LESSON PLAN

Course Code	Course Title	Semester	Branch	Contact Periods /Week	Academic Year	Date of commencement of Semester
23ME6E08	INDUSTRY 4.0	VII	ROBO	5	2024-25	10-12-2025

COURSE OUTCOMES: Students are able to

1	Explain the basics of Industry 4.0, its drivers, enablers, and difference between Industry 4.0 factories with today's factory [K2]
2	Describe the idea of IoT, IIoT, smart manufacturing factories, smart devices, smart cities and smart services [K2]
3	Analyze different technologies enabling Industry 4.0 with some case studies [K2]
4	Distinguish different design principles in Industry 4.0 [K2]
5	define cloud manufacturing and connected factories . [K2]
6	Summarize the impact of Industry 4.0 in different sectors including challenges in implementing Industry 4.0 [K2]

UNIT	Out Comes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
I	CO1: Realize the need of industry 4.0 and its inter-connectivity [K2]	**UNIT INTRODUCTION TO INDUSTRY 4.0**				Classroom learning, PPT,Videos, Quiz
		1.1	Introduction	T2,R1	1	
		1.2	Various Industrial Revolutions	T2,R1	1	
		1.3	Digitalization	T2,R1	1	
		1.4	Networked Economy	T2,R1	1	
		1.5	Drivers of Industry 4.0	T2,R1	1	
		1.6	Enablersof Industry 4.0	T2,R1	2	
		1.7	Comparison of Industry 4.0 Factory and Today's Factory	T2, R3	1	
		1.8	Trends of Industrial Big Datafor Smart Business Transformation	T2,R1	1	
		1.9	Trends of Predictive Analyticsfor Smart Business Transformation	T2,R1	1	
				Total	**10**	
II	CO 2: Interpret the architecture of IOT and its protocols [K2]	**UNIT II ROAD TO INDUSTRY 4.0**				Classroom learning,PPT, Videos, Quiz
		2.1	Internet of Things (IoT)	T2, R3	1	
		2.2	Industrial Internet of Things (IIoT)	T2, R3	1	
		2.3	Internet of Services	T2, R3	1	
		2.4	Big data	T2, R3	1	
		2.5	Value chains in Manufacturing companies	T3,R3	1	
		2.6	Smart factories	T3,R3	1	
		2.7	Smart devices	T3,R3	1	

		2.8	Smartproducts	T3,R3	1	
		2.9	Smart logistics	T3,R3	1	
		2.10	Smart cities	T3,R3	1	
		2.11	Smart services	T3,R3	1	
		2.12	Predictive analytics	T3,R3	1	
		2.13	Case studies in Smart cities &Smart factories	T3,R3	1	
				Total	**13**	
III	CO3: Understand the different technologies used in enabling industry 4.0 [K2]	**UNIT III TECHNOLOGIES FOR ENABLING INDUSTRY 4.0**				Classroom learning, PPT, Videos, Case Study, Quiz
		3.1	Cyber Physical Systems	T1, R3	1	
		3.2	Robotic Automation	T1, R3	1	
		3.3	Collaborative Robots	T1, R3	1	
		3.4	Support System for Industry 4.0	T1, R3	1	
		3.5	Mobile Computing	T1, R3	1	
		3.6	Cyber Security	T1, R3	1	
		3.7	Augmented / Virtual reality	T1, R3	1	
		3.8	Artificial Intelligence	T1, R3	1	
		3.9	System integration	T1, R3	1	
		3.10	Digital twin	T1, R3	1	
		3.11	3D printing	T1, R3	1	
		3.12	Case studies	T1, R3	1	
				Total	**12**	
IV	CO4: Brief on design principles and its connected components [K2]	**UNIT IV INDUSTRY 4.0 DESIGN PRINCIPLES**				Classroom PPT, Flipped Class, Case Study Quiz
		4.1	Introduction to Industry 4.0 design principles	T1,R3	1	
		4.2	Interoperability	T1,R3	1	
		4.3	Communication systems for Industry 4.0	T1,R3	1	
		4.4	Communication standards for Industry 4.0	T1,R3	1	
		4.5	Virtualization	T1,R3	1	
		4.6	Decentralization	T1,R3	1	
		4.7	Modularity	T1,R3	1	
		4.8	Real time capability	T1,R3	1	
		4.9	Information transparency	T1,R3	1	
		4.10	Foundation of Industry 4.0	T1,R3	1	

		4.11	Cloud Manufacturing	T1,R3	1	
		4.12	Connected factories	T1,R3	1	
				Total	**12**	
V	CO5: Plan the uses of IOT, cloud computing, data analytics and Industry 4.0 technologies. [K2] CO5: Summarize the impact of Industry 4.0 in different sectors including challenges in implementing Industry 4.0 [K2]	**UNIT V IMPACT OF INDUSTRY 4.0**				Classroom learning, PPT, Videos, Seminars, Quiz
		5.1	Impact of Industry 4.0 on service and business models	T1, R3	1	
		5.2	Impact of Industry 4.0 on IT security	T1, R3	1	
		5.3	Impact of Industry 4.0 onmanufacturing	T1, R3	1	
		5.4	Impact of Industry 4.0 on machine safety	T1, R3	1	
		5.5	Impact of Industry 4.0 on product life cycle	T1, R3	1	
		5.6	Impact of Industry 4.0 on socioeconomic factors	T1, R3	1	
		5.7	Impact of Industry 4.0 on textile industries	T1, R3	1	
		5.8	Impact of Industry 4.0 on healthcare industries	T1, R3	1	
		5.9	Impact of Industry 4.0 on real estate industries,	T1, R3	1	
		5.10	Impact of Industry 4.0 on maritime industries,	T1, R3	1	
		5.11	Impact of Industry 4.0 on tourism industries	T1, R3	1	
		5.12	Compelling Forces and Challenges in implementing Industry 4.0	T1, R3	1	
		5.13	Case studies	T1, R3	1	
	CBS	5.14	Industry 5.0: Transforming the Manufacturing Landscape	Web	1	
				Total	**14**	
			CUMULATIVE PROPOSED PERIODS		**61**	

Text Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Alasdair Gilchrist, "Industry 4.0: The Industrial Internet of Things", A press, 2016
2	Bruno S.Sergi, Elena G.popkova, et al. " Understanding Industry 4.0: AI, The internet of things, and the future of work", 2019, Emerald publishing limited.

Reference Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Kaushik kumar, DivyaZindani, J. Paulo Davim, " Digital manufacturing and assembly systems in Industry 4.0", CRC Press, Taylor and Francis group, 2020.
2	Antonio sartal, Diego Carou, J.PauloDavim, " Enabling technologies for the successful deployment of Industry 4.0, CRC press, 2020.

3	Alp Ustundag, Emrecavikcan, " Industry 4.0 : Managing the digital transformation", springer international publishing , 2018.
Web Details	
1	https://onlinecourses.nptel.ac.in/noc20_cs69/preview
2	https://www.ibm.com/topics/industry-4-0
3	https://www.twi-global.com/what-we-do/research-and-technology/technologies/industry-4-0
4	https://radixweb.com/blog/what-is-industry-4-0
5	https://www.intechopen.com/chapters/80514

		Name	Signature with Date
i.	Faculty	Dr. Francis Luther King M	
ii.	Course Coordinator	Mr.B.Mahesh Krishna	
iii.	Module Coordinator	Dr. R. Sanjeev Kumar	
iv.	Programme Coordinator	Dr. Francis Luther King M	

Principal

Swarnandhra College of Engineering and Technology * Seetharampuram * MECH Dept.