Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH(ME)/SEM-2/MMT-205A/2012

2012
RELIABILITY

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions : 5 × 14 = 70

1. What is meant by 'reliability' ? Deduce an expression for reliability from the basic definition of hazard rate.
2. Draw a curve, showing variation of hazard rate against time/age of the asset in years. Indicate clearly the various regions of the curve.
3. Following table shows the results of life tests carried out on 100 components simultaneously :

Operating time (hours)	0	10	20	30	40	50	60	70	80	90	100
No. of Surviving Components	100	90	81	73	66	60	55	50	45	41	37

Evaluate hazard rate, failure density function and reliability and plot these functions against time.

4. a) Discuss in detail fault tree analysis.

   b) Outline the symbology of fault trees and explain them in detail. 5 + 9

5. Explain in detail the concept of Binomial Acceptance Test and Accelerated Life Test methods of reliability testing.
6. Explain the concept of censoring in life testing. What are the types of censoring ? What are the advantages of each type of censoring ?
7. Calculate the reliabilities of the systems shown in the Figures 1 & 2.

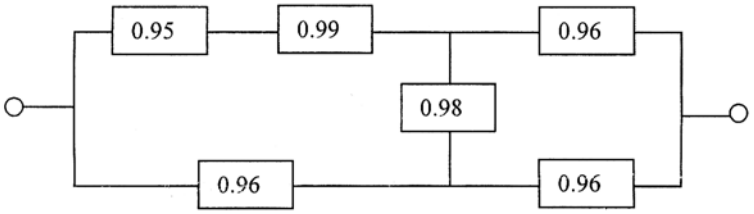

Figure - 1

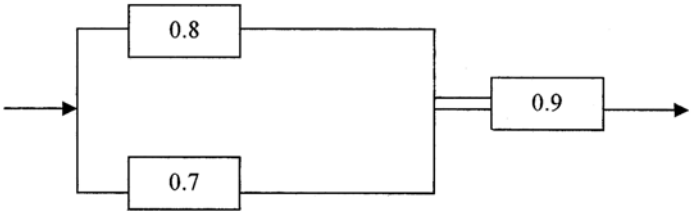

Figure - 2

8. a) For the system shown in the Figure - 3, calculate the reliability using the tie set and cut set methods.

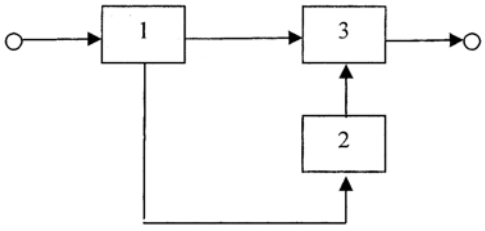

Figure - 3

b) Calculate the probability of the top event in the Figure 4 when the probabilities of the events are given as :

Pr (A) = Pr (C) = Pr (E) = 0.01

Pr (B) = Pr (D) = 0.0092

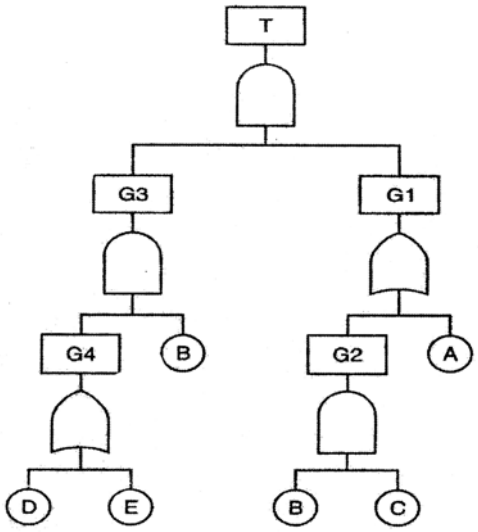

Figure - 4