PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025	
Date: 24- 12-2025	**Time:** 09:30am – 12:30pm

School: SOM-PG	**Program:** MBA	
Course Code: MBA4026	**Course Name:** Lean Six Sigma	
Semester: III	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	09	46	45	N/A	N/A

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 3 marks.   **10Q x 3M=30M**

1.	List any four common quality improvement tools used in Six Sigma.	3 Marks	L2	CO2
2.	Define a "Process Map," with suitable example, how does it help in problem-solving.	3 Marks	L2	CO2
3.	Explain the role of Six Sigma teams and team management.	3 Marks	L2	CO3
4.	Mention three industries where Six Sigma is widely applied with suitable examples.	3 Marks	L2	CO3
5.	Explain the term "Quality" in a business context.	3 Marks	L2	CO3
6.	Explain the key benefits of Six Sigma implementation in organizations.	3 Marks	L2	CO1
7.	List the main differences between DMAIC and DMADV.	3 Marks	L2	CO1
8.	Define Process Capability. State, why is it important in quality management.	3 Marks	L2	CO1
9.	List the types of wastes in Lean methodology with examples.	3 Marks	L2	CO2
10.	Define "Process Mapping". Explain with a simple warehouse process.	3 Marks	L2	CO2

Part B

Answer the Questions.   **Total Marks 40M**

11.	a.	A technology company's customer support center is experiencing high call abandonment rates. After analyzing the call data, the team finds that 75% of abandoned calls occur when customers are waiting for a specific technical expert. Apply the Pareto Principle to propose a focused approach for the Improve phase.	10 Marks	L3	CO3
		Or			
12.	a.	During the Analyze phase at Rainbow Hospital, the team suspects that "lack of available rooms" is a major contributor to long patient wait times. Design a brief "5 Whys" sequence that could logically lead to a deeper, more systemic root cause for this issue.	10 Marks	L3	CO3

13.	a.	An airline company faces frequent delays in baggage handling. The Analyze phase team has brainstormed numerous potential causes, ranging from staffing issues to equipment malfunctions to weather. Propose a logical sequence of tools from the Analyze phase that the team should use to efficiently identify and prioritize the true root causes.	10 Marks	L3	CO3
		Or			
14.	a.	A leading private hospital – Meridian Hospital, wants to ensure its patient wait times consistently remain below 30 minutes. During the Measure phase, they determine the current process average is 45 minutes with a standard deviation of 10 minutes. Apply the concept of Process Capability to explain why simply aiming for an average of 30 minutes might not be sufficient, emphasizing the role of variation.	10 Marks	L3	CO3

15.	a.	A hospital pharmacy frequently encounters errors where incorrect medication dosages are prepared by technicians. Apply a Poka-Yoke solution, detailing how it would prevent such errors at the source.	10 Marks	L3	CO2
		Or			
16.	a.	St. Francis Hospital's project team has successfully piloted solutions, and average patient wait times have reduced to 28 minutes. Analyze why it is crucial to develop a Future State Process Map at this juncture, explaining its value for the upcoming Control Phase.	10 Marks	L3	CO2

17.	a.	A private hospital's lean six sigma team has identified two promising solutions for reducing Emergency Department (ED) wait times: (A) implementing a "Fast-Track Nurse" for minor cases and (B) staggering physician shifts to ensure overlap during peak hours. Design a simple Solution Selection Matrix (qualitative, not numerical) that the team could use to prioritize these two solutions for pilot testing, including at least three relevant criteria.	10 Marks	L3	CO2
		Or			

18.	a.	A university's student registration process is fraught with errors, leading to frustration. The Improve phase team proposes implementing a new online registration portal. Describe how the PDCA cycle (Plan-Do-Check-Act) would guide the pilot testing of this portal, focusing on identifying potential issues before full deployment.	10 Marks	L3	CO2

Part C

Answer all the Questions. Each question carries 15marks **2Q x 15M=30M**

19.	a.	AeroFly Airlines, a major international carrier, was consistently struggling with on-time departures. Specifically, data collected over six months revealed that 35% of its flights from its primary hub were departing more than 15 minutes late, significantly impacting customer satisfaction and leading to cascading delays across its network. The primary metric of concern was "Aircraft Turnaround Time" (the time from when an aircraft arrives at the gate until it departs). A Lean Six Sigma project was launched to address this. In the Define phase, the goal was set to reduce late departures (over 15 mins) to less than 10%. The Measure phase confirmed the 35% baseline and detailed the various activities within turnaround. Through the Analyze phase, using tools like value stream mapping and root cause analysis, the team identified two major bottlenecks: 1) Delayed Baggage Unloading/Loading due to inefficient ground crew coordination and aging equipment, and 2) Inconsistent Cabin Cleaning Procedures leading to variable cleaning times. These two factors alone contributed to over 70% of the excessive turnaround times. The Improve phase focused on these areas. Solutions included implementing real-time digital communication devices for ground crews to better coordinate, upgrading to newer baggage tugs, and introducing standardized, visual work instructions for cabin cleaning with a designated "lead cleaner" for quality checks. A pilot of these solutions on a subset of flights demonstrated a reduction in late departures to 8%. The Control phase then focused on embedding these new processes, using control charts to monitor turnaround times and regular audits of cleaning procedures to sustain the gains. **Questions:** **(1)** Analyze the initial problem statement (35% of flights departing more than 15 minutes late) in terms of its alignment with a well-defined Lean Six Sigma problem. **(2)** Evaluate the identified root causes ("Delayed Baggage Unloading/Loading" and "Inconsistent Cabin Cleaning Procedures") based on the principles of the Analyze phase. What further steps or considerations would be crucial for the team here? **(3)** The case mentions the implementation of "real-time digital communication devices" and "standardized, visual work instructions." Explain how these specific solutions	15 Marks	L4	CO2

		demonstrate an application of Lean principles (beyond just Six Sigma) in the Improve phase.			

20.	a.	PrecisionTech Inc., a manufacturer of high-tolerance automotive components, was experiencing a significant decline in production line yield for a critical engine part, leading to missed delivery deadlines and increased scrap costs. Over a three-month period, the yield had dropped from a consistent 95% to an alarming 82%, with no clear explanation for the sudden dip. The company was particularly concerned about the inconsistent quality of finished components, which required extensive re-work. A Lean Six Sigma project team was assembled. In the Define phase, the project aimed to increase the production line yield to 97% within six months for the specific engine part. The Measure phase rigorously collected data on defects, cycle times, and machine parameters. The Analyze phase, utilizing Ishikawa (Fishbone) diagrams and process capability studies, uncovered that tool wear on a specific CNC machine (contributing to inconsistent dimensions) and operator training inconsistencies across shifts (leading to improper machine setup) were the two primary root causes, accounting for 85% of the defects and re-work. During the Improve phase, solutions were implemented: a preventive maintenance schedule for tool replacement based on usage rather than fixed intervals, and a standardized, hands-on training module for all operators on machine setup and tool inspection, coupled with visual setup guides. A pilot run on one shift demonstrated an immediate yield improvement to 96%. The Control phase involved establishing control charts for key dimensions, implementing a digital log for tool changes, and routine competency assessments for operators to sustain the improved yield. **Questions:** **(1)** Analyze PrecisionTech Inc.'s problem statement and objective ("yield dropped from 95% to 82%... increase to 97%") in the context of the Define phase. Are these clearly defined and measurable according to Lean Six Sigma principles? **(2)** Evaluate the identified root causes ("tool wear on a specific CNC machine" and "operator training inconsistencies") from the Analyze phase. How do these findings demonstrate the "vital few" concept, and what kind of data would have been crucial to verify them? **(3)** The Improve phase implemented "preventive maintenance schedule for tool replacement" and "standardized, hands-on training module with visual setup guides." Explain how these specific solutions are examples of both Six Sigma's focus on reducing variation and Lean's focus on efficiency/waste reduction.	**15 Marks**	**L4**	**CO3**