SEMESTER S6

SUSTAINABLE MANUFACTURING

Course Code	PESFT631	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. This course provides an overview of the Sustainability through Green Manufacturing Systems; various methodologies and its application in improving the eco-efficiency are focused.
2. Students will also learn about the commonly used Sustainable manufacturing tools such as Environmentally Conscious Quality Function Deployment (ECQFD) and Life Cycle Assessment (LCA).

KTU SPECIAL

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Concept of sustainability, manufacturing operations, resources in manufacturing. Concept of triple bottom line, environmental, economic and social dimensions of sustainability. Relation between green, lean and sustainable manufacturing.	9
2	Environmental conscious- quality function deployment-R3 and R6 cycles-Environmental impact assessment methods - CML, EI 95 and 99, ISO 14001, EMS and PAS 2050 standards, environmental impact parameters. Sustainability assessment-concept models and various approaches, product sustainability and risk assessment-corporate social responsibility.	10
3	Life cycle analysis-Remanufacture and disposal, tools for LCA, optimization for achieving sustainability in manufacturing, Environmentally Conscious Quality Function Deployment (ECQFD) Extended Producer Responsibility - Value analysis, Analysis for carbon footprint-software packages for sustainability analysis	9

4	Indicators of sustainability - Environmental, Economic, Societal and Business indicators - Concept Models and Various Approaches. Lifecycle of products/services, from the development, to the end of life stages	**8**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

KTUSPECIAL

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Students will be able to have a basic knowledge about sustainable manufacturing	**K2**
CO2	Students will be able to use the tools required for implementing sustainable manufacturing	**K2**
CO3	Students will be able to do calculations required for implementing sustainable manufacturing	**K3**
CO4	Manufacturing Students will know about practical applications of sustainable manufacturing	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3					2	3	3				3
CO2	3					2	3					3
CO3	2	3		3		3	3					3
CO4	2				2	2	3	2			3	2

KTU SPECIAL

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Handbook of Sustainable Manufacturing	G. Atkinson S. Dietz E. Neumayer	Edward Elgar Publishing Limited	2007
2	An Introduction to Sustainable Development	Rogers P.P Jalal K.F Boyd I A	Earth scan London	2007

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Industrial Development for the 21st Century: Sustainable Development Perspectives	D. Rodick	UN New York	2007
2	Sustainable Development Indicators in Ecological Economics	P. Lawn	Edward Elgar Publishing Limited	
3	The Economics of Sustainable Development	S. Asefa	W.E. Upjohn Institute for Employment Research	2005

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://onlinecourses.nptel.ac.in/noc23_me138/unit?unit=18&lesson=19
2	https://onlinecourses.swayam2.ac.in/aic19_ge05/unit?unit=7&lesson=13
3-4	https://onlinecourses.swayam2.ac.in/aic19_ge05/unit?unit=7&lesson=14

KTU SPECIAL