

PGDM IB, 2016-18
TQM- Manufacturing & Services
DM-444/IB-343
Trimester – III, End-Term Examination: March 2017

Time allowed: 2 hrs 30 min

Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means**. In case of rough work please use answer sheet.

Sections	No. of Questions to attempt	Marks	Marks
A	3 out of 5 (Short Questions)	5 Marks each	$3 \times 5 = 15$
B	2 out of 3 (Long Questions)	10 Marks each	$2 \times 10 = 20$
C	Compulsory Case Study	15 Marks	15
		Total Marks	50

Section A

Q1. What is "Six Sigma"? When and how is it implemented?

Q2. What are the sayings of W. Edwards Deming in relation to total quality management? On what basis his sayings contradict with that of Joseph M. Juran's view point on TQM?

Q3. A food processing company wants to ensure that the taste of its very popular frozen low-fat dinner entrée meets the six sigma quality standards. The manufacturing engineer believes that the taste is strongly related to the percentage of a secret spice (Alpha omega 1001) that is added during the production process. A number of consumer taste test were conducted, and it was found that all samples of entrees that were rated "excellent" contained between 1.5 and 3.25 percent alpha-omega 1001. If the mean percentage of alpha-omega 1001 falls in the middle of the identified limit, calculate the standard deviation necessary to achieve Six sigma quality?

Q4. A process has a mean of 9.2 grams and a standard deviation of .30 grams. The lower specification limit is 7.5 grams and the upper specification limit is 10.50 grams. Compute Cpk?

Q5. Process standardization requires an organization to write down their processes in the form of documented SOPs (Standard Operating Procedures). You have been requested to develop a documented SOP for the process "issue of books" for your college library. Develop the SOP both through written description of steps as well through Flow Chart?

Section B

Q1.

1. Kaizen deals with the management of change and is a methodology in the right direction to improve manufacturing operations, on a continual and incremental basis following the right steps? Discuss the role of Kaizen in implementing TQM framework?

2.

1. A pen manufacturing company has identified three opportunities for a pen to be defective
 - A blunt nib
 - Leakage in the ink tube
 - Crack in the plastic shield of the pen

In a batch of 100000 pens, the company has found 105 defects. Calculate the defects per million opportunities.

2. Area: Reception attending to phone calls for a company.

Customer Complaint: I have to generally wait too long to speak to a representative in this company.

CTQ Name: - Responsiveness of the receptionist

CTQ Measure: - Time to hold (seconds)

CTQ Specification:- Less than 90 seconds from call connection to the automated response system.

Defect: Telephone calls with hold time equal to or greater than 90 seconds.

Unit: A telephone call

Opportunities of defect per unit: 1 per call.

Number of defects: 347 telephone calls

Calculate "defects per million opportunities (DPMO)" if total number of calls in the duration considered as 11,239.

Also suggest atleast three possible CTQs for further studies.

Q2. Precision Auto shaft is a manufacturer of steel shafts and supplies its products to various automotive companies. It has received a contract from a major auto company for shaft of diameter $15 \text{ mm} \pm .30 \text{ mm}$. In order to control the quality of the shafts, Precision takes ten samples of size 3 at regular interval of one hour and the data of diameter measurement obtained is as given the following table:

Time	Sample unit	Unit 01	Unit 02	Unit 03
8.00 am	1	15.0034	15.0167	14.9975
9.00 am	2	14.9925	15.0287	15.0002
10.00 am	3	14.9822	14.9757	15.0427
11.00 am	4	15.2238	15.1760	15.1182
12.00 pm	5	14.8896	14.9970	15.2761
13.00 pm	6	14.9820	14.9992	14.9743
14.00 pm	7	15.1002	15.1165	14.9749
15.00 pm	8	15.0034	14.9812	14.9672
16.00 pm	9	14.9853	14.9993	15.1728
17.00 pm	10	15.2549	14.9536	14.9831

1. Prepare the mean of sample means μ Chart and sample R chart for the given data.
2. Find stable natural tolerance limits and the process capability ration for off-centring.

n	A ₂	D ₃	D ₄	A ₃	B ₃	B ₄
2	1.88	0	3.27	2.66	0	3.27
3	1.02	0	2.57	1.95	0	2.57
4	0.73	0	2.28	1.63	0	2.27
5	0.58	0	2.11	1.43	0	2.09
6	0.48	0	2.00	1.29	0.03	1.97
7	0.42	0.08	1.92	1.18	0.12	1.88
8	0.37	0.14	1.86	1.10	0.19	1.81
9	0.34	0.18	1.82	1.03	0.24	1.76
10	0.31	0.22	1.78	0.98	0.28	1.72
11	0.29	0.26	1.74	0.93	0.32	1.68
12	0.27	0.28	1.72	0.89	0.35	1.65
13	0.25	0.31	1.69	0.85	0.38	1.62
14	0.24	0.33	1.67	0.82	0.41	1.59
15	0.22	0.35	1.65	0.79	0.43	1.57
16	0.21	0.36	1.64	0.76	0.45	1.55
17	0.20	0.38	1.62	0.74	0.47	1.53
18	0.19	0.39	1.61	0.72	0.48	1.52
19	0.19	0.40	1.60	0.70	0.50	1.50
20	0.18	0.41	1.59	0.68	0.51	1.49

Q3. King-Toyota is large dealer of Toyota cars in Guwahati. They are thinking of implementing ISO 9001: 2015 as a part of their effort to standardize their operation. You have been requested by their management team to make a presentation before them explaining the following

- a) benefits of ISO 9001 Quality System
- b) possible barriers to implementation
- c) role of leadership team

Briefly state the contents which you would like to include for each of the above components.

Section C

Made in China

The last decade witnessed dramatic changes in the manufacturing scene the world over. Outsourcing, shifting of plants from the West to the East, and sourcing from vendors globally is all part of the game. This period has seen the emergence of China as the 'factory of the world', with Chinese products stacking the racks in the supermarkets of every nook and corner of the world.

In the past, Japan enjoyed the legendary status as the manufacturing powerhouse. But, with the rise in Chinese products across the world, Japan's status is gradually diminishing.

The success of China, however, has been blemished by quality-related furore in different parts of the world. The year 2007 saw a series of product recalls and import bans on Chinese products by the West. The trouble started in March 2007, when a Canadian company, which sourced pet food from Chinese manufacturers, complained of animals dying after consuming the products. Investigations revealed the presence of melamine, a chemical used in the production of plastics, in the pet food.

Reports came about Chinese manufacturers admitting that they added melamine to increase the nitrogen count in the pet food, which makes the protein content of the food higher.

Soon, American toy-manufacturing companies, such as RC2 Corporation and Mattel, recalled all their toys sourced from China, due to excessive presence of lead in the paint used on the toys. However, Li Changjiang, the then chief of China's quality watchdog,

defended the products.

He commented that the whole issue was politically motivated and blamed the client companies of not being able to detect exactly which toys had dangerous levels of lead content, thus rejecting the whole lot from China.

Strangely enough, Mattei later admitted that the recalls made by them were due to the flaws in designs of the toys given by them to the Chinese manufacturers and not due to manufacturing faults.

Another blow to China came from Europe, where two of its toothpaste brands were detected to contain diethylene glycol (DEG) as a substitute for glycerol, which is used to thicken the toothpaste. Glycerol is a safe ingredient used by prominent manufacturers worldwide; however, DEG is hazardous to health and may result in mass poisoning.

In July 2007, China executed the former chief of its State Food and Drug Administration (FDA), Zheng Xiaoyu, on charges of taking bribes from Chinese drug manufacturers, who manufactured sub-standard drugs leading to several deaths in the country. The year 2008 proved to be equally difficult for China, when the milk-products scandal broke out. Six infants died; about 900 were admitted to hospitals; and more than 3,00,000 affected people were identified after consuming Chinese milk products. Several countries instituted a ban against importing Chinese milk products. The presence of melamine in these products was found to increase the protein count, which actually increased the chances of kidney stones in its consumers.

Paul Midler, the author of *Poorly Made in China: An Insider's Account of the Tactics behind China's Production Game*, has tried to identify the root cause of the overall quality problems in China. In his view, the current quality woes in China are a result of 'relationship imbalance and asymmetrical information sharing' between American buyer companies and Chinese suppliers. The Chinese suppliers try to cut corners to save costs, while the American buyers pressurize them to meet high quality standards at reasonable prices.

More often than not, the Chinese suppliers know that they are compromising quality to save costs, but they let their American buyers presume where the problems are. The real issue in his view is the reduction of specifications by the Chinese and devising ways to 'fool' laboratory test equipment and inspection processes.

Discussion Questions

1. Critically analyse if the root cause of quality problems in China is quality planning or quality control.
2. Suggest ways in which the Chinese government could tackle the issue of relationship imbalance and asymmetrical information sharing
3. Explore if incomplete designs and lax specifications from American clients have landed the Chinese companies in soup.
4. Recommend ways through which the Chinese government should increase awareness in Chinese companies about the value of quality over cost.
5. Guide the Chinese government in taking suitable measures to rebuild trust and confidence in the world, for its products