Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–II EXAMINATION – SUMMER 2015

Subject Code: 2724603 **Date: 26/05/2015**

Subject Name: Quality Engineering and Six Sigma Fundamentals

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)** Give two definitions of quality. Differentiate between quality control and quality assurance with suitable examples. **07**

(b) Explain the concept of Quality Triology as given by J M Juran. **07**

Q.2 **(a)** Explain the basic objectives of each phase of DMAIC methodology of Six Sigma improvement drive. **07**

(b) Explain Kaizen and Poka Yoke techniques with suitable examples. **07**

OR

(b) Explain the concept of Quality Circle. How industries will be benefitted by the same? What are the limitations of this methodology? **07**

Q.3 **(a)** Following table illustrates thickness of steel block milled on a universal milling machine. A sample of six blocks was taken each day for eight consecutive days in series to draw this table. The block specification as designed is 15.75 +/- 0.1 mm. Construct X-bar and Range Charts from the data available and comment on the statistical stability of the process. Also comment on the chart patterns observed. (Charts can be drawn on your answer sheet taking suitable scale). **07**

1st Day	2nd Day	3rd Day	4th Day	5th Day	6th Day	7th Day	8th Day
15.77	15.80	15.77	15.79	15.75	15.78	15.76	15.76
15.80	15.78	15.78	15.76	15.78	15.76	15.78	15.79
15.78	15.76	15.77	15.79	15.78	15.73	15.75	15.77
15.73	15.70	15.77	15.74	15.77	15.76	15.76	15.72
15.76	15.81	15.80	15.82	15.76	15.74	15.81	15.78
15.75	15.77	15.74	15.76	15.79	15.78	15.80	15.78

($A_2 = 0.48$, $D_4 = 2$, $D_3 = 0$, $d_2 = 2.534$)

(b) List 7 QC tools and explain any two in details. **07**

OR

Q.3 **(a)** The following table indicates the number of defects observed during final inspection of 25 castings. Based on the data available, decide on suitable control chart, draw the same and conclude suitably based on the same. (Chart can be drawn on your answer sheet taking suitable scale). If required, based on your conclusion, calculate new control limits for the future till all points are falling within limits. Do not draw control charts in this case. **07**

Casting No.	Number of Defects	Casting No.	Number of Defects
1	8	14	23
2	16	15	15
3	14	16	9
4	19	17	9
5	11	18	14
6	15	19	11
7	8	20	9
8	11	21	10
9	21	22	22
10	12	23	7
11	23	24	28
12	16	25	9
13	9		

(b) Differentiate between attribute and variable data giving suitable examples. List the control charts applicable for attribute and variable data. Also mention under what kind of situation each of these charts are to be used. **07**

Q.4 **(a)** How Cost of Quality system will help any industry/business system to cut down overall expenditure and also improve the quality level? ï Explain with suitable example. **07**

(b) Draw a typical format of FMEA and explain significance of each element. **07**

OR

Q.4 **(a)** What tools and techniques you suggest for quality control and assurance system of a 3 star hotel in a metro city? ï Support your answer with suitable justifications. **07**

(b) ISO:9000, ISO:14000, QS:9000 etc. are the quality standards for overall improvements in the quality system of industry/business unit. ï Evaluate the statement. **07**

Q.5 **(a)** Six Sigma is a data driven, process based approach. ï Justify the statement. **07**

(b) Write the equations of following formulae used to calculate sigma level of a process. **07**

i) DPMO

ii) C_p and C_{pk} indices

What are the criteria for selection of above formulae? What is the significance of C_p and C_{pk} indices?

OR

Q.5 **(a)** Why the process operating at 6ů level is much better than that operating at 3ů level? **07**

(b) If you are executing a Six Sigma project in an industry, what care will you exercise to ensure that the project end up successfully? ï Justify your answer with appropriate explanations. **07**

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