

Code No: 123CT

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD  
B.Tech II Year I Semester Examinations, November/December - 2016****DIGITAL LOGIC DESIGN  
(Computer Science and Engineering)****Time: 3 Hours****Max. Marks: 75**

**Note:** This question paper contains two parts A and B.  
Part A is compulsory which carries 25 marks. Answer all questions in Part A.  
Part B consists of 5 Units. Answer any one full question from each unit.  
Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A****(25 Marks)**

- 1.a) Explain duality theorem with example. [2]
- b) Convert following hexadecimal number to decimal.
  - i)  $F28_{16}$
  - ii)  $BC2_{16}$ . [3]
- c) Implement Ex-NOR gate using only NAND gates. [2]
- d) Obtain the prime implicants for given Boolean expression using K-map.  
 $f(A, B, C) = \sum(1, 3, 6, 7)$ . [3]
- e) What is code converter? [2]
- f) Explain the analysis procedure for combinational circuit. [3]
- g) Explain clear and preset inputs. [2]
- h) What is race around condition? [3]
- i) Explain the role of Cache Memory in sequential circuits. [2]
- j) Compare ROM and RAM. [3]

**PART-B****(50 Marks)**

- 2.a) Using 2's complement perform  $(42)_{10} - (68)_{10}$ .
  - b) Implement the following Boolean function with NOR-NOR logic  
 $F(A,B,C) = \pi M(0,2,4,5,6)$ . [5+5]
- OR**
- 3.a) What is the specialty of unit-distance code? State where they are used.
  - b) Give the Boolean expressions used for following gates
    - i) AND
    - ii) NOR
    - iii) EX-OR
    - iv) OR
    - v) EX-NOR. [5+5]
4. Reduce the following functions using K-map techniques.
    - a)  $f(A, B, C, D, E) = \sum m(1, 4, 8, 10, 11, 20, 22, 24, 25, 26) + d(0, 12, 16, 17)$
    - b)  $f(A, B, C, D) = \pi M(4, 5, 6, 7, 8, 12, 13) + d(1, 15)$ . [5+5]
- OR**
- 5.a) Using K-map obtain the minimal sum of products and the minimal product of sums from of the function  $f(a,b,c,d) = \sum m(1, 2, 3, 5, 6, 7, 8, 13)$ .
  - b) Explain about essential prime implicants. [5+5]
6. Design the full adder circuit using decoder and de-multiplexer. [10]
- OR**
- 7.a) Write a short note on priority encoder.
  - b) What is decoder? [5+5]

- 8.a) Compare combinational circuits and sequential circuits.  
b) Explain the clocked JK flip-flop with truth table. [5+5]
- OR**
9. Draw and explain the working of following flip-flops:  
a) RS                      b) D. [5+5]
- 10.a) Draw and explain the block diagram of PLA.  
b) Explain address and data bus in digital electronics. [5+5]
- OR**
11. Implement the following function using a PROM.  
a)  $F(A, B, C, D) = \sum m(1, 9, 12, 15)$   
b)  $G(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15)$ . [5+5]