Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2182003 **Date: 06/05/2017**

Subject Name: Quality Assurance & 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)** Explain Quality Control, Quality Assurance and Quality Management with suitable examples. **07**

(b) Define Total Quality Management. Explain important principles of TQM. **07**

Q.2 **(a)** Define Reliability. What are the factors affecting reliability. Explain reliability in series and reliability in parallel. **07**

(b) What do you mean by redundancy? Explain various types of redundancies with graph. Show the best redundancy with suitable example. **07**

OR

(b) Name 7 basic quality control tools. Explain any three tools along with suitable example. **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	28	30	31	46	32	35	45	32	31	42	43	40
No. of defectives	3	3	4	4	2	1	6	2	1	4	3	2

(b) Define sampling technique of inspection. What are different sampling techniques? What are the benefits using sampling technique? **07**

OR

Q.3 **(a)** Following are the inspection results of piston rings manufactured in 10 lots of 200 nos. each. Calculate the control limits, draw a suitable control chart and state whether the process is under statistical control or not. Compute the control limits for the future production. **07**

Day	1	2	3	4	5	6	7	8	9	10
No. of defectives	17	20	21	18	20	21	18	20	18	17

(b) (i) Compare between Attribute chart and Variable charts. **04**

(ii) Explain characteristics of p charts and c charts. **03**

Q.4 **(a)** Briefly explain the concept of ISO 9000 with its benefits and implementation barriers. **07**

(b) 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**

OR

Q.4 **(a)** A ceiling fan manufacturing company wants to improve its quality by reducing number of defective items. Out of 1000 fans inspected in one week, a total of 150 fans were found defective. From the given inspection report draw Pareto diagram. **07**

Type of defect	A	B	C	D	E	F	G	H
Quantity	20	15	17	6	12	45	25	10

(b) Explain the curve of Failure rate vs Life (time) with three clear zones on it. **07**

Q.5 **(a)** (i) Compare between Variable data with Attribute data. **02**

(ii) Briefly explain DMAIC concept of Six Sigma methodology. **05**

(b) (i) What are the benefits of control charts? **03**

(ii) What are the characteristics and uses of Normal Distribution curve? **04**

OR

Q.5 **(a)** Explain with mathematical relation formulation

(i) Mean Time to Failure (MTTF), **03**

(ii) Mean Time Between Failures (MTBF) **04**

(b) Explain:

(i) Draw and brief about Operating Characteristics (OC) curve along with Producer's risk and Consumer's risk. **04**

(ii) Structure and operation of Quality Circle. **03**

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