

Roll No. ....

**67013**

**M.C.A. Ist Sem. w.e.f. Dec. 2011 (Old)**

**Examination – December, 2012**

**( For Re-appear Candidates )**

**DIGITAL DESIGN**

**Paper : MCA-103**

**Time : Three hours ]**

**[ Maximum Marks : 80**

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complain in this regard, will be entertained after examination.*

**Note :** Attempt *five* questions in all by selecting at least *one* question from each Unit. All questions carry equal marks.

**UNIT – I**

1. (a) What is Booth's coding? Perform  $(-12)_{10} \times (-8)_{10}$  using this method. 5
- (b) What are Error-Detecting and Error-Correcting Codes? Illustrate the significance of each. 5
- (c) What is BCD arithmetic? Perform the following BCD operations: 6
  - (i)  $(5678)_{10} + (5432)_{10}$
  - (ii)  $(9876)_{10} - (6789)_{10}$

2. (a) Why is 2's complement preferred in binary arithmetic? Also perform the following operations using 2's complement arithmetic : 6

(i)  $(45)_{10} + (66)_{10}$

(ii)  $(43)_{10} - (96)_{10}$

- (b) What are Gray codes? Where are these useful? Illustrate. 4

- (c) Perform the operation : 6  
 $(1001 \times 1101)_2 + (B1.A)_{16} - (31.5)_8 + (35.5)_{10}$

and find out the result in an Octal Number System.

**UNIT – II**

3. (a) What is K-map? Using K-map, obtain the minimal expression in SOP and POS of the following expression: 7

$$F = \sum_m (0, 2, 4, 6, 7, 8, 10, 12, 13, 15)$$

Implement the same in using universal gate.

- (b) What do you mean by the following terms : 6

(i) Noise Margin

(ii) Propagation delay

(iii) Fan-in and Fan-out

Illustrate their relevance.

- (c) What are Universal Gates? How Universal gates are realized into basic gates? Illustrate. 3

4. (a) What is a Logic family ? What criteria make one logic family to differ from another? Differentiate between TTL and CMOS Logic families. 7
- (c) What do you mean by Canonical SOP and POS ? Obtain canonical SOP and POS of the following function : <http://www.HaryanaPapers.com> 6  
 $F(X, Y, Z) = X + Y \cdot Z'$
- (c) What is De Morgan's Theorem? How is it useful? Illustrate its use with suitable examples. 3

### UNIT – III

5. (a) What is combinational circuit? Design a combinational circuit that receives 2 input binary number and produces its square at the output. 5
- (b) What is Master-Slave flip-flop? Discuss its working and show how the race around condition is eliminated in this flip-flop. 7
- (c) What is programmable logic array (PLA)? Where and how are these useful? Illustrate. 4
6. (a) What is the purpose served by ROM in a computer? Draw the block diagram of a 32 X 8 ROM with an Enable input. How many address lines and output lines are needed? Also show the external connections of two such ROMs in order to produce 64 X 8 ROM. 7
- (b) How would you convert decimal digits represented by a 7-bit ASCII into a 4-bit BCD ? 5

- (c) Differentiate between the following:
- (i) Decoder and Encoder 2
- (ii) Level-triggered and edge-triggered flip-flops 2

### UNIT – IV

7. (a) What is dynamic RAM? How is it different from Static RAM? Under what circumstances each of these preferred and why? Explain. 5
- (b) What is a counter? Show that N-bit counter connected to  $N \times 2^N$  decoder is equivalent to a ring counter with  $2^N$  flip-flop. Illustrate it with  $N=2$ . 6
- (c) What is a BCD Counter? How will you design it? Illustrate. 5
8. (a) What is Multiplexer (MUX)? How will you design a 64 x 1 MUX using 8 X 1 MUX? Illustrate. 5
- (b) What are the general characteristics of a good shift registers? Design a 3-bit shift register and outline the procedure for serial to parallel conversion and vice-versa. 6
- (c) What is meant by IC RAM ? Provide the logic diagram of such a IC memory cell. How is it possible to construct and address a 1 KB memory using 128X 8 bit RAM chips ? Explain. 5

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