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

Examination	**: First Sessional**	**Seat No.**	**:**
Date	**: 04/08/2016**	**Day**	**: Thursday**
Time	**: 9:30 to 10:45**	**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) Simplify the following Boolean expressions(Use Boolean algebra): **[3]**
- **i) wx'y + x + xz' + wxz' + w'y**
- **ii) p'q'r + (p + q+ r')' + p'q'r's**

(b) Encode the decimal digits 0,1,2 …….9 for weighted code 4221 so that 9's complement of each decimal digit is obtained by changing 1's to 0's and 0's to 1's. **[2]**

(c) Express the functions in sum of minterms and product of maxterms. **[2]**
- **i) F(x,y,z) = 1**
- **ii) F(p,q,r) = (pq + r) (q + pr)**

(d) Perform the subtraction for the following decimal number using 10's complement and 9's complement. **i) (635.7) – (419.8)** **[2]**

(e) Convert the number $(724.5)_{10}$ into following codes: **[3]**
- **i) Base 4**
- **ii) Base 6**
- **iii) Base 11**

Q.2 Attempt following questions. **[12]**

(a) Simplify the given function using Tabulation method: **[7]**
F(A,B,C,D,E,F) = ∑(1,2,5,6,9,18,19,25,28,41,45,57,59,61)

(b) Design and implement the Full-Subtractor circuit. **(represent 2 variation of it)** **[5]**

OR

(b) Implement the function **F = (x'+z') (w'+y'+z) (w+x'+y'+z) (w'+x+y'+z')** with the following two level forms: **[5]**
- **i) NOR-OR**
- **ii) NAND-AND**

Q.3 Attempt following questions **[12]**

(a) Show that dual of Ex-OR is equal to its complement. **[2]**

(b) Determine the even-parity bit generated when the message consist of ten decimal digits in **2421** code. **[4]**

(c) Simplify the given Boolean function F using don't care condition d, in SOP and POS from: **[6]**
F = ∑(0,2,6,9,11,13,15,20,25,31)
D = ∑(4,16,18,22,27,29)

OR

Q.3 Attempt following questions **[12]**

(a) State and Prove Absorption Theorem. **[2]**

(b) Given the function **F = ABC + A'B'C' + AB'C + A'BC'.** **[4]**
Implement only using following gates.
- **i) OR** & **NOT** gate.
- **ii) AND** & **NOT** gate.

(c) Simplify the following Boolean function using K-map & implement them using universal logical gates (**2 level NAND & 2 level NOR**): **[6]**
F(W,X,Y,Z) = **∑(5,6,7,9,10,11,13,14,15)**