

**INDIAN STATISTICAL INSTITUTE
SQC & OR Unit, Hyderabad**

MS in Quality Management Science: 2015-17

III SEMESTER: MID-TERM EXAMINATION

Subject: Six Sigma - Business Excellence Strategies and Problem Solving Framework

Date : 9th September 2016 Max. Marks : 100 & Time : 120 minutes

Instructions

This paper has two parts and each part contains questions for 60 marks. You need to answer all the questions but maximum you can score in each part is 50 marks. Answer each Part on separate answer sheet provided to you. You will also be given the soft copy of this question paper for using data for analysis. You are free to use appropriate statistical software for analysis but the answers will have to be given in the answer sheet given to you. You need also to submit the soft copy of your analysis if any, only in a word file format opened in your name before the end of the examination without fail.

PART I

- Q1. Imagine that you are working for a reputed mobile manufacturing company. Identify with reference to your company the Customer(s) and the Provider(s). How do you define Quality from the perspective of Six Sigma methodology? State any one well known definition of quality given by any one Quality guru and explain the difference or otherwise the understanding of quality between the two definitions with reference to your company product.
(15 Marks)
- Q2. In a recent market survey on mobiles by an independent agency reported that your mobile manufacturing company's market share has dropped by nearly 10% in past one year with an estimated business loss of 100 crores with indications of further decline in the current year from the best in class mobile company product in the country. The management team has entrusted you to take up this as a six sigma project and has asked you to outline your approach to find a solution. For your project, outline at least five important steps you will undertake to initiate the project. Identify at least 10 voices of the customer (VOC) and perform Kano analysis. Explain the rationale adopted in your VOC analysis.
(20 Marks)
- Q3. What is Juran's concept of Breakthrough? What is called the Breakthrough Strategy in Six Sigma parlance? Do these two understandings are same or different? Justify your answer in relation to the your above project.
(15 Marks)

Q4. For any six sigma project, if a detailed SIPOC is done then the need for FMECA is not required as both will serve the same purpose. Do you agree with this statement or not and briefly justify your answer.

(10 Marks)

Part - II

(Note: You need to submit the Minitab file saved as a project in your name)

Q1. State whether the following statements are correct or wrong with justification for your answer briefly.

(5x3 = 15)

- a. A process need to be always stable for improving it by introducing solutions for the assignable causes.
- b. A Black Belt reported that the process understudy is exhibiting stable behavior with $C_p=1.67$, $C_{pk}=1.33$ and Sigma Level=4, DPMO = 2700 DPMO (with 1.5 shift).
- c. In Six Sigma methodology, MSA study is aimed at evaluating stability and capability of the Instrument.
- d. You receive on an average 2 dropped calls in a day, therefore the service provider's process with respect to call drop is operating at 2.8 Sigma Level (with 1.5 Shift)
- e. The primary objective of the measure phase is to establish a good measurement system for collection of data.

Q2. In a Six Sigma project the Black Belt was entrusted with the responsibility of studying a process where bearings are produced and the inner diameter of the bearing is the CTQ. Before collecting data he planned for a MSA study on the measurement process. He selected 3 inspectors and 30 bearings. Each inspector measured the parts two times. The MSA study data is given in the next page.

- a. State briefly the purpose of MSA study and different methods available for performing MSA study. (10)
- b. Using the available data perform suitable analysis and give your inference. (15)
- c. Assuming that the measuring instrument is meeting the MSA requirements, use the available data to perform stability analysis of the process. (10)

- d. The customer given specifications are : 12.5 ± 3.5 mm. Is the process capable of meeting the specifications ? Compute the suitable performance measures. At what Sigma Level (Short term and Long term) the process is operating.

(10)

Part No	Diameter in mm (specs : 12.5 ± 3.5 mm)					
	Inspector - A		Inspector - B		Inspector - C	
1	9.80	9.80	9.60	9.80	9.70	9.70
2	14.00	13.80	13.80	13.80	13.90	13.70
3	14.00	13.80	13.80	13.80	14.10	13.80
4	13.40	13.20	13.20	13.20	13.30	13.20
5	13.00	12.80	12.80	12.80	12.90	12.80
6	11.60	11.40	11.40	11.50	11.50	11.50
7	13.40	13.20	13.20	13.20	13.40	13.20
8	12.60	12.40	12.40	12.50	12.30	12.50
9	12.40	12.20	12.20	12.10	12.20	12.20
10	12.40	12.20	12.20	12.10	12.20	12.30
11	11.60	11.40	11.40	11.50	11.40	11.40
12	12.20	12.00	12.20	12.30	12.20	12.20
13	12.40	12.20	12.20	12.10	12.20	12.20
14	12.60	12.40	12.40	12.50	12.40	12.40
15	12.20	12.00	12.20	12.30	12.20	12.20
16	12.40	12.20	12.20	12.10	12.20	12.10
17	12.60	12.40	12.40	12.50	12.40	12.40
18	13.20	13.20	13.20	13.00	13.20	13.10
19	13.00	12.80	12.80	12.80	12.80	12.90
20	13.20	13.20	13.20	13.00	13.10	13.00
21	13.00	12.80	12.80	12.80	12.80	12.90
22	11.60	11.40	11.40	11.50	11.50	11.50
23	12.40	12.20	12.20	12.10	12.20	12.00
24	13.20	13.20	13.20	13.00	13.30	13.00
25	13.20	13.20	13.20	13.00	13.10	13.00
26	12.60	12.40	12.40	12.50	12.20	12.50
27	13.00	12.80	12.80	12.80	12.80	12.90
28	13.00	12.80	12.80	12.80	12.80	12.70
29	14.00	13.80	13.80	13.80	13.80	13.90
30	11.60	11.40	11.40	11.50	11.40	11.30