GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Master of Business Administration (Part - Time), 4th Semester
Specialization: Production and Operations Management
Subject Name: Six Sigma and Lean Manufacturing
Subject Code: 5549936

1. Learning Outcome:

Learning Outcome Component	Learning Outcome (Learner will be able to)
Business Environment and Domain Knowledge (BEDK)	• Explain the concept of Lean Manufacturing and its influence on Production Practices • Describe, distinguish and use the Six Sigma quality management tool for practical purposes
Critical thinking, BusinessAnalysis, Problem Solving and Innovative Solutions (CBPI)	• Predict the errors in the Lean Manufacturing process, distinguishing its nature and the root causes.
Global Exposure and Cross-Cultural Understanding (GECCU)	• *Identify* the elements that are part of the lean manufacturing measuring process in the global industry.
Social Responsiveness and Ethics (SRE)	• Prioritize and critically analyze ethical issues in lean manufacturing and the implementation of six sigma
Effective Communication (EC)	• Explain the regulation and the phases of a six sigma quality system and lean manufacturing process
Leadership and Teamwork (LT)	• Lead and manage six sigma quality circles, and lean manufacturing improvement processes and systems.

LO – PO Mapping: Correlation Levels:
1 = Slight (Low); 2 = Moderate (Medium); 3 = Substantial (High), "-"= no correlation

Sub. Code: 5549936	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
LO1: Explain the concept of Lean Manufacturing and its influence on Production Practices	3	2	-	2	1	1	-	1	1
LO2: Describe, distinguish and use the Six Sigma quality management tool for practical purposes	2	2	1	2	1	-	-	2	2
LO3: Predict the errors in the Lean Manufacturing process, distinguishing its nature and the root causes.	1	2	1	1	3	-	1	1	1
LO4: *Identify* the elements that are part of the lean manufacturing measuring process in the global industry.	3	1	3	1	-	2	-	1	1
LO5: Prioritize and critically analyze ethical issues in lean manufacturing and the implementation of six sigma	2	2	2	-	3	-	-	1	-
LO6: Prioritize and critically analyze ethical issues in lean manufacturing and the implementation of six sigma	3	1	2	-	-	3	3	-	2
LO7: Explain the regulation and the phases of a six sigma quality	1	2	-	1	1	1	3	-	1

system and lean manufacturing process									
LO8: Lead and manage six sigma quality circles, and lean manufacturing improvement processes and systems.	1	2	2	1	1	3	-	-	-

2. **Course Duration:** The course duration is of **36 sessions of 75 minutes** each.

3. **Course Contents:**

Module No.	Modules / Sub-Modules	No. of Sessions	70 Marks (External Evaluation)
I	**Lean and Six Sigma Fundamentals: -** Value of Six Sigma, Organizational drivers and metrics, aligningSix Sigma for achieving goals and competitive advantages. Understanding concepts and tools of lean manufacturing **Design for Six Sigma (DFSS): -** Design For Six Sigma Method - Failure Mode Effect Analysis(FMEA), FMEA process, Difference between DMADV and DMAIC (in brief)	9	17
II	**Define Phase:** Create Project Charter, Process mapping, identifying customers,collecting and analyzing customer data, translating customer requirements. Commonly used tools (in brief) – Force field analysis, Risk PriorityNumber (RPN), SIPOC Diagram. **Measure Phase:** Process measurement, AS IS Value Stream Map, Process inputs and outputs, Preparing data collection plan, assessing processcapabilities (process capability and performance indices), processperformance v/s specification.	9	18
III	**Analyze Phase:** Identify critical inputs, data analysis, and process analysis, determining and prioritizing root causes. (This is done through various statistical tests. It is not required to perform anynumerical analysis. Students should be just appraised of the significance of statistical testing during this phase).	9	18

	Improve Phase: Priority list of solutions, applying lean Six Sigma best practices, creating TO BE value stream map, risk assessment, pilot testing of solution.		
IV	**Control Phase:** Creating the process control plan, developing Standard Operating Procedures (SOPs), training, transition of ownership, project storyboard. **Evaluation and continuous improvement: -** Return on Six Sigma (ROSS), Lean manufacturing, Kaizen, 5S	9	17
V	**Practical:** Students can simulate process improvements in their surroundings. Students can also carry out projects in organizations which have implemented Six Sigma. Students can also undertake projects based upon various tools of the DEFINE phase, to define the statement. Students can also undertake Kaizen and 5S projects in small SMEs or service organizations.	---	(30 marks CEC)

4. Teaching Methods:

The course will use the following pedagogical tools:

- Lectures
- Case Discussions and Role Playing
- Audio-visual Material (Using CDs/Clippings/ online videos)
- Assignments and Presentations

5. Evaluation:

The evaluation of participants will be on continuous basis comprising of the following elements:

A	Continuous Evaluation Component comprising of Projects / Assignments /Quiz / Class Participation / Class test /Presentation on specific topic etc.	(Internal Assessment- 50 Marks)
B	Mid-Semester examination	(Internal Assessment-30 Marks)
C	End –Semester Examination	(External Assessment-70 Marks)

6. Reference Books:

Sr. No.	Author	Name of the Book	Publisher	Year of Publication
1	Roderick A. Munro, Govindarajan Ramu and Daniel J.Zrymiak	The Certified Six SigmaGreen Belt Handbook, Second Edition	ASQ Quality Press	2015

2	T. M. Kubiak, Donald W. Benbow	The Certified Six Sigma Green Belt Handbook	Pearson	2010
3	Michael L.George,David Rownalds, Bill Kastle	What is Lean SixSigma?	McGraw Hill	2003
4	Forrest W.Breyfogle	ImplementingSixSigma: Smarter Solutions Using Statistical Methods	John Wiley & Sons	2003
5	Evans, J R and W M Lindsay	An Introduction to Six Sigma and Process Improvement	Cengage	2014
6	Howard S. Gitlow and David M.Levine	Six Sigma for Green Belts and Champions	Pearson	2004
7	Michael L. George, John Maxey, David Rowlands, Mark Price	The Lean Six SigmaPocket Tool book	McGraw-Hill	2004

Note: Wherever the standard books are not available for the topic appropriate print and online resources, journals and books published by different authors may be prescribed.

7. List of Journals/Periodicals/Magazines/Newspapers, etc.

1. Lean & Six Sigma Review
2. International Journal of Six Sigma and Competitive Advantage
3. International Journal of Lean Six Sigma