

### BE (8<sup>th</sup> Semester) Examination, 2007

Subject: Digital System Design

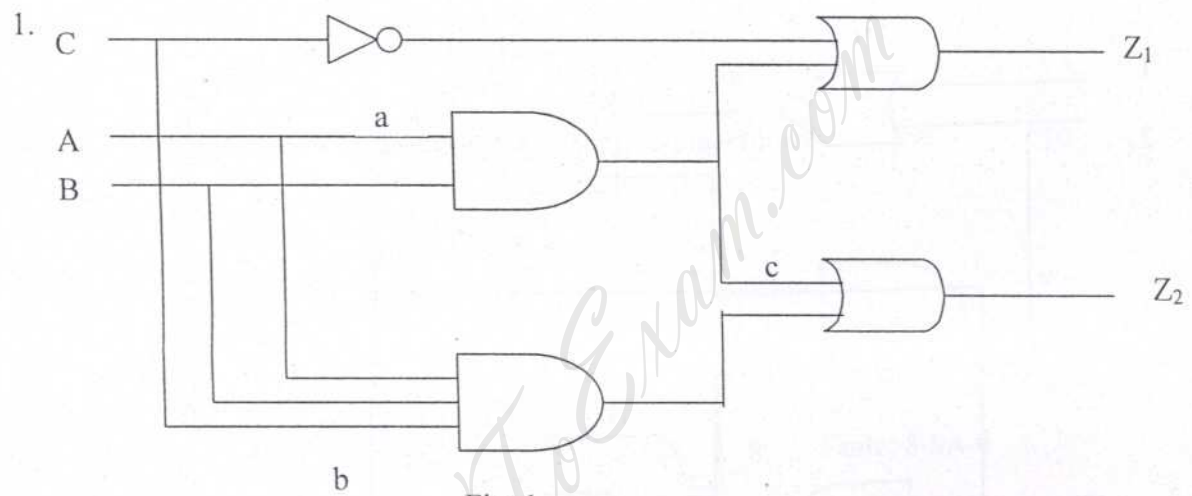
Code No. CST 803/5

Branch: Computer Science and Technology  
Engineering

Time: 3 Hours

Full Marks:100

Answer any five questions



- a) Find the set of all tests that distinguish the faults a s-a-0 and c s-a-0? 5
- b) Find the set of all tests that distinguish the multiple faults {a s-a-0, b s-a-1} and {c s-a-0, b s-a-1}? 7
- c) Find a counter example to the following statement: 8  
“In a Combinational circuit two faults f and g are functionally equivalent iff they are always detected by the same tests.”

- 2 a. Find the equivalence partition for the machine shown in Table – 1? 10
- 2 b. Find a minimum length sequence that distinguishes state A from state D? 6

TABLE - 1

PS	NS, Z	
	X=0	X=1
A	B, 1	H, 1
B	F, 1	D, 1
C	D, 0	E, 1
D	C, 0	F, 1
E	D, 1	C, 1
F	C, 1	C, 1
G	C, 1	D, 1
H	C, 0	A, 1

2c. Draw a redundant circuit and explain it with example. 4

3.

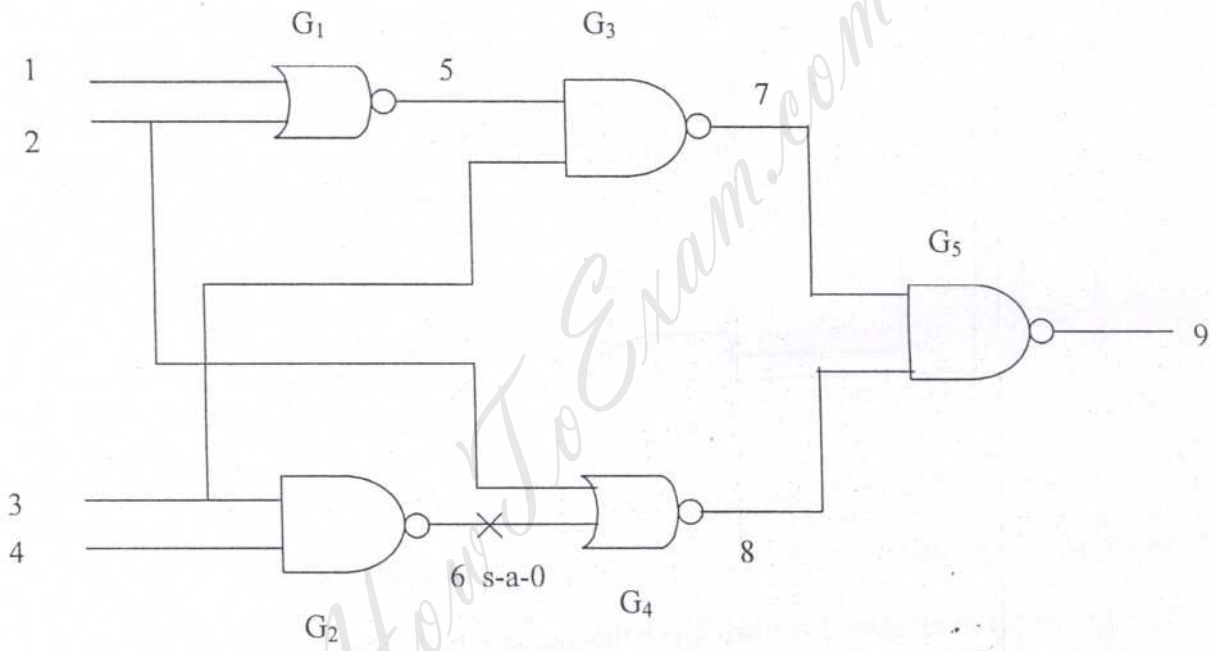


Fig 2

a) Construct Singular Cover and propagation D-cube for the circuit of fig.2. 3

b) Find the test set for s-a-0 fault at the line 6 using D-algorithm? 12

c) What are the Advantages of PODEM and FAN Algorithm in comparison to D-Algorithm? 5

f-2

4.

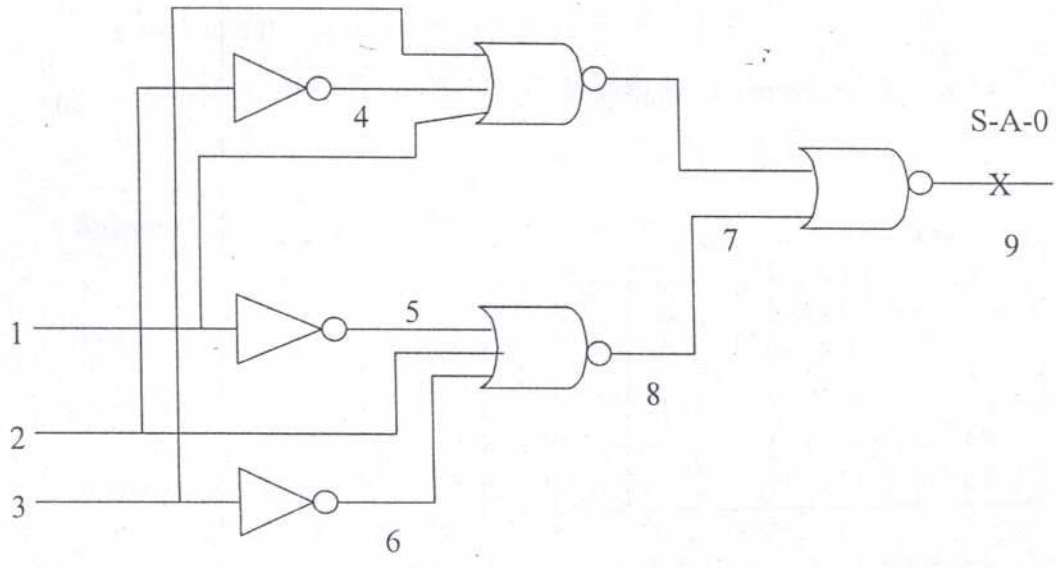


Fig.3

a. Find the test set for s-a-0 fault at the line 9 using D-algorithm? 10

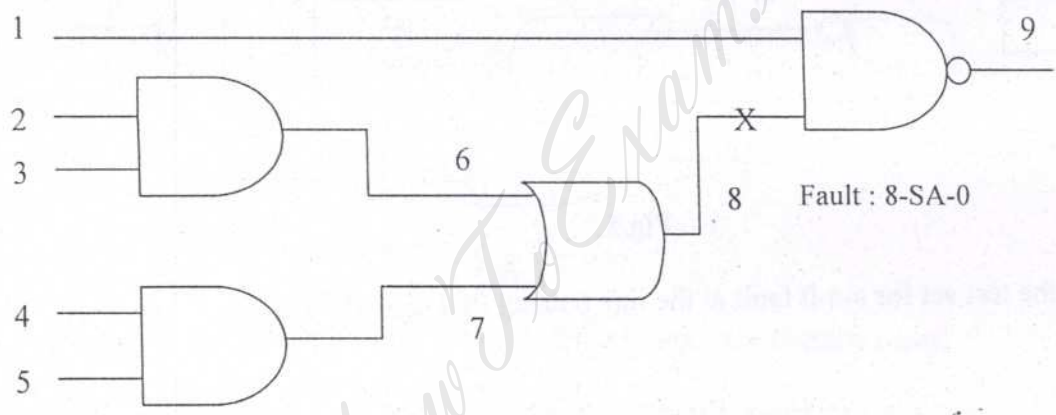


Fig.4

b. Find the test set for s-a-0 fault at the line 8 using PODEM algorithm. 10

5. Define Boolean Difference of a function. Use Boolean Difference for finding tests for the function,

$$F = (X_1 + X_2)X'_3 + X_3X_4 + X_1X_2$$

- i) detecting  $X_4$  stuck at 0
- ii) detecting  $X_3$  stuck at 1

f-3

Determine the minimal test sets for detecting all single faults in the above circuit. 10

5b. Given the fault table shown in the following figure, where z denotes the fault-free output for the corresponding test.

Find a minimal set of tests to detect all single faults. 10

TABLE 2.

Tests	Faults					z
	f1	f2	f3	f4	f5	
T1			1	1	1	0
T2	1	1				1
T3				1	1	1
T4		1				0
T5					1	1

6.

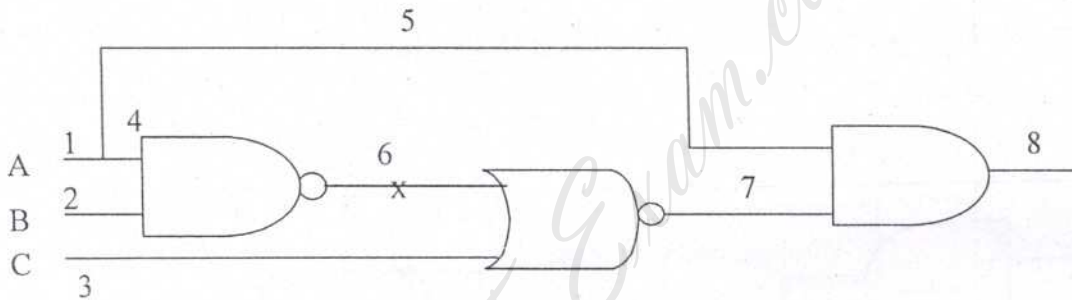


Fig.5

a) Find the test set for s-a-0 fault at the line 6 using PODEM algorithm. 10

6b.

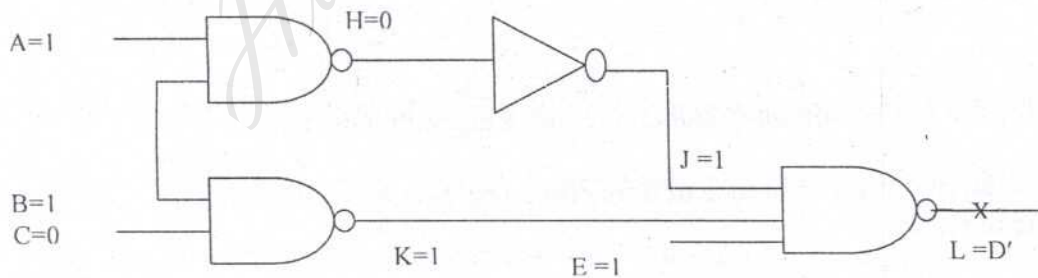


Fig.6

b) Find the test set for L-SA-1 fault using FAN algorithm 10

f-4