Fundamentals of Computer Engineering

HW# 5

Q.1. For each of the following simplified expressions; determine the number of Essential Prime Implicants (EPIs) and the number of minterms in each EPI:

(i) $F(X,Y,Z) = XY + Z$

(ii) $F(A,B,C,D) = D(A` + B)$

(iii) $F(X,Y,Z) = X`(Y` + Z`) + YZ`$

(iv) $F(X,Y,Z) = X`(Y` + Z`) + XZ$

(v) $F(A,B,C) = A`$

(vi) $F(A,B,C,D,E) = 1$

(vii) $F(A,B,C,D,E,G,H) = 0$

Q.2. Using K-maps, simplify the following expressions for both; POS and SOP formats:

(i) $F(X,Y,Z) = \Sigma(0,2,4)$

(ii) $F(A,B,C,D) = \Pi(1,7,9,13,15)$

(iii) $F(A,B,C,D) = \Sigma (0,1,2,3,4,8,10)$

(iv) $F(A,B,C,D,E) = = D(A` + B) + EA + D`E`CB + A`C`B + B`$

Q.3. The following Boolean expression: $BE + B`DE`$ is a simplified version of the expression: $A`BE + BCDE + BC`D`E + A`B`DE` + B`C`DE`$. Are there any don`t care conditions? If so, what are they?

Q.4. Using K-maps, simplify the following expressions using the specified don't care conditions for both; POS and SOP formats:

(i) $F(X,Y,Z,W) = \Sigma (0,1,2,3,4,8,10)$, $d(X,Y,Z,W) = \Sigma(7,11,15)$

(ii) $F(A,B,C,D) = \Sigma (1,7,9,13,15)$, $d(A,B,C,D) = \Sigma (2,3,5,6)$

(iii) $F(X,Y,Z) = \Sigma (0,3,5,6)$, $d(X,Y,Z) = \Sigma (1,2,4,7)$

(iv) $F(A,B,C,D) = \Sigma (0,1,4,8, 12)$, $d(A,B,C,D) = \Sigma (3,6,7)$