



**M.E DEGREE EXAMINATIONS: NOV/ DEC 2024**

(Regulation 2024)

First Semester

**INDUSTRIAL ENGINEERING**

24ILT505: Lean Manufacturing and Six Sigma

**COURSE OUTCOMES**

- CO1:** apply the core principles of Lean and Six Sigma to analyze the impact of waste and variation on manufacturing processes.
- CO2:** analyze the benefits and challenges of integrating Lean and Six Sigma methodologies to optimize production efficiency.
- CO3:** evaluate the criteria for project selection and team dynamics to recommend strategies for successful Lean Six Sigma projects.
- CO4:** examine the DMAIC process and its associated tools to assess their effectiveness in solving complex industrial problems.
- CO5:** create a comprehensive plan for institutionalizing Lean Six Sigma within an organization, focusing on leadership and continuous improvement.

**Time: Three Hours**

**Maximum Marks: 100**

**PART A (4\*20 = 80 Marks)**

1.
  - a) "Identify and analyze an example of waste (Muda) in a manufacturing or service industry. Propose how Lean principles can be applied to eliminate the identified waste and improve efficiency." 10 CO1 [K<sub>3</sub>]
  - b) "Consider a case where a company is facing quality issues in its product. Apply the DMAIC methodology of Six Sigma to outline the steps the company should take to identify and resolve the problem." 10 CO1 [K<sub>3</sub>]
2.
  - a) "Consider an organization aiming to improve its operational efficiency. Design a framework that integrates Lean and Six Sigma principles, outlining the steps and strategies needed to implement this integration effectively." 10 CO2 [K<sub>3</sub>]
  - b) Evaluate a business scenario where both Lean and Six Sigma principles are required. Select and justify the use of specific integrated tools or techniques 10 CO2 [K<sub>4</sub>]

to achieve process improvement and quality enhancement."

3. Scenario: You are a project manager tasked with selecting a project for a Lean Six Sigma initiative. You are given the following options: 20 CO3 [K<sub>4</sub>]

A project with high potential impact but low feasibility due to resource constraints.

A project with moderate impact and high feasibility, well-aligned with organizational goals.

Task: Using a structured approach, analyze which project you would select and justify your decision by considering the impact, feasibility, and alignment with organizational goals.

4. Scenario: A manufacturing company is experiencing frequent product defects, leading to customer complaints. The team has completed the Measure Phase and identified key performance indicators (KPIs) showing a high defect rate in a specific process step. 20 CO4 [K<sub>4</sub>]

Task: Apply the Analyze Phase tools to determine the root cause of the defects. Propose a strategy using at least one tool (e.g., Pareto Chart, Hypothesis Testing, or FMEA) and explain how it would help pinpoint the issue.

**Answer any ONE Question  
PART B (1\*20 = 20 Marks)**

5. a) A service-based organization has decided to implement Lean Six Sigma (LSS) but lacks leadership involvement. Propose a strategy to engage executives and managers effectively in sustaining the LSS initiative, highlighting their specific roles and responsibilities. 10 CO5 [K<sub>3</sub>]
- b) Design a Lean Six Sigma (LSS) training and certification program tailored for employees at different organizational levels, ensuring alignment with continuous improvement goals. 10 CO5 [K<sub>3</sub>]

**OR**

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|----|----|--|----|-----|-------------------|
| 6. | a) | Analyze a scenario where an organization has implemented a training and certification program for Lean Six Sigma (LSS). Design an evaluation framework to measure the program's effectiveness and its impact on overall performance metrics. | 10 | CO5 | [K <sub>3</sub> ] |
|    | b) | Develop a step-by-step approach to implement Design for Lean Six Sigma (DFLSS) in a product development process for a manufacturing industry.  | 10 | CO5 | [K <sub>3</sub> ] |

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