Roll No. .....

67013

MCA 1st Semester w.e.f. Dec. 2011 (Old for Re-appears only with old notes) Examination– December, 2013

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 : All questions carry equal marks. Attempt **five** questions, selecting at least **one** question from each Unit.

UNIT - I

1. What do you mean by radix of any number system ? Explain any four popular number systems with examples. Also perform the following conversions : 4

(i) $(101101.10101)_2 = (\ )_{10}$ 2

(ii) $(0.10100)_2 = (\ )_{16}$ 2

(iii) $(10.675)_{10} = (\ )_8$ 2

(iv) +15 and –15 in 1's complement 2

(v) 00110101 in 2's complement 2

(vi) +23 in signed magnitude 2

2. Perform the following operations : $4 \times 4 = 16$

(i) (a) Add :

0101 and 1110

(b) 01101010, 00001000 and 11111111

(ii) Multiply :

(a) 1001 and 1101

(b) 0011 and 1111

(iii) Division :

(a) 1110101 by 1001

(b) 11110001 by 1100

(iv) Convert to Octal : $(247)_{10}$ and $(324.6875)_{10}$

UNIT - II

3. (i) What are Semi Conductors ? Explain the working if p-n junction diode in view of forward bias and reverse bias.

   (ii) List down various differences between NMOS and PMOS logic families.

4. (i) Minimize the following logic function, using Boolean Algebra :

   $F(a,b,c,d) = abcd + abcd + abc + abd + ac + abc + b$

   (ii) Define the following concepts : SOP, POS, Canonical minterm and maxterm.

UNIT - III

5. Define Flip-Flops. Explain the concept of Edge Triggered and Level Triggered circuits. Describe the structure of 1-bit memory cell (latch). Also outline the working of Master-Slave flip-flop.

6. Differentiate between : (any **two**)

(i) ROM and RAM

(ii) Encoder and Decoder

(iii) PLA and Arrays

UNIT - IV

7. Why Counters are very popular circuits ? What are its various applications and types ? Also design a divide-by-6-counter. What is propagation delay in counters ?

8. (i) How a simple shift register is updated to controlled shift register ?

(ii) Outline the details of RAM architecture. Which type of RAM is preferred in digital circuits ?