UPES
End Semester Examination, Dec 2024
Course: 6 Sigma & Lean Operation Management
Semester: VII
Program: INT-BBA-MBA-VII   **Time: 03 hrs.**
Course Code: LSCM8030   **Max. Marks: 100**

Instructions:
Read the questions carefully before attempting
Calculator is allowed
Standard normal table will be provided.

SECTION A
10Qx2M=20Marks

S. No.		Marks	CO
Q 1	Statement of question		**CO1**
Q1.1	A factory has reduced machine idle time by implementing preventive maintenance. This effort primarily addresses which type of waste? A) Overproduction B) Waiting C) Defects D) Inventory	**2**	**CO1**
Q1.2	In Lean terminology, "Muri" refers to which of the following? A) Excessive waiting time B) Overburdening of workers or machinery C) Production of defective products D) Excess movement in the process	**2**	**CO1**
Q1.3	A factory reduces batch sizes to produce only what is needed per order instead of producing large quantities at once. Which types of waste does this reduction primarily address? A) Overproduction and Inventory B) Motion and Defects C) Waiting and Transportation D) Overprocessing and Inventory	**2**	**CO1**
Q1.4	A Six Sigma project aims to reduce defect rates in a process. Currently, the process produces 4,500 defects per million opportunities (DPMO). What sigma level does this represent? A) 3.5 Sigma B) 4 Sigma C) 4.5 Sigma D) 5 Sigma	**2**	**CO1**

Q1.5	During a Lean audit, a team finds that excess raw materials are stored on the shop floor, leading to clutter and mismanagement. This issue primarily reflects which type of waste? A) Overproduction B) Inventory C) Transportation D) Motion	2	CO1
Q1.6	A factory tracks defect counts per shift to monitor its assembly line. Which control chart would best suit this purpose? A) X-bar Chart B) p-Chart C) u-Chart D) np-Chart	2	CO1
Q1.7	When conducting a QFD for a new product, what is the first step? A) Establish engineering metrics B) Identify customer needs C) Design control limits D) Develop SIPOC diagram	2	CO1
Q1.8	A process operates with a Cp of 1.5, and the target width between specification limits is 3 mm. What is the process standard deviation? A) 0.25 mm B) 0.33 mm C) 0.5 mm D) 1.0 mm	2	CO1
Q1.9	The 5S methodology in Lean focuses on organizing and standardizing the workspace. Which type of waste is primarily reduced by implementing 5S? A) Overproduction B) Waiting C) Motion D) Defects	2	CO1
Q1.10	The specifications for a part are 20 mm ± 0.5 mm. The process mean is 20.1 mm with a standard deviation of 0.2 mm. Calculate the process capability index (Cpk). A) 0.83 B) 1.00 C) 1.25 D) 1.50	2	CO1
	SECTION B **4Qx5M= 20 Marks**		
Q 2	Statement of question		**CO**
Q2.1	A company produces 150,000 units in a month, out of which 2,000 units are defective. Calculate the sigma level of the process.	5	CO2
Q2.2	A process has a Cp of 1.2 and a Cpk of 0.8. Explain what this indicates about the process and what actions may be needed to improve capability.	5	CO2

Q2.3	In a QFD matrix for a vehicle manufacturer, "fuel efficiency" has a high correlation with "engine design" and a negative correlation with "vehicle weight." Explain how these relationships impact the design decisions for improving fuel efficiency.	**5**	**CO2**
Q2.4	Explain the difference between Type I and Type II errors in the context of control charts. Provide examples of each type of error in a production environment.	**5**	**CO2**
SECTION-C **3Qx10M=30 Marks**			
Q 3	Statement of question		**CO**
Q3.1	A logistics company frequently faces delays due to vehicle breakdowns. How would you apply FMEA to identify and mitigate potential risks to improve reliability?	**10**	**CO3**
Q3.2	A smartphone manufacturer wants to improve product quality based on customer feedback. Use QFD technique to translate customer needs into engineering requirements for product design.	**10**	**CO3**
Q3.3	A warehouse has issues with misplaced tools and equipment, leading to delays. Outline the steps of 5S and explain how each step could address the issue.	**10**	**CO3**
SECTION-D **2Qx15M= 30 Marks**			
Q4	Statement of question		**CO**

Q4.1	A company that manufactures custom parts has a high lead time that is leading to customer complaints. You are tasked with leading a Six Sigma DMAIC project to reduce lead time.
	  1. Describe the steps you would take in each DMAIC phase.
	  2. Propose at least three tools to be used in this project and justify each.
		15	**CO4**

Q4.2	A retail chain faces inefficiencies at checkout counters, leading to long waiting times for customers. Management wants to streamline this using Lean principles.
	  1. Propose an approach to analyze and improve the checkout process using Lean tools.
	  2. Suggest metrics to track improvements in customer flow and experience.
		15	**CO4**