Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – SUMMER 2016

Subject Code:182003 **Date:07/05/2016**

Subject Name:Quality Assurance and Reliability

Time:10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 (a) Differentiate between Quality Assurance and Total Quality Management. 07

(b) Explain Quality Chain and Continuous improvement in the context of TQM. 07

Q.2 (a) How reliability can be improved by using redundancy? Explain all the techniques with suitable examples. 07

(b) 1. Explain the role of the top management in quality management. 07
2. 'Sampling is prone to risk.'- Evaluate.

OR

(b) Explain the linearly increasing hazard model in detail. Derive the expression for reliability, failure density and probability of failure for this model. 07

Q.3 (a) Following are the inspection results of a manufactured component for 12 observations. Calculate the control limits, draw a suitable control chart and state whether the process is under statistical control or not. 07

OBSERVATION NO.	1	2	3	4	5	6	7	8	9	10	11	12
NO. OF ITEMS INSPECTED	25	30	31	46	32	35	45	32	31	43	43	39
NO. O F DEFECTIVES	3	3	4	4	2	1	6	2	1	4	3	2

(b) The record of defectives on daily samples of size 300, for 16 days is given below. Prepare a control chart and establish revised control limits if required. 07

Day	No. of defectives	Day	No. of defectives	Day	No. of defectives
1	10	7	18	13	10
2	9	8	4	14	14
3	10	9	12	15	4
4	12	10	24	16	10
5	11	11	19		
6	9	12	15		

OR

Q.3 (a) Evaluate: 07

1. Cost of failure can be reduced to a great extent if we invest in cost of prevention.
2. Quality of conformance depends upon quality of design and quality of performance.

(b) Explain : 07

1. Certification Audit
2. Quality control

Q.4 (a) The Mean Time to Failure (MTTF) is simply the reciprocal of the hazard rate, for a constant hazard model. Prove it. It is observed that the failure pattern of an electronic system follows an exponential distribution with mean time to failure of 2600 hours. What is the probability that the system failure occurs within 970 hours? 07

(b) A company manufactures large number of resistors; the probability of failure of any resistor is 0.08. If a random sample of 10 resistors were taken, determine the probability of 07

i. Getting exactly two defective resistors

ii. Getting at least three defective resistors

iii. Getting exactly five good resistors

OR

Q.4 (a) Explain the use of Baye's theorem with suitable example. 08

(b) Explain the complementary events, mutually exclusive events and random events with suitable examples. 06

Q.5 (a) Assuming that the life in number of days of a compressor is a random variable following normal distribution with a mean of 5000 days and standard deviation of 800 days. Find expected number of compressors from a random sample of 4000 compressors having: 07

1. life of more than 6000 hours.

2. life of less than 3500 hours

3. life in the range of 3000 to 4000 hours

(b) Explain the procedure of constructing fish bone diagram in details with the help of an example. 07

OR

Q.5 (a) Explain the following: 07

i. Six Sigma
ii. Taguchi's triology

(b) 1) Identify the following costs under the categories of prevention, appraisal, internal failure and external failure costs. 02

a) Travelling cost for the employees sent to attend a training programme
b) Rework before dispatching the job to the customer
c) Cost incurred for settlement of customer's complaint
d) Design review cost

2) Differentiate between attribute and variable types of data. 03

3) Explain the role of facilitator in the Quality circle. 02

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