(3 hours) **Marks: 80**

Note the following instructions.

1. **Question No.1 is compulsory**
2. **Attempt any three questions from remaining five questions**
3. **Solve in total 4 questions**
4. **Assume suitable data wherever necessary, justify the same**
5. **Figures to the right indicate full marks.**

1.a Mention the different types of faults present in logic circuits and list the method to detect and locate them. **[5]**

1.b What is a Threshold logic element? Give its advantages and limitations **[5]**

1.c What is a logic hazard and describe in brief the types of logic hazard **[5]**

1.d Differentiate between Mealy and Moor type state machine. **[5]**

2.a Use the Quine–McCluskey method to generate the set of essential prime implicants and to obtain the minimal expressions for the following functions. **[10]**

$$T(w, x, y, z) = \sum (0,1,2,8,9,11,13,15)$$

2.b In the following state table, find the equivalence partition and the corresponding reduced machine in standard form. **[10]**

	NS, z	
PS	$x = 0$	$x = 1$
A	$F, 0$	$B, 1$
B	$G, 0$	$A, 1$
C	$B, 0$	$C, 1$
D	$C, 0$	$B, 1$
E	$D, 0$	$A, 1$
F	$E, 1$	$F, 1$
G	$E, 1$	$G, 1$

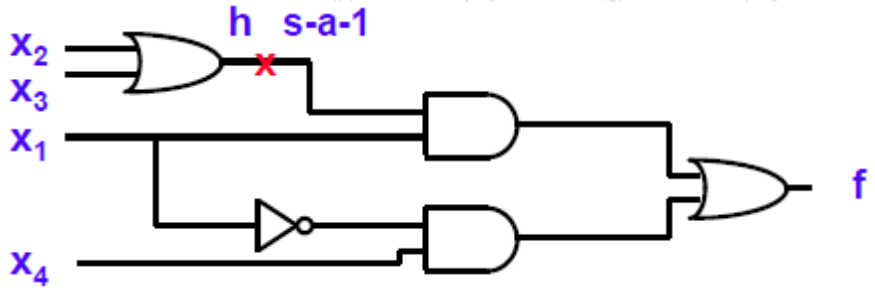
3.a (i) Give the properties of symmetric function. **[10]**

(ii) Decomposed the following function and determine the functions F and Φ.

$$f(v, w, x, y, z) = \sum (1,2,7,9,10,17,19,26,31) + \sum_{\phi} (0,15,20,23,25)$$

=F[Φ(v,w,y),x,z]

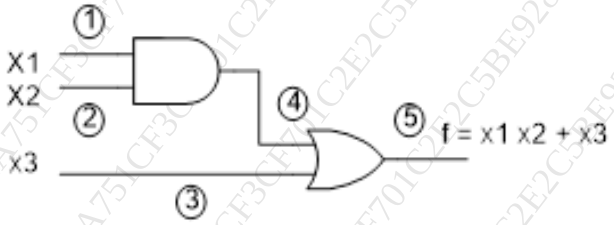
3.b Find all the test vectors that detect input *h s-a-1* by using the Path sensitization and the Boolean Differences method. **[10]**



4.a Show that threshold logic realization of Full Adder requires only two threshold elements.(Note that both sum and carry must be generated) **[10]**

4.b Explain the synthesis procedure with suitable example for the design of fundamental-mode asynchronous sequential circuits. **[10]**

5.a Find the fault table for all stuck-at faults of the following circuit **[10]**



5.b Explain the lattice of closed partitions of machine**.** **[10]**

6. a Draw the state diagram and the state table for Moore type sequence detector to detect the sequence 110. **[10]**

6. b Draw and explian the ASM chart for a weighing machine. **[10]**

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