Tutorial 2

1.   (a) Use a K-map to convert the following canonical SOP expression into a minimum POS expression.
$f(a,b,c,d) = \Sigma m\ (0,1,5,6,8,10,13,14)$

(b) Use a K-map to convert the following canonical POS expression into a minimum SOP expression.
$f(a,b,c,d) = \prod M\ (0,2,5,6,8,9,13)$

2.   (a) Plot the following functions on the K-map.
    (i) $f(x,\ y,\ z) = \Sigma\ m\ (0,\ 1,\ 3,\ 7)$
    (ii) $f(a,\ b,\ c,\ d) = \Sigma\ m\ (2,\ 4,\ 6,\ 7,\ 14)$
(b) Identify the prime implicants and the essential prime implicants for the answers.
(c) Find the simplest SOP form of the above functions from the K-maps.
(d) Find the simplest POS form of the above functions from the K-maps.

3.   (a) Plot the following function on the K-map.
$f(A,\ B,\ C,\ D) =$
$(A'+B'+C+D)(A+B'+C+D)(A+B+C+D')(A+B+C'+D')(A'+B+C'+D)(A+B+C'+D)$

(b) Convert the standard POS expression in part (a) into
    (i)   Minimum POS expression.
    (ii) Canonical sum expression.
    (iii) Minimum SOP expression.

4.   Simplify the following function to SOP form using Q-M method:
$f(a,b,c,d) = \Sigma\ m(4,\ 5,\ 6,\ 8,\ 11,\ 13,\ 14) + \Sigma\ d(2,\ 10,\ 15)$