

**Total No. of Questions : 08**

**M.Tech. (ME) (Sem.-1)**

## QUALITY ASSURANCE AND RELIABILITY

**Subject Code : MME-509**

**M.Code : 38210**

**Time : 3 Hrs.**

**Max. Marks : 100**

**INSTRUCTIONS TO CANDIDATES :**

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.
3. Use of Statistical Tables is allowed.

1.
  - a) Write the need of Quality control in industries and discuss the factors influencing it. (10)
  - b) Quality control is fine, but my product is different. It is not easily subject to control. It is too complicated. Such types of remarks came from a man who sought examples of modern statistical quality control. Is he justified? Why or why not? (5)
  - c) Distinguish between Quality control and inspection. (5)
2.
  - a) Define Total Quality control and explain various quality characteristics. (10)
  - b) Explain the concept of 'Quality Circle' and show the basic organizational structure and discuss its elements. (10)
3.
  - a) Explain the patterns of variation in the observed data in process monitoring. (10)
  - b) What do you mean by dispersion? How will you measure it? (10)
4.
  - a) Write the management principles of Quality Assurance and show the implementation of QA program in the industries. (10)
  - b) Explain Normal and Binomial probability distributions along with their applications. (10)
5. A manufacturers of electric heaters uses a p-chart to monitor the no. of non-conforming heaters produced that require rework. The manufacturer produces these heaters in the lot sizes of 100 and 100% inspection in required. In the past, 5% of the heaters have been non-conforming and have required rework. The quality control group maintains two sets of control limits. In the p-chart with  $\pm 2\sigma$  limits are being used as warning limits and  $\pm 3\sigma$  limits being used as shut down limits. The company's profile is that; if the fraction rejected of a lot exceeds the upper shut down or if two successive lots exceed the upper warning limit, then the manufacturing process is shut down and thoroughly inspected.

- a) Calculate the  $\pm 2 \sigma$  Warning limits and  $\pm 3 \sigma$  Shut down limits for this operation. (6)
- b) If the percent rejected suddenly shifts to 7%, what is the probability that any one point will exceed the upper shut down limits? (use table G). (8)
- c) At the 7% rejection level, what is the probability that two successive points will fall between upper warning limits and upper shutdown limits? (6)
6. a) Derive the expression of Reliability in terms of failure rate and life of the product, along with all assumptions. (10)
- b) What do you mean by Availability? Explain and derive the expressions of various types of Availability. (10)
7. A double sampling plan is as follows :
  - a) Select the sample of 2 from a lot of 20. If both articles inspected are good, accept the lot. If both articles are defective, reject the lot. If 1 is good and 1 is defective, take the second sample. (10)
  - b) If the article in the second sample is good, accept the lot. If it is defective reject the lot. If a lot 25% defective is submitted, what is the probability of acceptance? Compute this by the method that is theoretically correct. (10)
8. Write short notes on the following :
  - a) Series and parallel reliability systems (5)
  - b) Skip lot Sampling plan (5)
  - c) ISO 9002 and ISO 9003 QA standardization (5)
  - d) Bath-tub Curve of reliability failure (5)

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**