B. Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75b - SIX SIGMA AND LEAN MANUFACTURING

(Open Elective-III)

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Course Objectives: The objectives of the course are to make the students learn about

- Introduce the students, the basic concepts of six sigma and lean manufacturing.
- Expose with various quality issues in Inspection.
- Gain Knowledge on quality control and its applications to real time.
- Know the extent of cellular manufacturing and 5S.
- Understand the importance of Quality standards in manufacturing.

UNIT - 1: Introduction to Six-Sigma

8 Hrs

Probabilistic models-Six Sigma measures-Yield-DPMO-Quality level-Reliability function using Six-Sigma-MTTF using Six Sigma-Maintenance free operating period- Availability using Six-Sigma-Point availability-Achieved availability-Operational Availability-Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

•	Explain the concepts of probabilistic models	L2
•	Determine the reliability function using six-sigma	L3
•	Explain about MTTF using six sigma concepts	L2
•	Illustrate the examples of availability using sigma	1.2

UNIT - II: The Elements of Six Sigma and their Determination

6Hr

The Quality Measurement Techniques: SQC, Six Sigma, Cp and Cpk- The Statistical quality control (SQC) methods-The relationship of control charts and six sigma-The process capability index (Cp)-Six sigma approach-Six sigma and the $1.5~\sigma$ shift-The Cpk Approach Versus Six Sigma-Cpk and process average shift- Negative Cpk-Choosing six sigma or Cpk-Setting the process capability index-Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the quality measurement techniques
 Discuss the process capability index (Cp).
 Compare the Cpk Approach and Six Sigma
- Explain about different statistical quality control methods
 State the relationship of control charts and six sigma

UNIT - III: Introduction To Lean Manufacturing

6Hrs

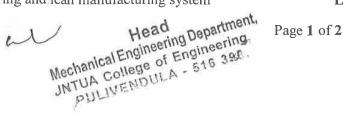
L2

Conventional Manufacturing versus Lean Manufacturing – Principles of Lean Manufacturing – Basic elements of lean manufacturing – Introduction to LM Tools.

Learning Outcomes:

At the end of this unit, the student will be able to

•	Illustrate the basic elements of lean manufacturing	L2
•	List the various lean manufacturing tools.	L1
•	Describe the principles of lean manufacturing	L2
•	Compare conventional manufacturing and lean manufacturing system	L2



UNIT - IV: Cellular Manufacturing, JIT, TPM

6 Hrs

Cellular Manufacturing – Types of Layout, Principles of Cell layout, Implementation. JIT – Principles of JIT and Implementation of Kanban. TPM – Pillars of TPM, Principles and implementation of TPM.

Learning Outcomes:

At the end of this unit, the student will be able to

•	Explain the concept of cellular manufacturing		L2
•	Indentify the types of layouts.		L3
•	Describe the concepts of JIT and TPM		L2
•	Demonstrate the pillars of TPM		L2
•	Create the cell layout.		L6

UNIT - V: Set Up Time Reduction, TQM, 5S, VSM 10

6Hrs

Set up time reduction – Definition, philosophies and reduction approaches. TQM – Principles and implementation. 5S Principles and implementation - Value stream mapping - Procedure and principles.

Learning Outcomes:

At the end of this unit, the student will be able to

•	Define set up time reduction.	L1
	Illustrate the principles and implementation of 5S techniques.	L2
•	Discuss procedure and principles of value stream mapping	L6
	List the various reduction approaches	L1

Text Books:

- 1. U Dinesh Kumar, Crocker, Chitra and Harithe Saranga, Reliability and Six Sigma, Springer Publishers.
- 2. Sung H. Park, Six Sigma for Quality and Productivity Promotion, Asian Productivity Organization

Reference Books:

- 1. Sammy G. Shina, Six Sigma for Electronics Design and Manufacturing, McGraw-Hill.
- 2. Design and Analysis of Lean Production Systems, Ronald G. Askin & Jeffrey B. Goldberg, John Wiley & Sons, 2003.
- 3. Mikell P. Groover (2002) _Automation, Production Systems and CIM.
- 4. Rother M. and Shook J, 1999 Learning to See: Value Stream Mapping to Add Value and Eliminate Muda', Lean Enterprise Institute, Brookline, MA.

Course Outcomes:

At the end of this Course the student will be able to

	Summarize various techniques that are related to the six-sigma and lean manufacturing	L2
	Outline the concepts of cellular manufacturing, JIT and TPM	L2
	Illustrate the principles and implementation of 5S techniques	L2
•	Discuss procedure and principles of value stream mapping	L6
	Determine the reliability function using six-sigma.	L3

