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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3059 Roll No.

B. Tech.

(SEM. VIII) EXAMINATION, 2006-07

RELIABILITY & QUALITY MANAGEMENT

Time : 3 Hours] *[Total Marks : **100***

Note : *(i) Attempt all **5** questions, choices are within.*

*(ii) All questions carry **equal** marks.*

(iii) State clearly the assumptions made if any. Also assume suitable any missing data/information, if any.

1 Attempt any **two** out of the following : **10×2=20**

(a) Explain the fundamental concept of Reliability. How is reliability associated with an urgent need? Why is it important to analyze the Reliability of manufacturing system?

(b) Which aspects are covered under psychological aspects of quality and reliability? Discuss the need of economy in the area of quality and reliability.

(c) Why is it necessary to accumulate failure data accurately? What is the objective of failure investigation? What are different modes of failure? Describe briefly the manner in which system failure occurs.

2 Attempt any **two** out of the following : **10×2=20**

(a) Write down the properties of probability of survival. Establish a relationship among reliability, failure and MTBF.

(b) Name the different types of survival curves which are found to be useful in reliability study. Further, show that the hazard function is the ratio of failure rate and reliability function of the system.

(c) Under what situations parallel redundancy is generally introduced. Prove that the components if duplicated in the system at component level give higher system reliability than if duplicated at the subsystem level.

An equipment consists of three components A, B and C which are functionally connected in parallel and the respective reliabilities are 0.92, 0.95 and 0.96. Calculate the equipment reliability. If the reliability of each component is on an average 0.95, then what will be the equipment reliability?

3 Attempt any **two** out of the following : **10×2=20**

(a) Classify redundancy and describe each briefly.

Calculate the reliability of a 2 out of 4 configuration having an identical constant failure rate of 0.01 per hour for a mission time of 10 hour.

(b) What are the areas where the utilization and application of a test programme can be obtained ? What are the reasons for it ? Discuss some of the stages where the tests can be formed.

A sample of 300 items was placed on test. After 1650 hours, 50 of the survivors were withdrawn and at the end of 1735 hours, the test was terminated with 95 of the original specimens surviving. The life span in hours was recorded for each specimen which failed and mean was computed as 1544.8. Calculate the expected mean time to failure of the item. Comment on your answer.

(c) What is meant by accelerated testing? How is it performed? What practical considerations should be taken into account in planning an accelerated life test ?

4 Attempt any **two** out of the following : **10×2=20**

(a) Enumerate the requirements for the successful implementation of ISO 9000. Show by means of a figure the structure of quality system standards. Describe the role played by three parts of ISO 9000.

(b) How are quality and reliability interdependent ? What are the basic problems faced in achieving quality and reliability with reference to present day systems ?

(c) Enlist the factors that affect maintainability at optimum level in the design of a system.
The mean time of maintenance action for an amplifier consisting of various parts is 22 min. The equipment is subjected to a maintenance time constraints of 40 min. What is the probability that the maintenance action will be completed in this time? What is maintainability expressed in percentage for 1 hour, 2 hours and 10 hours? What conclusions can be drawn from the results?

5 Attempt any **two** out of the following : **10×2=20**

(a) Define the following terms:

Intrinsic availability, mission availability, system availability, down time ratio and use availability.

(b) What do you mean by reliability management matrix? What are the primary objectives of reliability management, show by mean of figure the structure of a reliability management department.

(c) Write short notes on any two of the following:

(i) Important features of the QC software packages

(ii) Commercially available QC software

(iii) Bath-tub curve and its importance.
