BE (8th Semester) Examination, 2007

Subject: Digital System Design
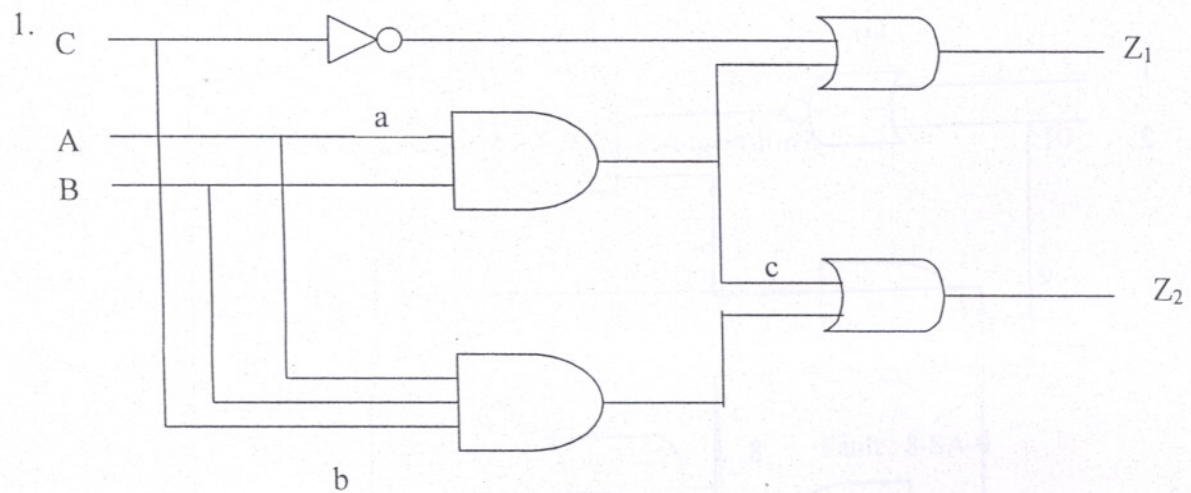
Code No. CST 803/5

Branch: Computer Science and Technology ~~Engineering~~

Time: 3 Hours

Full Marks:100

Answer any five questions

1.

Fig. 1

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

P-1

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
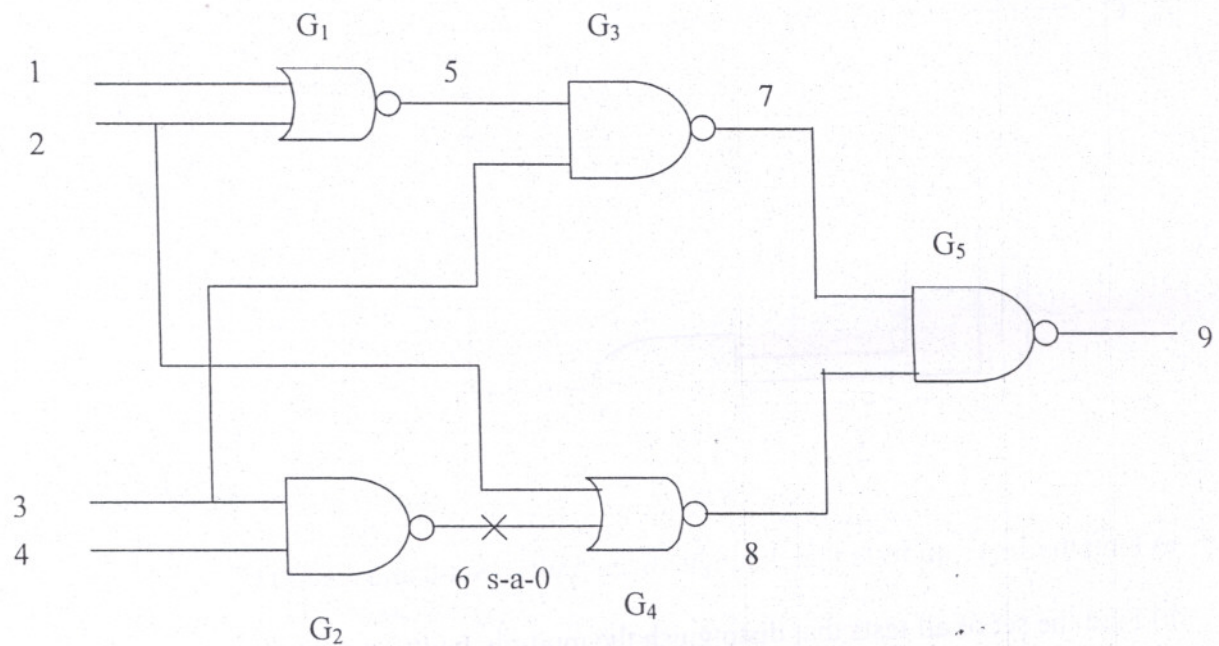
3.

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
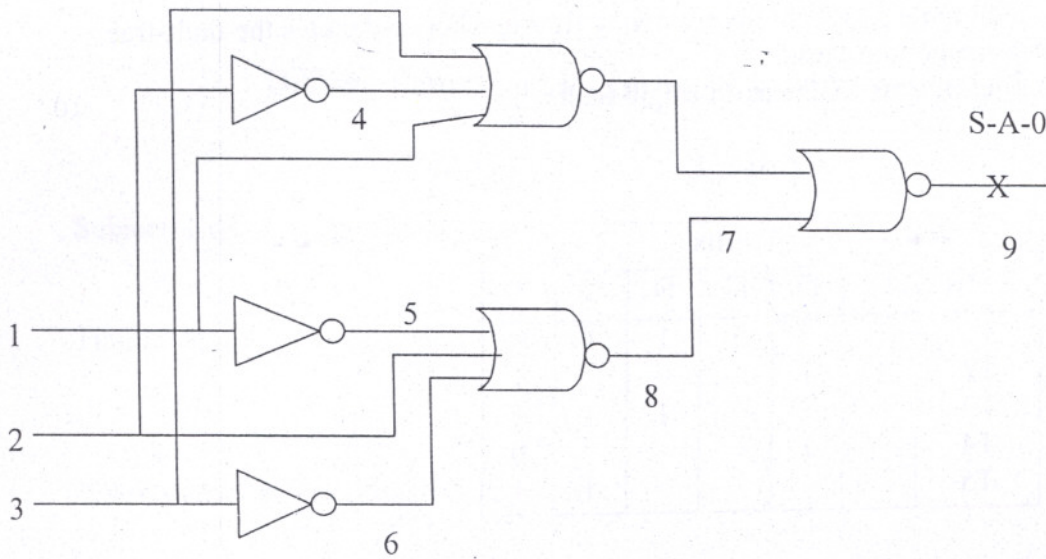
f-2

4.

Fig.3

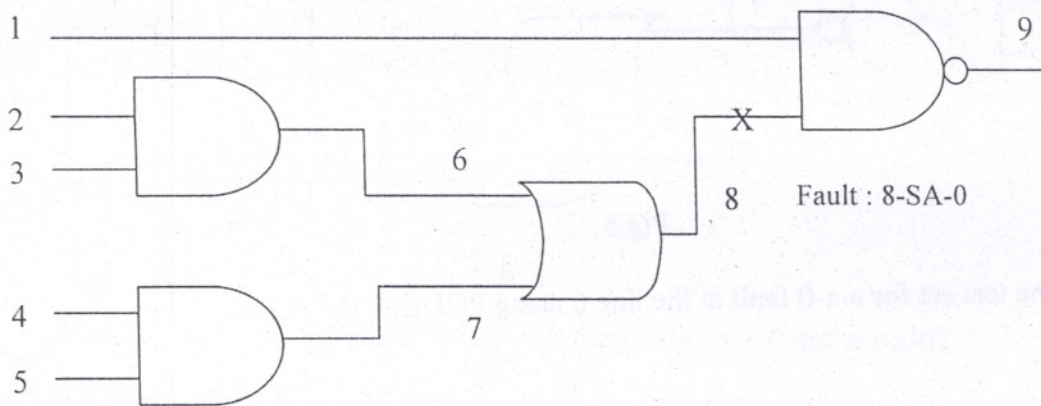a. Find the test set for s-a-0 fault at the line 9 using D-algorithm?   10

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

P-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.

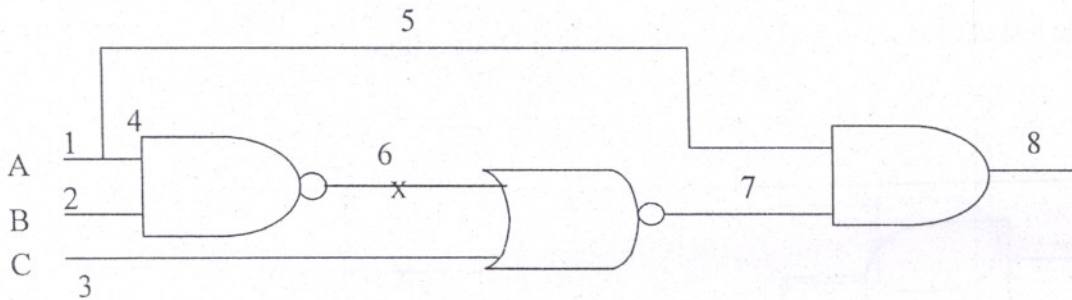| Tests | Faults | | | | | z |
	f1	f2	f3	f4	f5	
T1			1	1	1	0
T2	1	1				1
T3				1	1	1
T4		1				0
T5					1	1

6.

Fig.5

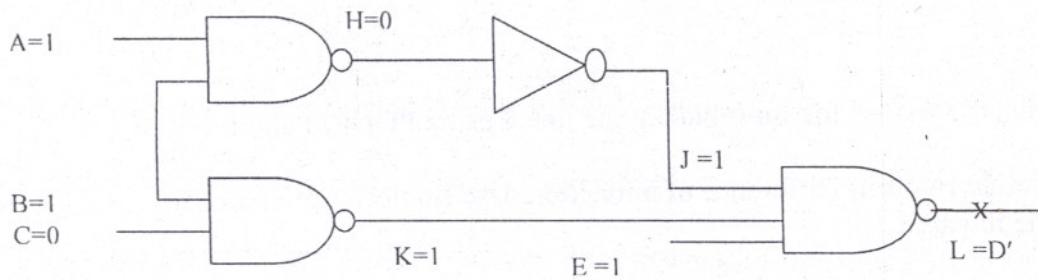a) Find the test set for s-a-0 fault at the line 6 using PODEM algorithm.   10

6b.

Fig.6
b) Find the test set for L-SA-1 fault using FAN algorithm   10

P-4