COURSE CONTENT

GREEN MANUFACTURING

I Semester: M.Tech (CAD/CAM)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
2414013	Foundation	3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisites: Manufacturing Processes

Course Overview:

This course introduces the principles of sustainability and sustainable development, focusing on social, economic, and environmental dimensions. It covers the role of technology in achieving sustainable manufacturing and explores tools such as life cycle assessment, design for environment, and sustainable product development. Students learn Environmental Impact Assessment methods, ISO standards, and the relationship between energy, technology, and sustainability. The course also emphasizes eco-friendly design, recycling strategies, and decision-making techniques. Finally, it discusses sustainability measurement frameworks, performance indicators, risk-benefit analysis, and corporate social responsibility, enabling students to apply sustainable practices effectively in engineering and industrial applications.

Course Objectives:

1. Provide knowledge on Sustainable Manufacturing, its Scope, Need and Benefits.
2. Expose the students with various Tools and Techniques of Sustainable Manufacturing.
3. Impart knowledge on Environmental Impact Assessment towards sustainable manufacturing.
4. Design Eco friendly products and to have knowledge on various recycling methods.
5. Implement idea towards frameworks for measuring sustainability.

Course Outcomes: After Completion of the Course, Students should be able to

1. Explain the importance of sustainable development.
2. Identify the link between manufacturing process models and sustainable manufacturing metrics for product and process improvement.
3. Understand the three pillars of sustainability and how they are manifested in sustainable manufacturing.
4. Incorporate economic, environmental, and social aspects into decision making processes using multi-criteria decision-making methods.
5. Exhibit competence on the usage and applicability of sustainability tools. Compute sustainability performance through the indicators.

UNIT-I:

Concepts of sustainability and sustainable development – Need for sustainable development - Components of sustainability- Social, Economic, Environmental dimensions - Linkages between technology and sustainability - Sustainable Manufacturing –Scope, Need and Benefits.

UNIT-II:

Tools and Techniques of Sustainable Manufacturing – Environmental Conscious Quality

Function Deployment, Life cycle assessment, Design for Environment, R3 and R6 cycles, Design for Disassembly -Sustainable Product Development – Various Phases.

UNIT-III:

EIA Methods –CML, EI 95 and 99, ISO 14001 EMS and PAS 2050 standards, Environmental Impact parameters - Interactions between energy and technology and their implications for environment and sustainable development.

UNIT-IV:

Design for recycling – Eco friendly product design methods – Methods to infuse sustainability in early product design phases – Multi-Criteria Decision Making in Sustainability.

UNIT-V:

Frameworks for measuring sustainability- Indicators of sustainability – Environmental, Economic, Societal and Business indicators - Concept Models and Various Approaches, Product Sustainability and Risk/Benefit assessment– Corporate Social Responsibility.

TEXT BOOKS:

1. G. Atkinson, S. Dietz, E. Neumayer, — "Handbook of Sustainable Manufacturing". Edward Elgar Publishing Limited,2007.

REFERENCE BOOKS:

1. D. Rodick, "Industrial Development for the 21st Century: Sustainable Development Perspectives", UN New York,2007.

ELECTRONIC RESOURCES:

1. https://nptel.ac.in/courses/110104119
2. http://digimat.in/nptel/courses/video/110104119/L01.html

MATERIALS ONLINE:

1. Course template
2. Definitions and terminology
3. Lecture notes
4. E-Learning Readiness Videos (ELRV)