Name_____ **Student ID**_____ **Colleges & Schools**_____ **Department**_____

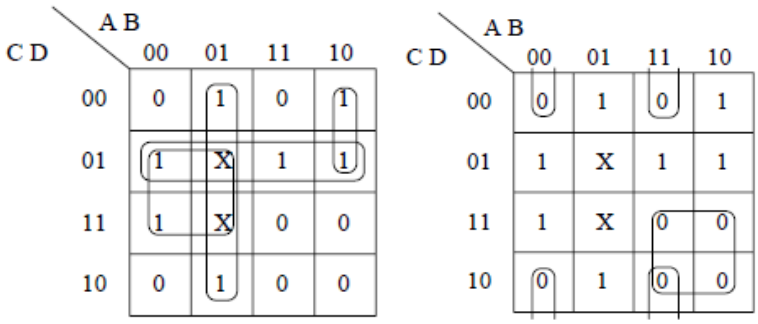
Homework Unit 5 Solutions

1. Find a minimum sum-of-products and a minimum product-of-sums expression for the following function:

$$F(A, B, C, D) = \prod M(0, 2, 10, 11, 12, 14, 15) \cdot \prod D(5, 7)$$

Sol.) Minimum sum-of-products F = C'D+AB'C'+A'B+A'D

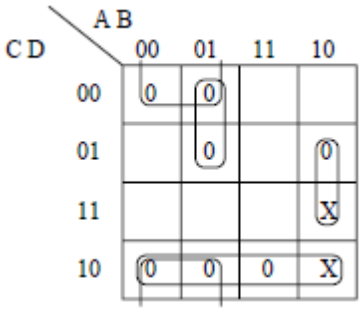
Minimum product-of-sums F = (A'+B'+D)(A'+C')(A+B+D)



2. Find the minimum product-of-sums expression for the following function and underline the essential prime implicants in your answer.

$$F(A, B, C, D) = \prod M(0, 2, 4, 5, 6, 9, 14) \cdot \prod D(10, 11)$$

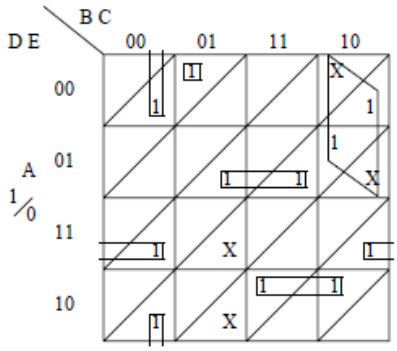
Sol.) F = (C'+D) (A'+B+D') (A+B'+C) (A+D)



3. Find the minimum sum-of-products expression for f. Underline the essential prime implicants in your expression.

$$f(A, B, C, D, E) = \sum m(0, 2, 3, 5, 8, 11, 13, 20, 25, 26, 30) + \sum d(6, 7, 9, 24)$$

Sol.) F = AB'CD'E' + BC'D' + ABDE' + A'B'C'E' + A'C'DE + A'CD'E



4. Find all of the prime implicants for the following functions *F* and *G*. (*F* and *G* have seven prime implicants.)

Sol.) For the function *F*, the prime implicants are b'c'de', a'ce, ab'e', ac'd', abc'e, c'd'e, and a'd'e.

For the function *G*, the prime implicants are ab'ce, a'bcd, a'bde', cde, b'de, a'b'c'd, and a'c'e'.