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

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2172507 **Date: 02/05/2017**

Subject Name: Quality Engineering & Management

Time: 02.30 PM to 05.00 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)**	A travel agency is attempting to enter a market where several competitors currently exist. What are the various customer needs that they should address? How will quality be measured?	**07**
	(b)	Refer to Q.1 (a) As the company strives to improve its market share, discuss the impact on the various categories of quality costs.	**07**
Q.2	**(a)**	Discuss the importance of (i) IPR (ii) Benchmarking in quality management.	**07**
	(b)	Define "Total Quality Management". Explain how TQM can be ensured. Enumerate the quality documents and systems needed in TQM.	**07**
		OR	
	(b)	Discuss W.Edward's contribution to TQM.	**07**
Q.3	**(a)**	What are the various types of Quality Audits? Discuss each and identify the context in which they are used.	**07**
	(b)	What is the difference between quality control and quality improvement? Discuss the role of management in each of these settings.	**07**
		OR	
Q.3	**(a)**	As natural resources become scare, discuss the role of ISO 14000 in promoting good environmental management practices.	**07**
	(b)	Describe some characteristics for selecting vendors in the following organizations and the selection process to be followed. (i) Supermarket (ii) Fast-food restaurant	**07**
Q.4	**(a)**	What are the various magnificent quality tools? Explain any one of them.	**07**
	(b)	Twenty random samples are selected from a process that makes vinyl tiles. The sample size as well as the number of nonconforming tiles is shown in Table.1. Construct a Standardized *p*-chart.	**07**
		OR	
Q.4	**(a)**	Discuss Taguchi's philosophy for quality improvement. Discuss his loss function and its contributions.	**07**
	(b)	Flight delays are of concern to passengers. An airline obtained observations on the average and range of delay times of flights, each chosen from a sample of size 4, as shown in Table.2. Construct appropriate control charts. Also find the 2σ control limits. (Refer appendix A-7 for necessary values)	**07**
Q.5	**(a)**	What is the importance of the OC curve in the selection of sampling plans? Describe the impact of the sampling size and the acceptance number on the OC curve.	**07**
	(b)	What are the advantages of using quality function deployment? What are some key ingredients that are necessary for its success?	**07**
		OR	
Q.5	**(a)**	(i) What are the advantages of creating a long-term partnership with vendors?	**03**

(ii) Compare the capability indices C_p and C_{pk}. Discuss what they measure in the process. **04**

(b) Distinguish between producer's risk and consumer's risk. In this context, explain the terms *accepting quality level* and *limiting quality level.* Discuss instances for which one type of risk might be more important than the other. **07**

Table.1

Sample	No. of Tiles Inspected	No. of Nonconforming Tiles	Sample	No. of Tiles Inspected	No. of Nonconforming Tiles
1	200	14	11	190	15
2	180	10	12	380	26
3	200	17	13	200	10
4	120	8	14	210	14
5	300	20	15	390	24
6	250	18	16	120	15
7	400	25	17	190	18
8	180	20	18	380	19
9	210	27	19	200	11
10	380	30	20	180	12

Table.2

Observation	Average Delay	Range	Observation	Average Delay	Range
1	6.5	2.1	14	9.2	3.5
2	11.1	3.8	15	7.8	2.2
3	15.8	4.6	16	10.6	4.1
4	10.9	4.2	17	10.7	4.2
5	11.2	4.0	18	8.8	3.8
6	5.6	3.5	19	9.8	3.6
7	10.4	4.1	20	10.2	3.6
8	9.8	2.	21	9.0	4.2
9	7.7	3.2	22	8.5	3.3
10	8.6	3.8	23	9.8	4.0
11	10.5	4.2	24	7.7	2.8
12	10.2	3.8	25	10.5	3.2
13	10.5	4.0			

APPENDIX A-7 Factors for Computing Center line and Three-Sigma Control Limits

Observations in Sample, n	$\bar{X}$-Charts			s-Charts						R-Charts						
	Factors for Control Limits			Factors for Center line		Factors for Control Limits				Factors for Center line		Factors for Control Limits				
	A	A_2	A_3	c_4	$1/c_4$	B_3	B_4	B_5	B_6	d_2	$1/d_2$	d_3	D_1	D_2	D_3	D_4
2	2.121	1.880	2.659	0.7979	1.2533	0	3.267	0	2.606	1.128	0.8865	0.853	0	3.686	0	3.267
3	1.732	1.023	1.954	0.8862	1.1284	0	2.568	0	2.276	1.693	0.5907	0.888	0	4.358	0	2.574
4	1.500	0.729	1.628	0.9213	1.0854	0	2.266	0	2.088	2.059	0.4857	0.880	0	4.698	0	2.282
5	1.342	0.577	1.427	0.9400	1.0638	0	2.089	0	1.964	2.326	0.4299	0.864	0	4.918	0	2.114
6	1.225	0.483	1.287	0.9515	1.0510	0.030	1.970	0.029	1.874	2.534	0.3946	0.848	0	5.078	0	2.004
7	1.134	0.419	1.182	0.9594	1.0423	0.118	1.882	0.113	1.806	2.704	0.3698	0.833	0.204	5.204	0.076	1.924
8	1.061	0.373	1.099	0.9650	1.0363	0.185	1.815	0.179	1.751	2.847	0.3512	0.820	0.388	5.306	0.136	1.864
9	1.000	0.337	1.032	0.9693	1.0317	0.239	1.761	0.232	1.707	2.970	0.3367	0.808	0.547	5.393	0.184	1.816
10	0.949	0.308	0.975	0.9727	1.0281	0.284	1.716	0.276	1.669	3.078	0.3249	0.797	0.687	5.469	0.223	1.777

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