Code No: NR410506 $\qquad$ **NR**

**IV B.Tech I Semester Supplementary Examinations, November 2006**
**FAULT TOLERANT SYSTEMS**
**( Common to Computer Science & Engineering and Electronics &**
**Computer Engineering)**

Time: 3 hours $\qquad$ Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) A computer system contains 10,000 components each with failure rate 0.5% per 1000 hours. What is the period of 0.99 reliability of this system.

   (b) What is meant by active repair time and passive repair time referred in maintainability of a system. Derive the expression for the MTTR.     [6+3+3+4]

2. (a) A circuit realizes the function.
   $Z = \overline{X_1} X_4 + \overline{X_2} X_3 + X_1 \overline{X_4}$
   Using Boolean Difference method find the test vectors for SA0, SA1 faults on all input lines of the circuit.

   (b) What are the different properties of Boolean differences? Explain     [5+5+6]

3. Derive the Reliability factor of TMR and Triplicathd TMR systems. Show that R(t) of Triplicated TMR is better than R(t) of TMR system.     [5+5+6]

4. (a) Explain in detail the practicle fault Tolerant space shuttle computer complex system.

   (b) What are the different ways to have software redundancy.     [8+8]

5. (a) Write short notes on
   i. Fault secure circuit
   ii. Self-testing circuit
   iii. Code disjoint circuit

   (b) Write short notes on:
   i. self-checking circuit
   ii. self-checking checker circuit
   iii. fail safe circuit     [8+8]

6. (a) Explain the advantages of PLA and how it is used as totally self-checking circuit.

   (b) For the given 4 input, 4 output function design a totally self checking checker circuit using PLAs.     [6+10]
   $f_1 (A,B,C,D) = \sum (0,2,3,7,8,10,12,13,15)$
   $f_2 (A,B,C,D) = \sum (0,2,3,4,9,12,13,15)$
   $f_3 (A,B,C,D) = \sum (0,1,2,4,8,9,10,14)$
   $f_4 (A,B,C,D) = \sum (0,1,2,4,5,6,8,11,14).$

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7. (a) What are the goals of a design for testability?

   (b) What are the different DET methods available? Explain at least two such techniques. [6+4+6]

8. Explain observability enhancement with neat diagram with suitable examples. [4+2+10]

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