

This question paper contains 3 printed pages.

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Your Roll No.

B. Tech. (EC) / IV

J

Paper EEC-404 (f)

FAULT TOLERANT COMPUTING

Time : 3 hours

Maximum Marks : 70

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Attempt any five questions.

All questions carry equal marks.

1. (a) What are the types of fault generated in TTL NAND gate if signal line open, supply voltage open, ground open, signal line and V_{CC} short-circuited, signal line and ground short-circuited? Draw a neat diagram of a TTL NAND gate and explain these in details. 8
- (b) What do you mean by 'stuck-open faults' in CMOS NOR gate? Explain the same by drawing a neat diagram of CMOS NOR gate. 6
2. (a) Explain the concept of dynamic redundancy for hardware fault tolerance. 6
- (b) Drawing a neat diagram of ESS, explain how BELL system of Telephone Laboratory incorporates hardware dynamic fault tolerance in the ESS. 8

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3. (a) Explain the concept of signature analysis and the working of signature analyzer circuit. 8
- (b) Calculate the period of 99% reliability for a first generation computer containing 8000 thermionic valves each with $\lambda = 0.5\%$ (1000 hrs). 6
4. (a) Explain, by drawing a neat diagram, one-dimensional path sensitization technique for the detection of faults in any combinational circuit. 8
- (b) What do you know about the 'pulse-mode' and 'fundamental-mode' of operation of the synchronous sequential circuit. Explain also what you mean by a strongly connected sequential machine. 6
5. (a) For the following state table obtain an isomorphic reduced state table:

<i>Present States</i>	<i>Next States and Present Outputs</i>	
	<i>x=0</i>	<i>x=1</i>
A	F, 0	C, 0
B	H, 1	A, 1
C	H, 0	D, 1
D	B, 0	H, 0
E	G, 0	C, 0
F	C, 1	E, 1
G	H, 1	E, 1
H	C, 0	A, 1

- (b) Explain what you mean by synchronizing sequence for a reduced, completely specified sequential machine. 6

6. What do you mean by the term BILBO? Draw its logic diagram. How are the BILBOs utilized in the formation of BIDCO? Explain the entire operation of a BILBO. 14

7. Write short notes on following:

- (i) Self-checking checker circuits

Or

SPOOF method of Clegg for the fault detection in the combinational circuit 6

- (ii) 'Transition counting' method 4

- (iii) Syndrome testing for a circuit. 4