(b) What do you understand by various statistical properties of data ? How does these helping estimating the reliability study of a system. **7**

4. (a) Explain in detrail reliability growth testing with the help of neat labelled sketches and suitable mathematical derivations. **8**

(b) A prototype model of an engineering system was initially tested for a 300 hr. period during which 5 failures occurred. The specified mean time between failures of the system is 800 hrs. Assume that the value of the Duane model slope parameter β is 0.4. Compute the value of additional system test hours. **7**

Unit III

5. (a) Explain in detail parameter estimation of covariance model. Cite an example of the complete process. **7**

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M. Tech. EXAMINATION, May 2017

(Third Semester)

(Re-appear Only)

ECE/INDUSTRY INTEGRATED

MTEC-603-B

Reliability Engineering

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) What do you understand by probability distribution functions ? Enumerate various types of continuous and discrete distribution functions citing their specific applications and usage. **10**

(b) The failure data for ten electronic components is as given in Table 1. Compute and plot failure density, failure rate, reliability and unreliability functions. **5**

Table 1

Failure No.	Operating time hrs.
1	8
2	20
3	34
4	46
5	63
6	86
7	111
8	141
9	186
10	266

2. (a) Explain maintenance cost relationship with the help of a neat labelled sketch. Also derive the maintainability function. **9**

(b) Two transmitters are installed at a particular station with each capable of meeting the full requirements. One transmitter has a mean constant failure rate of 9 faults per 10^4 hrs and occurrence of each fault renders it out of service for a fixed time of 50 hours. The other transmitter has a corresponding failure rate of 15 faults per 10^4 hours and an out of service time per fault of 20 hours. What is the mean availability of the system ? **6**

Unit II

3. (a) What are different empirical methods for data analysis for reliability estimation ? Explain any *one* of them citing suitable examples. **8**

(b) What is the significance of various distributions in failure and repair analysis ? Explain the effect of choice of distribution in such studies. **8**

6. (a) What is Weibull distribution ? Explain Mann's goodness of fit test for it giving suitable mathematics. **8**

(b) Explain in detail test for power law process model. Also give its applications with the help of a suitable examples. **7**

Unit IV

7. How does repairability in a system affects its reliability ? Describe various reliability allocation methods under such scenarios with the help of suitable examples and mathematics. **15**

8. Write short notes on any *two* of the following :

(a) Burn in testing

(b) Software reliability

(c) Preventive main furnace analysis. **15**

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