

Indian Statistical Institute

M.S.(QMS) First Year

Second Semester – Reliability, Maintainability and Safety - II

Mid Term Exam

Date: 02/03/2020

Time: 2 hours

Maximum Marks: 50

1. Consider a system of 6 pumps of which at least 4 must function properly for system success. Each pump has 85% reliability for the mission duration. What is the probability of success of the system for the same mission duration?

[5]

2. If three components with exponential failure rate, λ_1 , λ_2 and λ_3 are connected in series, calculate the system reliability and MTBF. [5]

3. (a) Assuming exponential distribution, obtain the MLE for λ for type – 1 censored data. Use the usual notations.

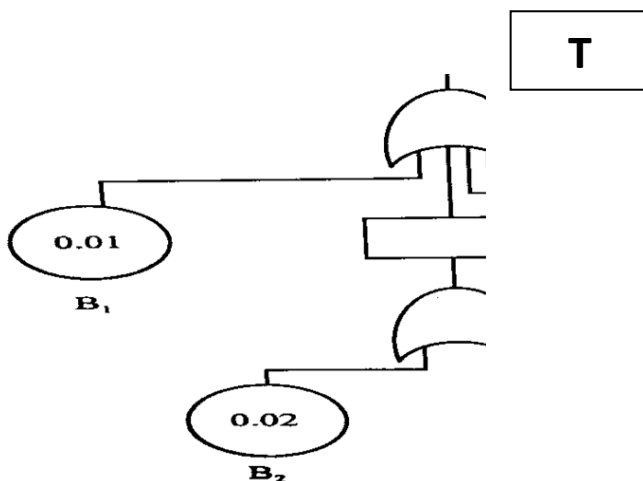
(b) Consider the following data from life testing, in hours.

Unit No.	Time (t_i)	Failed / Censored
1	8	F
2	30	C
3	81	C
4	113	F
5	670	C

Assuming $\text{Exp}(\lambda)$, estimate λ .

[10 + 7 = 17]

4. What is FMEA? Explain the role of FMEA in improving the reliability of a system. [3 + 5 = 8]
5. Assume that the probability of occurrence of basic fault events B_1 , B_2 , B_3 , B_4 and B_5 are as shown in the figure below. Calculate the probability of occurrence of the top level event, T.



[10]

6. Write short note on the following
- a. Progressive type -1 interval censoring scheme
 - b. FTA

[2 × 5 = 10]