DIGITAL LOGIC DESIGN

ECE2002

Tutorial -2

Dr. Anirban Bhowmick

---

1. K-Map reduction
   a) F(A,B,C,D) = $\sum m(2,3,6,7,10,11,14)$
   b) F(w,x,y,z) =$\prod M(1,3,4,6,8,9,14,15)$
   c) F(A,B,C,D) = $\sum m(1,4,7,10,12,14) + \sum d(2,6,11,13)$
   d) F(A,B,C,D,E) =$\sum m(1,2,3,8,10,17,19,23,25,27,29,31) + \sum d(4,7,20,24)$
2. A safe has 5 locks v, w, x, y and z all of which must be unlocked the safe to open. The keys to the locks are distributed among five executives in the following manner.
   Mr. A has keys for locks v and x.
   Mr. B has keys for locks v and y.
   Mr. C has keys for locks w and y.
   Mr. D has keys for locks x and z.
   Mr. E has keys for locks v and z.

   a) Determine the minimal number of executives required to open the safe.
   b) Find all the combinations of executives that can open the safe, write an expression f(A, B, C, D, E) which specifies when the safe can be opened as a function of what executives are present.
   c) Who is the essential executive?
3. You are presented with a set of requirements under which an insurance policy can be issued. The applicant must be:
   i) A married female 25 years old or over, or
   ii) A female under 25, or
   iii) A married male under 25 who has not been involved in a car accident, or
   iv) A married male who has been involved in a car accident, or

v) A married male 25 years or over who has not been involved in a car accident.

Find an algebraic expression which assumes a value 1 whenever the policy is issued. Simplify the expression obtained.

4. Design a Full adder circuit with two 4:1 Multiplexer.
5. Design a 3 bit Gray to Binary Converter.
6. Design an odd parity generator and checker.