneous equations. A'+ AB = 0; AB = AC ; AB + AC' + CD = C'D	**03**
	(b)	i.	When a Karnaugh map has four rows or columns, they are numbered 00, 01, 11, and 10 instead of 00, 01, 10, and 11. Why?	**02**
		ii.	Reduce the expression A(B+C')(A+B')(B+C+D') using K – Map to find the minterms. Implement them in Universal logic.	**05**

OR

(b) A lawn sprinkling system is controlled automatically by certain combinations of the following variables. **07**

Season (S = 1, if Summer; otherwise S = 0)
Moisture Content of Soil (M=1, if high; 0 if low)
Outside Temperature (T = 1,if high; 0 if low)
Outside Humidity (H = 1, if high; 0 if low)

The Sprinkler is turned on under any of the following circumstances.

1. The moisture content is low in winter.
2. The temperature is high and the moisture content is low in summer.
3. The temperature is high and the humidity is high in summer.
4. The temperature is low and the moisture content is low in summer.
5. The temperature is high and the humidity is low.

Use a K – map to find the simplest possible logic expression involving the variables S,M,T,H for turning ON the sprinkler system. Implement them using Universal logic.

Q.3	**(a)**	i. What is a master – slave flip-flop? Discuss its working.	**03**
		ii. Explain 4-bit transfer circuit. Where it is used?	**04**
	(b)	Design a counter using J-K flip flop which counts the sequence 0,1,2,4,0,….. and repeat.	**07**
		OR	
Q.3	**(a)**	i. What is a latch? Explain D-latch using its waveform.	**03**
		ii. Explain 3-bit binary counter in detail.	**04**
	(b)	Design a counter using R-S flip flop which counts the sequence 0,1,2,4,0,….. and repeat.	**07**
Q.4	**(a)**	i. Explain Half Adder. Design using NOR gate.	**03**
		ii. What is Cache memory and Virtual memory.	**02**
		iii. What is cycle stealing?	**02**
	(b)	i. What are different modes of data transfer? Explain Programmed I/O mode in detail.	**05**
		ii. What is program Counter?	**02**
		OR	
Q.4	**(a)**	i. Explain bootstrap Loader.	**02**
		ii. A computer system requires memory capacity of 2048 bytes. a.) How many 128 x 8 RAM chips are needed to provide 2048 bytes. b.) How many lines of the address bus must be used to access 2048 bytes of memory? How many of these lines will be common to all chips? c.) How many lines must be decoded for chip select? Specify the size of decoders.	**05**
	(b)	i. Explain Handshaking protocol in detail.	**05**
		ii. What is an instruction format? Explain its parts and significance.	**02**
Q.5	**(a)**	What is a multiplexer? Explain 4 to 1 line multiplexer. Construct a 16 to 1 line multiplexer with two 8 to 1 line multiplexer and one 2 to 1 line multiplexer. (use block diagrams of multiplexer)	**07**
	(b)	Write a short note on Printer and its types.	**07**
		OR	
Q.5	**(a)**	Write a note on display units.	**07**
	(b)	What is a decoder? Explain 3 to 8 line decoder. How we can construct 3 x 8 decoder with two 2 x 4 decoder. (use block diagrams of decoder)	**07**

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