

Roll No. ....

**67043**

**M.C.A. 1st Sem. w.e.f. Dec. 2012  
with New Notes (Current Scheme)**

**Examination-December, 2014**

**Digital Design**

**Paper-MCA-103**

**Time : 3 hours**

**Max. Marks : 80**

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

**Note :** Question No. 1 is **compulsory**. Attempt **four** more questions selecting **one** question from each unit.

$$8 \times 2 = 16$$

1. (a) Convert  $(A72E)_{16} = ( )_8$
- (b) Prove  $A \oplus B = \overline{A} \oplus \overline{B}$
- (c) Draw circuit diagram for CMOS NAND gate.
- (d) Convert  $Y = AB + A\overline{C} + BC$  into standard SOP form.

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(1)

[ Turn Over

- (e) Write the advantages of PLA.
- (f) What is race round condition ?
- (g) Differentiate between SRAM and DRAM.
- (h) Realize using EXOR gate  

$$Y = A \oplus B \oplus C \oplus D$$

### Unit-I

2. (a) Perform the following conversions : 4
- (39.12)<sub>10</sub> = ( )<sub>2</sub>
- (268)<sub>10</sub> = ( )<sub>16</sub>
- (b) Calculate the following : 12
- (i) 1011 × 100 (ii) 11011 × 1001
- (iii) 1000 ÷ 10 (iv) 101010 ÷ 111
- (v) (23)<sub>8</sub> + (67)<sub>8</sub> = ( )<sub>2</sub>
- (vi) (37)<sub>8</sub> - (53)<sub>8</sub> = ( )<sub>8</sub>
3. (a) Explain the concept of parity bits with reference to even detection. 8
- (b) Construct hamming code for BCD 0110. Use even parity. 4
- (c) Discuss how floating point numbers can be represented ? 4

## Unit-II

4. (a) Draw logic circuit for the given identity. 4

(i)  $X = \overline{AB + C} + \overline{BC}$

(ii)  $4 = \overline{AB + C} + \overline{BC}$

- (b) What is propagation delay. 4

- (c) Simply the functions using K map 8

(i)  $X = \overline{A} \overline{D} + A \overline{B} \overline{D} + \overline{A} \overline{C} D + \overline{A} CD$

(i)  $f(W, X, Y, Z) = \sum(0, 1, 2, 3, 4, 7, 8, 11, 12, 14, 15)$

5. (a) Explain the working of CMOS inverter. 6

- (b) Simplify the Boolean expression.

$$5 \times 2 = 10$$

(i)  $F = \overline{A} \overline{B} C (\overline{\overline{A} \overline{B} + ABCD})$

(ii)  $F = \overline{A} \overline{B} C + \overline{B} \overline{C} + \overline{A} BC + ABC$

## Unit-III

6. (a) Design a 1 bit comparator which can compare  $A = B$ ,  $A > B$ ,  $A < B$ . 8

- (b) Show the D flip flop implementation from JK flip flop. 4
- (c) What are different forms of triggering in flip flops ? Discuss. 4
7. (a) Explain the working of full subtractor. 8
- (b) Design a combinational circuit using a ROM that accepts a 2-bit number and generates an output binary number equal to the square of the input number. 8

#### Unit-IV

8. (a) Design a synchronous mod-6 counter using JK flip-flop. 10
- (b) Explain the operation of 4-bit universal shift register. 6
9. (a) Why SRAM is faster than DRAM ? Discuss. 6
- (b) Explain the operation of 4-bit SIPO shift register. 10