

Digital Circuits and Systems

Mid Semester Exam -2

Date: 15th Oct. 2013

Time: 55 Minutes

Max Marks. 30

Notes: Use **don't care conditions** wherever you can. Minimum network solved with **don't care conditions** would result in full marks.

Assumptions made should be written clearly.

1: Show that the operation (gate) * described by the following table is universal. [5]

A	B	A*B
0	0	0
0	1	1
1	0	0
1	1	0

2: Obtain the value of minimum **product of sum** for the function $f(A, B, C, D) = \sum(0,1,3,4,6,8,9,10,11,12,14)$ using Quine McCleskey Method. [5]

3: Determine the state diagram for the sequential system described by the following expressions:

$$s(t+1) = \begin{cases} s(t) & \text{if } x = a \\ (s(t) + 1) \bmod 5 & \text{if } x = b \\ 2 & \text{if } x = c \end{cases} \quad z(t) = \begin{cases} 0 & \text{if } s(t) \text{ is even} \\ 1 & \text{otherwise} \end{cases}$$

The system has five state labeled 0, 1, 2, 3 and 4.

[5]

4: Design a pattern generator that generates a continuous pattern 3, 5, 6, 1, 7 using SR flip flops. [10]

5: You are provided with a 50 kHz square wave “x” with 5 Volts magnitude. X is connected as input to a block **BLACKBOX** which has one speaker at output end. Design the sequential network for the block using D flip flops such that once the circuit is switched on, speaker produces a sound. [5]