MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN

DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Subject	LEAN SIX SIGMA	Name of the handling Faculty	Dr.S.Prasath
Subject Code	OMF751	Year / Sem	IV/VIII
Acad Year	2023-2024	Batch	2021-2024

Course Objective

To gain insight about the importance of lean manufacturing and six sigma practices.

To improve the skill to predict,prevent and control defects in a process.

To understanding the elements of waste.

To achieve sustainable quality improvement through process improvement.

To understanding of variation in processes.

Course Outcome

CO1 Understand the basics of lean six sigma

CO2 Summarize the tools and techniques used in the analysis.

CO3 Compare the six sigma methodologies.

CO4 Demonstrate the implementation and challenges in six sigma.

CO5 Summarize the evaluation and continuous improvement methods.

Lesson Plan

Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
	UNIT I (LEAN AND SIX SIGMA BACKROUND AND FUNDAMENTALS)						
1	Historical Overview , Definition of quality	R2	1	BB	**L1**	CO1	PO1
2	What is six sigma ,TQM and Six sigma	R2	1	BB	**L1,L2**	CO1	PO1
3	lean manufacturing and six sigma , six sigma and process tolerance	R2	1	BB	**L1**	CO1	PO1
4	Six sigma and cultural changes	R2	1	PPT	**L1**	CO1	PO1
5	six sigma capability	R2	1	PPT	**L1**	CO1	PO1
6	six sigma need assessments	R2	1	PPT	**L1**	CO1	PO1
7	Implications of quality levels	R2	1	PPT	**L2**	CO1	PO1
8	Cost of Poor Quality (COPQ)	R2	1	BB	**L2**	CO1	PO2
9	Cost of Doing Nothing ,assessment questions	R2	1	BB	**L2**	CO1	PO2
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any …..Seminar and Assignment							
Evaluation method : Assignment and Direct interaction during Tutorials							
	UNIT II (THE SCOPE OF TOOLS AND TECHNIQUES)						
10	Tools for definition , IPO diagram, SIPOC diagram, Flow diagram	R5	1	BB	**L2**	CO3	PO1
11	CTQ Tree, Project Charter, Tools for measurement	R5	1	BB	**L2**	CO3	PO5
12	Check sheets, Histograms, Run Charts, Scatter Diagrams, Cause and effect diagram, Pareto charts, Control charts, Flow process charts	R5	1	BB	**L1,L2**	CO3	PO5
13	Process Capability Measurement, Tools for analysis	R5	1	BB	**L2**	CO3	PO5
14	Process Mapping, Regression analysis, RU/CS analysis, SWOT	R5	1	BB	**L1,L2**	CO3	PO5
15	PESTLE, Five Whys, interrelationship diagram, overall equipment effectiveness, TRIZ innovative problem solving	R5	1	BB	**L2**	CO3	PO5
16	Tools for improvement ,Affinity diagram, Normal group technique, SMED, 5S, mistake proofing, Value stream Mapping,	R5	1	PPT	**L2**	CO3	PO5
17	Forced field analysis ,Tools for control , Gantt chart, Activity network diagram	R5	1	PPT	**L1,L2**	CO3	PO5
18	Radar chart,PDCA cycle,Milestone tracker bdiagram,earned value management	R5	1	BB	**L2**	CO3	PO1-PO5
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any…..Seminar and Assignment							
Evaluation method: Case Studies and Tuorials							

UNIT III (SIX SIGMA METHODOLOGIES)							
19	Design for six sigma (DfSS)	R2	1	BB	**L2**	CO4	PO1-PO3
20	Design For Six Sigma Method	R2	1	BB	**L1,L2**	CO4	PO1-PO3
21	Failure Mode Effect Analysis (FMEA)	R2	1	PPT	**L1,L2,L3**	CO4	PO1
22	FMEA process	R2	1	PPT	**L1,L2**	CO4	PO1
23	Risk Priority Number (RPN)	R2	1	BB	**L1,L2**	CO4	PO1
24	Six Sigma and Leadership	R2	1	BB	**L2**	CO4	PO1
25	Committed leadership	R2	1	PPT	**L2,l3**	CO4	PO1
26	Change Acceleration Process (CAP)	R2	1	PPT	**L2,L3**	CO4	PO1
27	Developing communication plan , Stakeholder	R2	1	PPT	**L2**	CO4	PO1
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any…..Seminar and Assignment							
Evaluation method: Assignment and Direct interaction during Tutorials							
UNIT IV (SIX SIGMA IMPLEMENTATION AND CHALLENGES)							
28	Tools for implementation , Supplier Input Process Output Customer (SIPOC)	R5	1	PPT	**L2,L3**	CO4	PO1-PO2
29	Quality Function Deployment or House of Quality (QFD)	R5	1	PPT	**L1,L2**	CO4	PO1
30	Alternative approach , implementation , leadership training	R5	1	PPT	**L1,L2,L3**	CO4	PO1
31	Close communication system,	R5	1	PPT	**L2**	CO4	PO1
32	project selection , project management and team	R5	1	PPT	**L1,L2**	CO4	PO1
33	Champion training , customer quality index , challenges	R5	1	BB	**L2,L3**	CO4	PO1
34	program failure, CPQ vs six sigma	R5	1	BB	**L1,L2**	CO4	PO1
35	structure the deployment of six sigma	R5	1	BB	**L2**	CO4	PO1
36	cultural challenge , customer/internal metrics	R5	1	BB	**L2**	CO4	PO1
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any…..Seminar and Assignment							
Evaluation method : Assignment and Direct interaction during Tutorials							
UNIT V (EVALUATION AND CONTINOUSIMPROVEMENT METHODS)							
37	Evaluation strategy , the economics of six sigma quality	R2	1	**BB**	**L2**	CO5	PO1
38	Return on six Sigma (ROSS)	R2	1	**BB**	**L1,L2**	CO5	PO1-PO2
39	ROI, poor project estimates , continuous improvement	R2	1	**BB**	**L1,L2**	CO5	PO1-PO2
40	lean manufacturing ,value, customer focus	R2	1	**BB**	**L2**	CO5	PO1
41	Perfection, focus on waste, overproduction , waiting	R2	1	**BB**	**L1,L2**	CO5	PO1
42	Inventory in process (IIP), processing waste	R2	1	**BB**	**L1,L2**	CO5	PO1
43	Transportation, motion	R2	1	**PPT**	**L2**	CO5	PO1
44	Making defective products, underutilizing people	R2	1	**PPT**	**L2**	CO5	PO1
45	Kaizen – 5S	R2	1	**BB**	**L1,L2**	CO5	PO1
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any…..Seminar and Assignment							
Evaluation method : Assignment and Direct interaction during Tutorials							
Content Beyond the Syllabus Planned							
1	SWIMLANE DIAGRAM,ACTIVITY DIAGRAM						
2	INTEGRATION OF LEAN MANUFACTURING AND INDUSTRY 4.0						
Reference Books							
1	Michael L.George, David Rownalds, Bill Kastle, What is Lean Six Sigma, McGraw – Hill 2003						
2	Thomas Pyzdek, The Six Sigma Handbook, McGraw-Hill,2000						
3	Fred Soleimannejed , Six Sigma, Basic Steps and Implementation, AuthorHouse, 2004						
4	Forrest W. Breyfogle, III, James M. Cupello, Becki Meadows, Managing Six Sigma:A Practical Guide to Understanding, Assessing, and Implementing the Strategy That Yields Bottom-Line Success, John Wiley & Sons, 2000						
5	James P. Womack, Daniel T.Jones, Lean Thinking, Free Press Business, 2003						
Website/URL references							
1	https://www.sixsigmaonline.org/						
2	https://www.investopedia.com/terms/s/six-sigma.asp						

Blooms Level					
Level 1 (L1) : Remembering	Lower Order Thinking	Fixed Hour	**Level 4 (L4) : Analysing**	Higher Order Thinking	Projects / Mini Projects
Level 2 (L2) : Understanding			**Level 5 (L5) : Evaluating**		

Level 3 (L3) : Applying		Exams	Level 6 (L6) : Creating					Thinking	Projects

Mapping syllabus with Bloom's Taxonomy LOT and HOT

Unit No	Unit Name	L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	LEAN AND SIX SIGMA BACKROUND AND FUNDAMENTALS	6	4	0	0	0	0	10	0	10
Unit 2	THE SCOPE OF TOOLS AND TECHNIQUES	3	9	0	0	0	0	12	0	12
Unit 3	SIX SIGMA METHODOLOGIES	4	9	3	0	0	0	16	0	16
Unit 4	SIX SIGMA IMPLEMENTATION AND CHALLENGES	4	9	3	0	0	0	16	0	16
Unit 5	EVALUATION AND CONTINOUSIMPROVEMENT METHODS	5	9	0	0	0	0	14	0	14
Total		22	40	6	0	0	0	68	0	68
Total Percentage		32.353	58.8	8.8235294	0	0	0	100	0	100

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1											1	
CO2	1				1								1	
CO3	1		1										1	
CO4	1	1											1	
CO5	1	1											1	
Avg	1	1	1		1								1	

Justification for CO-PO mapping

CO1	students can know about the basic knowledge of lean six sigma.
CO2	students can identify the problem with the help of using the six sigma tools.
CO3	students can use six sigma methods for reducing the failure.
CO4	students can identify the tools for implementation and challenges.
CO5	The students is able to improve continous quality improvement in production.

3	High level	2	Moderate level	1	Low level

Name & Sign of Faculty Incharge: Dr. S.Prasath

Name & Sign of Subject Expert: Dr.S.Prasath

Head of the Department : Dr. Shunmugasundaram M

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