22MEHO309	DIGITAL MANUFACTURING AND IOT					
PREREQUISITES		**CATEGORY**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

COURSE OBJECTIVES:

1.	To study the various aspects of digital manufacturing.
2.	To inculcate the importance of DM in Product Lifecycle Management and Supply chain Management
3.	To formulate of smart manufacturing systems in the digital work environment
4.	To interpret IoT to support the digital manufacturing
5.	To elaborate the significance of digital twin

UNIT I	**INTRODUCTION**	**9**	**0**	**0**	**9**

Introduction – Need – Overview of Digital Manufacturing and the Past – Aspects of Digital Manufacturing: Product life cycle, Smart factory, and value chain management – Practical Benefits of Digital Manufacturing – The Future of Digital Manufacturing.

UNIT II	**DIGITAL LIFE CYCLE & SUPPLY CHAIN MANAGEMENT**	**9**	**0**	**0**	**9**

Collaborative Product Development, Mapping Requirements to specifications – Part Numbering, Engineering Vaulting, and Product reuse – Engineering Change Management, Bill of Material and Process Consistency – Digital Mock up and Prototype development – Virtual testing and collateral. Overview of Digital Supply Chain - Scope& Challenges in Digital SC - Effective Digital Transformation - Future Practices in SCM

UNIT III	**SMART FACTORY**	**9**	**0**	**0**	**9**

Smart Factory – Levels of Smart Factories – Benefits – Technologies used in Smart Factory – Smart Factory in IoT- Key Principles of a Smart Factory – Creating a Smart Factory – Smart Factories and Cybersecurity

UNIT IV	**INDUSTRY 4.0**	**9**	**0**	**0**	**9**

Introduction – Industry 4.0 –Internet of Things – Industrial Internet of Things – Framework: Connectivity devices and services – Intelligent networks of manufacturing – Cloud computing – Data analytics –Cyber physical systems –Machine to Machine communication – Case Studies.

UNIT V	**STUDY OF DIGITAL TWIN**	**9**	**0**	**0**	**9**

Basic Concepts – Features and Implementation – Digital Twin: Digital Thread and Digital Shadow- Building Blocks – Types – Characteristics of a Good Digital Twin Platform – Benefits, Impact & Challenges – Future of Digital Twins

TOTAL (45L): 45 PERIODS

TEXT BOOKS:

1.	Zude Zhou, Shane (Shengquan) Xie and Dejun Chen, Fundamentals of Digital Manufacturing Science, Springer-Verlag London Limited, 2012.
2.	Alasdair Gilchrist, “Industry 4.0: The Industrial Internet of Things”, A press, 2016.

REFERENCES:

1.	Lihui Wang and Andrew YehChing Nee, Collaborative Design and Planning for Digital Manufacturing, Springer-Verlag London Limited, 2009.
2.	Andrew Yeh Chris Nee, Fei Tao, and Meng Zhang, “Digital Twin Driven Smart Manufacturing”, Elsevier Science., United States, 2019.
3.	Alp Ustundag and Emre Cevikcan, “Industry 4.0: Managing The Digital Transformation”, Springer Series in Advanced Manufacturing ., Switzerland, 2017
4.	Ronald R. Yager and Jordan Pascual Espada, “New Advances in the Internet of Things”, Springer., Switzerland, 2018.
5.	Ronald R. Yager and Jordan Pascual Espada, “New Advances in the Internet of Things”, Springer., Switzerland, 2018

COURSE OUTCOMES: Upon completion of this course, the students will be able to:		**Bloom Taxonomy Mapped**
CO1	Impart knowledge to use various elements in the digital manufacturing.	
CO2	Differentiate the concepts involved in digital product development life cycle process and supply chain management in digital environment.	
CO3	Select the proper procedure of validating practical work through digital validation in Factories.	
CO4	Implementation the concepts of iot and its role in digital manufacturing.	
CO5	Analyse and optimize various practical manufacturing process through digital twin.	

COURSE ARTICULATION MATRIX

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	0	0	0	0	2	0	0	0	2	2	2	2	2
CO2	1	1	0	0	0	0	2	0	0	0	2	2	2	2	2
CO3	1	1	0	0	0	0	2	0	0	0	2	2	2	2	2
CO4	1	1	0	0	0	0	2	0	0	0	2	2	2	2	2
CO5	1	1	0	0	0	0	2	0	0	0	2	2	2	2	2
Avg	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**2**	**2**	**2**	**2**
3/2/1 – indicates strength of correlation (3 – high, 2- medium, 1- low)															