

Code No: RT42034D

R13

Set No. 1

IV B.Tech II Semester Supplementary Examinations, July/August- 2017

QUALITY AND RELIABILITY ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Discuss the importance of quality. [3]
- b) Explain Process Capability Analysis [4]
- c) Find a single-sampling plan for which $p_1=0.05$, $\alpha=0.05$, $p_2=0.105$ and $\beta=0.10$ [3]
- d) How quality circles will improve the industry? [4]
- e) Discuss the concept of 'stand-by redundancy'. [4]
- f) What is the relationship between reliability, availability and maintainability [4]

PART-B (3x16 = 48 Marks)

2. a) Explain aims and objectives of quality control [8]
- b) How do quality control and quality assurance differ? [8]
3. a) Control-chart data have been recorded and plotted on \bar{X} and R charts for a certain process using a sub group size of 5. After 30 sub-groups, $\sum \bar{X} = 1,518$ and $\sum R = 104.7$.
 - i). Find control limits for the \bar{X} and R charts, and estimate the value of σ , assuming that the process is in control.
 - ii). If the mean of the process should suddenly shift to 48.75. what is the probability that the shift will be detected on first subgroup plotted after it occurs? [8]
- b) What is statistical Process control? What are the causes for variations in production process? [8]
4. a) Discuss the characteristics of ideal O.C curve [8]
- b) Draw the O.C curve for the following Plan N= 500, n = 150 & C = 2 [8]
5. a) Briefly describe the purpose of an ISO 9000 quality system [8]
- b) What are the objectives of the quality control? [8]

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- 6 a) Define the terms 'MTTF' and 'MTTR'. Derive the relation between Reliability and MTTF. [8]
- b) Deduce the expression for the reliability, R of a system having two components of reliabilities R_1 and R_2 connected in parallel. Find the reliability of system of three components of reliability 0.85 each, connected in series. [8]
- 7 a) Distinguish between repairable equipment and non-repairable equipment in light of reliability literature. [8]
- b) Discuss about the evolution of maintenance performance [8]

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