Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: Mid Semester Theory

Program/Branch	**: B.Tech/EEE**	**Semester**	**: IV**
Title of the Course	**: Digital Electronics**	**Course Code**	**: CSB 254**

Time: 1.5 Hours **Maximum Marks: 25**

Note: 1) Make suitable assumptions wherever required
2) The symbols have their usual notations

Question number mapping with course outcomes (COs)

Q. No.	1	2	3	4	5	6	7	8
CO	2	2	1	1	1	1	2	2

Q1) The logical sum of all minterms of a Boolean function of n variables is 1. Prove the previous statement for n = 3. [2]

Q2) Express the following function as a sum of minterms and as a product of maxterms:

$$F(A,B,C,D) = \bar{B}D + \bar{A}D + BD$$ [2]

Q3) Determine the base of the numbers in each case for the following operations to be correct:
(a) 14/2 = 5 (b) 54/4 = 13 (c) 24 + 17 = 40. [3]

Q4) What are self complementary codes. Explain with an example. [3]

Q5) What is the importance of Gray codes. Write an application for the same. [3]

Q6) (a) Find the 16's complement of C3DF.
(b) Convert C3DF to binary.
(c) Find the 2's complement of the result in (b).
(d) Convert the answer in (c) to hexadecimal. [4]

Q7) Express the complement of the following functions in sum-of-minterms form:

(a) F(A,B ,C, D) = $\sum$ (2, 4, 7, 10, 12, 14)
(b) F (x, y, z) = $\prod$ (3, 5, 7) [4]

Q8) Convert each of the following expressions into sum of products and product of sums:

(a) $(u + xw)(x + \bar{u}v)$

(b) $\bar{x} + x(x + \bar{y})(y + \bar{z})$ [4]