# GUJARAT TECHNOLOGICAL UNIVERSITY
## BE - SEMESTER–VIII(OLD) • EXAMINATION – WINTER 2017

**Subject Code:182003**                                    **Date: 07-11-2017**
**Subject Name: Quality Assurance & Reliability**
**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)** Explain the classification of different Quality costs with suitable examples. | **07** |
| | **(b)** Explain 14 points of Deming's philosophy of TQM. | **07** |
| **Q.2** | **(a)** Define Reliability. Explain its importance and state its elements. | **07** |
| | **(b)** 1. Explain Normal Distribution curve and its significance. | **07** |
| |     2. Define Quality Assurance and explain it in detail. | |

**OR**

**(b)** Draw a suitable control chart for the following data and give your comments. Also determine the control limits for the future production.   **07**

| Lot No. | No. of defects | Lot No. | No. of defects | Lot No. | No. of defects |
|---------|----------------|---------|----------------|---------|----------------|
| 1 | 80 | 8 | 42 | 15 | 77 |
| 2 | 92 | 9 | 56 | 16 | 54 |
| 3 | 58 | 10 | 63 | 17 | 69 |
| 4 | 65 | 11 | 43 | 18 | 47 |
| 5 | 81 | 12 | 58 | 19 | 56 |
| 6 | 67 | 13 | 61 | 20 | 51 |
| 7 | 55 | 14 | 50 | | |

| | | |
|---|---|---|
| **Q.3** | **(a)** Explain the concept of Quality Circle with the process of formation and its working pattern. | **07** |
| | **(b)** Explain the following terms with one suitable example for each. | **07** |
| |     1. Impossible event | |
| |     2. Certain event | |
| |     3. Complementary event | |

**OR**

| | | |
|---|---|---|
| **Q.3** | **(a)** Explain the concept of Fish bone diagram in the context of quality management, with a suitable example. | **07** |
| | **(b)** Explain in Brief with examples: **1.** MTTF **2.** Random events **3.** Kolmogorov's Axioms | **07** |
| **Q.4** | **(a)** Explain the following ISO9001 clauses; | **07** |
| |     1. Contract Review | |
| |     2. Design Review | |

**(b)** Following table illustrates thickness of steel block milled on a universal milling **07** 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. Calculate process capability index Cp and comment suitably regarding the capacity of the process to produce the components as per the design specification.

| 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 |

( $A_2$=0.483, $D_4$=2.004, $D_3$=0, $D_2$= 2.534)

**OR**

**Q.4** **(a)** Explain the concept of 'six sigma' with the help of steps involved in the application of the same. **07**

**(b)** In a manufacturing process, the number of defectives found in the inspection of **07** 15 lots of 400 items each are given below:

| Date | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| No. of defectives | 2 | 5 | 0 | 14 | 3 | 0 | 1 | 0 | 18 | 8 | 6 | 0 | 3 | 0 | 6 |

Determine the control limits for np chart and state whether the process is in control. Carry out one iteration if some points are falling outside the control limits and find out new limits.

**Q.5** **(a)** Explain the process of Audit in line with ISO9001 registration. **07**
**(b)** Explain bath tub curve with the help of a suitable example. **07**

**OR**

**Q.5** **(a)** Evaluate the statements: **07**
    1. 'Quality of design is dependent on the application of the component.'
    2. 'Quality control and quality assurance is the same.'

**(b)** Explain the concept of sampling and risks associated with sampling. **07**

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