Mid-Semester Exam   Duration: 2hrs   Date: 04th March 2015

Answer as many as you can. The maximum marks you can get are 50.

A. Please state whether the following statement are true or false. You need to justify your choice. No marks will be awarded if no justification is given. (No mathematical proof for your justification is required).   (5 * 3 = 15)

1. Reliability of any product up to its expected average life is less than 0.50.
2. System built with standby redundancy will have higher failure rate than the system built with parallel redundancy.
3. It is possible to estimate the upper confidence limit for average life even if no product failures are observed during the life test.
4. Counting the number of failures during the planned test period can be termed as Type-I Censoring.
5. DFMEA tool is used to assess the high risk component/ subsystem/system with respect to failure.

B. Answer the following:

1. The designer of Photo Copying Machine wants to assess the reliability of the product. One Prototype was tested and the following failure data noticed. 1500, 1800, 450, 5300, 1152, 7952, 153. Can the designer assume exponential distribution for the failure data? Assuming exponential distribution, what is the average life and what is the 90% lower confidence limit for the same.   What is the 95% lower confidence limit for the life corresponding to the 0.90 reliability of the product?
(Note: The life observed is the number of photo copies made between two successive failures.)   (12+5+8=25)

2. A Multinational corporate company wants to choose the best of the two brands of coffee vending machines they had been using in the past. The life data collected for the number of coffee cups dispensed between two successive failures is given below:
        Brand -1 – 75,000; 10,100; 85,200; 7,100; 8,250; 11,290; 180,000;
        Brand-2 – 280,000; 750; 8,250; 10,100; 110,010; 95,000;
Check which brand is preferable. State your hypothesis and then conclude your recommendation to the corporate.   (10)

3. Designer of a white goods product wanted to conduct a life test to estimate the reliability of a new product under development. Expected average life of the product is 100,000 operations. He is planning to test 10 products till 5 failures are observed. Estimate the expected test duration.   (5)