



DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH - IT - Semester - III
SUBJECT: (IT 301) Design of Digital Circuits

Examination : First Sessional
Date : 02/08/2014
Time : 9:30 to 10:45

Seat No. :
Day : Saturday
Max. Marks : 36

INSTRUCTIONS:

1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed. [12]

- (a) Make the addition of **274.6 + 359.4** in excess-3 code [1]
- (b) Find the complement of the following Boolean functions: [2]
 - (i) $AB' + C'D'$
 - (ii) $[(XY)'X] [(XY)'Y]$
- (c) Multiply the following binary number: [2]
 - (i) **11001 X 10**
 - (ii) **1101.11 X 101.1**
- (d) Convert the given numbers to Octal and Decimal. [2]
 - (i) **(A08F.EA)**
 - (ii) **(8E47)**
- (e) Explain the following terms: [2]
 - (i) prime implicant
 - (ii) an essential prime implicant?
- (f) Design and Implement full adder circuit with two half adders and an OR gate. [3]

Q.2 Attempt following questions. [12]

- (a) For the weighted code 4,4,3,-2 for the decimal digits, determine all possible tables so that 9's complement of each decimal digit is obtained by changing 1's to 0's and 0's to 1's. [6]
- (b) Answer the following: [6]
 - (I) Prove the Distributive Law : $A+BC = (A+B)(A+C)$ [2]
 - (II) Reduce the Following Expressions using Boolean algebra : [4]
 - (i) $A + B[AC + (B+C')D]$
 - (ii) $(B+BC)(B+B'C)(B+D)$

OR

- (b) After simplifying the given function implement it with following two level forms : [6]
NOR-OR , NAND-AND (complement inputs and outputs are available)

$$F=AC'+ACE+ACE'+A'CD'+A'D'E'$$

Q.3 Attempt following questions [12]

- (a) Subtract the following decimal number by 9's and 10's complement method: [4]
 - (i) **574.6 - 279.7**
 - (ii) **95 - 500**
- (b) Simplify the following function F using don't care condition d using **Tabulation** method. [8]

$$F(P,Q,R,S,T) = PRT + P'RS'T' + P'R'ST$$
$$d = ST' + P'S'T + PS'T'$$

OR

Q.3 Attempt following questions [12]

- (a) Subtract the following decimal number by 1's and 2's complement method: [4]
 - (i) **10001.01 - 1111.11**
 - (ii) **1011 - 10110**
- (b) Simplify the following function F using don't care condition d in **POS** form using **K-Map** method. [8]

$$F((P,Q,R,S,T) = Q'ST' + P'QT + Q'R'T' + P'QR'S'$$
$$d = QST' + RS'T'$$