

**II B.Tech I Semester Examinations, May/June 2012****SWITCHING THEORY AND LOGIC DESIGN**

Common to BME, ICE, E.COMP.E, E.CONT.E, EIE, EEE

**Time: 3 hours****Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. Design the ASM chart, Data path circuit, Control circuit using multiplexers for Binary multiplier. [16]
2. (a) Explain the procedure to convert a decimal number to a hexadecimal number with an example.  
 (b) Given the binary numbers  $w = 1010.1$ ,  $x = 101.01$ ,  $y = 1001.1$  Perform the following binary operations:
  - i.  $w + y$
  - ii.  $w \times x$
  - iii.  $w \cdot y$
  - iv.  $w / x$

[4+12]
3. Design a 4 bit counter that counts either in Binary or gray depending on the input given to the select line. When select line = 0, the counter is to count in Binary, and when select line = 1, the counter is to count in gray. Draw the logic diagram. [16]
4. Minimize the following incompletely specified machine using Merger Table method. [16]

| PS | NS,Z  |       |
|----|-------|-------|
|    | X = 0 | X = 1 |
| A  | E,0   | B,0   |
| B  | F,0   | A,0   |
| C  | E,-   | C,0   |
| D  | F,1   | D,0   |
| E  | C,1   | C,0   |
| F  | D,-   | B,0   |

5. (a) Explain the procedure to implement the combinational logic circuit in a ROM. What is meant by programming the ROM?  
 (b) Implement the following function in the ROM. Show the internal circuit diagram. Explain the process of fusing. What is the size of ROM required to implement this function  
 $F1(p,q,r,s,t,u) = \Sigma(1,3,5,6,12,16,20,25,27)$   
 $F2(p,q,r,s,t,u) = \Sigma(0,2,4,5,7,19,20,24,28)$ 

[8+8]

6. Realize the function  $F(A,B,C,D) = \Pi(1,4,6,10,14) + d(0,8,11,15)$  using
- (a) 16:1 Mux
  - (b) 8:1 Mux
  - (c) 4:1 Mux [16]
7. (a) Design a logic circuit to provide an output when any two or three or four switches are closed.
- (b) Minimize the following Boolean function using K-map  
 $F = \Pi M (2, 7, 8, 9, 10, 12)$  [8+8]
8. (a) Convert the following SOP equation into its POS form.  
 $G = XY'Z + X'YZ'$
- (b) Reduce the following Boolean expressions to three literals.  
 $A'C' + ABC + AC'$  8+8]

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