| | |
|---|---|
| **Name:**<br>**Enrolment No:** | |

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**
**End Semester Examination, May 2023**

**Course: Total Quality Management** **Semester: II**
**Program: MBA-OM** **Time : 03 hrs.**
**Course Code: LSCM 7018** **Max. Marks: 100**

**Instructions:**

**SECTION A**
**10Qx2M=20Marks**

| S. No. | | **Marks** | **CO** |
|---|---|---|---|
| Q 1 | Which of the following is not part of the 'Define' activity in the DMAIC Model of Six Sigma?<br>a) Identification of project<br>b) Identification of champion<br>c) Identification of project owner<br>d) Identification of founder of the business | **2 Marks** | **CO1** |
| Q2 | What does the letter 'D' and 'V' refer to in the DMADV model?<br>a) Data, Verify<br>b) Design, Validate<br>c) Data, Validate<br>d) Design, Verify | **2 Marks** | **CO1** |
| Q3 | The $\bar{x}$-charts and R-charts are also known as _____ and _____ respectively.<br>a) average-charts, range-charts<br>b) median-charts, average-charts<br>c) range-charts, median-charts<br>d) median-charts, range-charts | **2 Marks** | **CO1** |
| Q4 | In which country was 5S invented?<br>a) India<br>b) Japan<br>c) Vietnam<br>d) Norway | **2 Marks** | **CO1** |

| | | | |
|---|---|---|---|
| Q5 | Which of the following is not an important aspect of employee involvement?<br>a) Employee motivation<br>b) Employee empowerment<br>c) Team and Teamwork<br>d) Keeping employee morale down | **2 Marks** | **CO1** |
| Q6 | Kaizen refers to _____<br>a) Continuous improvement<br>b) Intermittent improvement<br>c) Discontinuous improvement<br>d) Stop improvement | **2 Marks** | **CO1** |
| Q7 | Which of the following type of histogram represents a normal distribution?<br>a) Bell-shaped<br>b) Comb<br>c) Skewed<br>d) Plateau | **2 Marks** | **CO1** |
| Q8 | The total number of parts in ten samples of equal size is 1200. What is the average sample size?<br>a) 120<br>b) 12<br>c) 1.2<br>d) 1200 | **2 Marks** | **CO1** |
| Q9 | The control chart for defects is called as _____<br>a) R-chart<br>b) S-chart<br>c) P-chart<br>d) C-chart | **2 Marks** | **CO1** |
| Q10 | DPMO stands for _____<br>a) Defects per meter opportunities<br>b) Defects per million opportunities<br>c) Defects per month of opportunities<br>d) Defects per millimeter of opportunities | **2 Marks** | **CO1** |
| **SECTION B**<br>**4Qx5M= 20 Marks** | | | |

| | | | |
|---|---|---|---|
| Q1 | Explain the difference between DMAIC vs DMADV. | **5 Marks** | **CO2** |
| Q2 | Describe the Seven types of quality tool. | **5 Marks** | **CO2** |
| Q3 | Illustrate the process capability and explain the difference between Cp and Cpk. | **5 Marks** | **CO2** |
| Q4 | Clarify Quality according to Deming, Juran, Crosby and Taguchi. | **5 Marks** | **CO2** |
| **SECTION-C**<br>**3Qx10M=30 Marks** | | | |
| Q1 | Prince observes 200 letters delivered incorrectly to the wrong addresses in a small city during a single day when a total of 200,000 letters were delivered. What is the DPMO in this situation?<br>or<br>Describes the Six-Sigma phases wise. | **10 Marks** | **CO3** |
| Q2 | Analyze the concept of Taguchi Robust Design in details. | **10 Marks** | **CO3** |
| Q3 | Designate the Juran's Quality Triology. | **10 Marks** | **CO3** |
| **SECTION-D**<br>**2Qx15M= 30 Marks** | | | |
| Q1 | Customer tolerances for the height of a steering mechanism are 1.5± 0.020 m. For a product that just exceeds these limits, the cost to the customer for getting fixed is Rs 50. Ten products are randomly selected and yield the following heights (in meters): 1.53,1.49,1.50,1.49,1.48,1.52,1.54,1.53,1.51 and 1.52. Find the average loss per product item.<br><br>or<br><br>Calculate the 3σ control limits of P-Chart for the supplier's manufacturing process based on the first 15 weeks (i.e., weeks 1-15, when the quality of the alloy did not seem to be an issue). Set up P-chart for these data. | **15 Marks** | **CO4** |

**Table: Data for trial control limits.**

| Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flaws per 200 | 8 | 9 | 11 | 8 | 10 | 11 | 12 | 10 | 9 | 12 | 14 | 13 | 16 | 13 | 18 |

Q2

Table 2 presents the number of nonconformities observed in 26 successive samples of 100 printed circuit boards. Note that, for reasons of convenience, the inspection unit is defined as 100 board. Set up a C chart for these data.

**Table 2 Data on the Number of Nonconformities in Samples of 100 Printed Circuit Boards.**

| **Sample Number** | **Number of Nonconformities** | **Sample Number** | **Number of Nonconformities** |
|---|---|---|---|
| 1 | 21 | 14 | 19 |
| 2 | 24 | 15 | 10 |
| 3 | 16 | 16 | 17 |
| 4 | 12 | 17 | 13 |
| 5 | 15 | 18 | 22 |
| 6 | 5 | 19 | 18 |
| 7 | 28 | 20 | 39 |
| 8 | 20 | 21 | 30 |
| 9 | 31 | 22 | 24 |
| 10 | 25 | 23 | 16 |
| 11 | 20 | 24 | 19 |
| 12 | 24 | 25 | 17 |
| 13 | 16 | 26 | 15 |

**15 Marks**

**CO4**