Name: **Enrolment No:**	

UPES

End Semester Examination, Dec 2024

Course: TQM and Six Sigma_LSCM8011P_3 **Semester: III**

Program: MBA_LSCM_III **Time: 03 hrs.**

Course Code: LSCM8011 **Max. Marks: 100**

SECTION A

10Qx2M=20Marks

S. No.		Marks	CO
Q 1	Statement of question		
1.1	Which of the following is not the type of control chart? a. Variable control chart b. Attribute control chart c. Correlation control chart d. All of them are correct.	**2**	**CO1**
1.2	Twenty samples of size 5 are taken from a stable process. The average means of the sample means is 42.5, and the average range of the samples is 1.5. What is the UCL for the X-bar chart?	**2**	**CO1**
1.3	In which of the following cases a process cannot be said to be out of control? a. A point falls outside any of the control limits. b. Three out of four consecutive points fall beyond 2s limits. c. Four out of five consecutive points fall beyond 1s limits. d. Presence of upward or downward trend	**2**	**CO1**
1.4	Which of the following statements are correct? a. The OC curve plots the probability of accepting the lot for a range of proportions of defective items b. A graphic display of the performance of a sampling plan, showing the probability of accepting the lot for a range of proportions is called Exponential curve c. Chance of committing type I error which means accepting a good lot d. None of the above	**2**	**CO1**
1.5	Which of the following statements is not true regarding the producer's risk? a. Type I errors create poor relations with the producer b. A type I error adds unnecessarily to the lead-time for finished products or services c. The producer prefers a larger producer's risk in order to assure a higher quality of product used by the customer d. A type I error disrupts the consumer's production process	**2**	**CO1**

1.6	In Quality control, it often represents the most common sources of defects, the highest occurring type of defect, or the most frequent reasons for customer complaints, and so on. The purpose of the _____ is to highlight the most important among a (typically large) set of factors.	**2**	**CO1**
1.7	When a product is robust, it is _____? a. Non-sensitive to environment b. Weak and breakable c. Bendable and small d. All of above	**2**	**CO1**
1.8	The roof of the House of Quality shows the interrelationships between a. cost requirements and profit requirements b. technical requirements. c. customer requirements. d. customer requirements and technical requirements.	**2**	**CO1**
1.9	The quality loss function is given by $L(x) = k(x-N)^2$. What does 'N' stand for?	**2**	**CO1**
1.10	Six Sigma is multi-dimensional concept which of the following is correct A. It is used to define acceptance limit when no limit is stipulated by the product specification B. It is process improvement process that helps to improve the final quality of the product C. Six Sigma is a method that provides organizations tools to improve the capability of their business processes. D. It emphasizes cycle-time improvements while reducing manufacturing defects to no more than 3.4 occurrences per million units or events. I. A, B II. A, B, C, III. B, C, D IV. All of the Above	**2**	**CO1**
SECTION B **4Qx5M= 20 Marks**			
Q 2	Statement of question	**Marks**	**CO**
2.1	Select a process you are involved in, such as 'being taught', 'cooking a meal', 'cleaning', etc. What might be the benefits of benchmarking this process and with whom could you compare your performance? How would this lead to the benefits identified?	**5**	**CO2**
2.2	Explain briefly the difference between a c-chart and a u-chart.	**5**	**CO2**
2.3	What is design failure mode and effects analysis (DFMEA)? Provide a simple example where it will be applicable.	**5**	**CO2**
2.4	You are a Quality Manager at a manufacturing plant that produces precision-engineered components. The plant has been facing customer complaints about products not meeting the specified tolerance limits. Upon analyzing the production process, you find that the process capability index is low, and the process is not well-centered within the specification limits.	**5**	**CO2**

<table>
<tr><td></td><td>What steps would you take to improve the process capability of the production line?</td><td></td><td></td></tr>
<tr><td colspan="4">SECTION-C
3Qx10M=30 Marks</td></tr>
<tr><td>Q 3</td><td>Statement of question</td><td>Marks</td><td>CO</td></tr>
<tr><td>3.1</td><td>How might control charts be used in your daily life? For example, think of applications to monitor your school or sports performance.</td><td>10</td><td>CO3</td></tr>
<tr><td>3.2</td><td>The average time (minutes) that a customer has to wait for the arrival of a cab after calling the company has been observed for random samples of size 4. The data for 10 such samples are shown in Table.

<table><tr><th>Observation</th><th>Average Waiting Time</th><th>Range</th></tr><tr><td>1</td><td>12.5</td><td>5.1</td></tr><tr><td>2</td><td>14.0</td><td>7.2</td></tr><tr><td>3</td><td>15.2</td><td>6.5</td></tr><tr><td>4</td><td>13.9</td><td>6.3</td></tr><tr><td>5</td><td>11.4</td><td>5.8</td></tr><tr><td>6</td><td>12.6</td><td>6.1</td></tr><tr><td>7</td><td>9.5</td><td>4.8</td></tr><tr><td>8</td><td>9.2</td><td>4.3</td></tr><tr><td>9</td><td>13.6</td><td>5.7</td></tr><tr><td>10</td><td>13.8</td><td>6.2</td></tr></table>
Construct appropriate control charts and comment on the performance level.</td><td>10</td><td>CO3</td></tr>
<tr><td>3.3</td><td>The emergency service unit in a hospital has a goal of 3.5 minutes for the waiting time of patients before being treated. A random sample of 20 patients is chosen and the sample average waiting time is found to be 2.3 minutes with a sample standard deviation of 0.5 minute. Find an appropriate process capability index. Comment on the ability of the emergency service unit to meet the desirable goal, assuming normality. What are some possible actions to consider?</td><td>10</td><td>CO3</td></tr>
<tr><td colspan="4">SECTION-D
2Qx15M= 30 Marks</td></tr>
<tr><td>Q 4</td><td>Statement of question</td><td>Marks</td><td>CO</td></tr>
<tr><td>4.1</td><td>A car manufacturer aims to redesign a car door based on customer needs for safety, durability, ease of use, noise reduction, lightweight design, and aesthetics.
a. Develop a House of Quality (HoQ) to translate these needs into technical specifications, considering aspects like material choice, locking mechanisms, insulation, and hinges.</td><td>15</td><td>CO4</td></tr>
</table>

	Identify key conflicts between technical requirements and recommend the top three specifications to prioritize, explaining their importance in meeting customer expectations.		
4.2	A manufacturer of magnetic tapes is interested in reducing the variability of the thickness of the coating on the tape. It is estimated that the loss to the consumer is $10 per reel if the thickness exceeds 0.005 ±0.0004 mm. Each reel has 200m of tape. A random sample of 10 yields the following thicknesses (in millimeters): 0.0048, 0.0053, 0.0051, 0.0051, 0.0052, 0.0049, 0.0051, 0.0047, 0.0054, 0.0052. Find the average loss per reel.	**15**	**CO4**