Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 171906   **Date: 28/12/2012**
Subject Name: Quality and Reliability Engineering
Time: 10.30 am - 01.00 pm   **Total Marks: 70**
Instructions:
1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** (i) Define the term Quality and explain the various dimensions of quality with suitable examples. **05**

(ii) What are the objectives of quality control? **02**

(b) Explain the principles of Total Quality Management (TQM) and also mention various benefits of implementing TQM in an organization. **07**

Q.2 **(a)** Define Quality Circle and discuss the advantages and limitation of quality circle. **07**
(b) (i) Discuss 5 S for housekeeping and its role in quality control. **05**

(ii) What do you mean by cost of prevention and cost of appraisal as applied to cost of quality: **02**

OR
(b) Describe the following problem solving techniques with suitable examples: **07**
  1. Pareto diagram
  2. Cause and Effect diagram

Q.3 **(a)** What is Design of Experiments (DOE)? What are the components and benefits of DOE? **07**
(b) Describe in brief: **07**
  1. Rules of Kanban operation
  2. Objectives of Just In Time(JIT)
OR
Q.3 **(a)** (i) Describe the benefits of implementing ISO: 9000 and ISO 14000 quality system. **07**
(b) What are the characteristics and merits of JIT production system? **07**

Q.4 **(a)** Write a short note on Total Productive Maintenance. **07**
(b) (i) Define Failure Mode and Effect Analysis (FMEA) and explain the various stages of FMEA. **05**

(ii) Define the following terms: Quality Assurance and Inspection. **02**

OR

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Q.4 (a) (i) Discuss the principles of concurrent engineering. **04**

(ii) Discuss the objectives of lean manufacturing. **03**

Q.4 (b) Explain six sigma concepts? Why companies are gradually moving towards achieving six sigma? List down the name of four Indian companies which are moving towards (or achieved) six sigma. **07**

Q.5 (a) (i) State the law of addition, multiplication and conditional probability. **03**

(ii) Mother board of a laptop has four components P,Q, R and S. 400 numbers of the mother board were subjected to accelerated operation tests which have been equivalent to 3000 hours of normal operation. The following data is available from the tests. **04**

Components	No of failures
P	6
Q	4
R	48
S	10

Find the reliability of the mother board. Also calculate the MTBF for the four components

(b) (i) Five thermostatic controls are tested to determine the "On" temperature. The measured values are 344°,338°,342°,335° and 336°.These values constitute the first subgroup for certain control chart. Find out arithmetic mean, median, range, standard deviation and variance of this sub group. **05**

(ii) What is the difference between Discrete and Continuous probability distribution? **02**

OR

Q.5 (a) Discuss Quality Function Deployment in detail. **07**

(b) (i) Define the following terms: **05**
Reliability, Failure Density, Mean Time To Failure(MTTF), Mean Time Between Failure(MTBF) and Mean Time To Repair (MTTR).

(ii) A random sample of 4 is to be selected from a lot of 10 articles 3 of which are defective. What is the probability that the sample will contain exactly 1 defective? **02**

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