WIX1003WXES1109 – COMPUTER SYSTEMS & ORGANIZATION

TUTORIAL 4

Instruction: Show the complete working steps

1. Prove the expression below using Karnaugh. map
   a) A'B'C' + A'B'C + A'BC + ABC = A'B'+BC
   b) A'B'C' + A'B'C + A'BC' + AB'C' + AB'C = B'+A'C'
   c) x'y' + xy + x'y = x'+ y

2. Simplify the following Boolean expression using K-map
   a) F(X,Y,Z)= ∑m(3,4,6,7)
   b) F(X,Y,Z)= ∑m(0,2,4,5,6)
   c) F(A,B,C,D)= ∑m(0,1,2,4,5,6,8,9,12,13,14)

3. Simplify the following expression using K-map
   a) AB+AB'C+ABC
   b) A+BC
   c) AB'C'D+ACD'+BC'D+A'BCD'
   d) AB'+AB'C'D+CD+BC'D+ABCD

4. Find minterm by plotting it on the map:
   a) XY+XZ+X'YZ
   b) B'D'+ABD+A'BC

5. Draw K-map to find all 'prime implicants' (PI) and identify which are 'essential'.
   a) F(W,X,Y,Z)= ∑m(0,2,5,7,8,10,12,13,14,15)
   b) F(A,B,C,D)= ∑m(0,2,3,5,7,8,10,11,14,15)

6. Convert the following product-of-sum (POS) forms to sum-of-products (SOP) forms using Karnaugh map.
   a) (A+B')(A+C')(A'+B'+C)
   b) (A'+B)(A'+B'+C')(B+C'+D)(A+B'+C+D')

7. Simplify F function with don't care condition *d*. Find all PI and EPI(Essential Prime Implicants)
   a) F(A,B,C)= ∑m(3,5,6), *d*(A,B,C)=∑m(0,7)
   b) F(W,X,Y,Z)= ∑m(0,2,4,5,8,14,15), *d*(W,X,Y,Z)= ∑m(7,10,13)