Course Code	UDS21D04T	Course Name	Working with IIoT Data	Course Category	D	Discipline Specific Elective	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications		Data Book / Codes/Standards	Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning
CLR-1 :	To teach the participants with the fundamental concepts of Industrial IoT, the business benefits, challenges involved in implementing an IIoT based solutions.	
CLR-2 :	to teach the participants about how AI and Big Data together merge with IIoT, and develop new processes within organisations and supply chains, which bring about huge digital transformations.	
CLR-3 :	To teach the participants the basic building blocks of the IoT system sensors, processors, gateways, applications	
CLR-4 :	To educate the participants on Implementing, deploying, and maintaining IIoT infrastructure which can be a tricky proposition at best. It covers device connectivity and security, which expands the breadth and depth of all connected devices, providing additional value for the user with increased profitability and growth.	
CLR-5 :	To provide insights about set of integrated software capabilities to improve asset management decision making and operational visibility and control for plants, infrastructure and equipment's using the IIoT Technologies.	
CLR-6 :	To provide the participants with enough insights about how IIoT is applied in creating real-world applications from connected cars, smart homes, connected wearables, smart cities and connected healthcare.	

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Have a firm understanding and control over the fundamental concepts of Industrial IoT, Industrial IoT protocols, business drivers of an industrial IoT based solution etc	2	85	80
CLO-2 :	Have strong hands-on knowledge, skill and expertise on how AI and Big Data together merge with IIoT, and develop new processes within organisations and supply chains, which bring about huge digital transformations.	3	85	80
CLO-3 :	A Firm control of IIoT architecture and protocols in the communications layer, that the systems use to exchange actionable information	3	85	80
CLO-4 :	Have the ability of developing capability of IIoT to extract value from data, diminish costs, improve tasks and present new plans of action	3	85	80
CLO-5 :	Have the ability to understand all the privacy risks surrounding an IIoT implementation and how these risks can be mitigated for an efficient process.	3	85	80
CLO-6 :	Have insights about how IIoT is applied in creating real-world applications from connected cars, smart homes, connected wearables, smart cities and connected healthcare.	3	85	80

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H
CLO-2 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H
CLO-3 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H
CLO-4 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H
CLO-5 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H
CLO-6 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H

Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

Duration (hour)		12	12	12	12	12
S-1	SLO-1	**Unit 1: Understanding IIoT fundamentals**	Utilizing the right Business Strategy	Secure Telemetry	**Unit 8: IIoT Implementation Framework**	**Unit 12: Working with Sensor Data**
	SLO-2	IIoT Overview	Find Experts within Your Organisation	Software Updates and maintenance	IIoT Implementation Framework Overview	Industrial Control Systems
S-2	SLO-1	Business Benefits of IIoT	Keep Your Customer Front and Centre	Embedded devices in IIoT	Categories of IIoT Implementation Framework	Industrial Applications
	SLO-2	Business Challenges of IIoT	Agile Decision Making and Rapid Prototyping	**Unit 6: IIoT Architecture and Protocols**	IIoT Architecture	Reading Data from Sensors
S-3	SLO-1	Future of IIoT	Data Driven Design	IIoT Architecture overview	Category of Implementation	Business Benefits of Reading Sensors Data
	SLO-2	Impact of IIoT	Data as a Service	Perception Layer	Knowledge Category of IIoT	Business Challenges of Reading Sensors Data
S-4	SLO-1	Overview of the IIoT technology components	Real-Time Visibility	Network Layer	**Unit 9: Security Considerations Using IIoT**	**Unit 13: Working with Machine Data**
	SLO-2	Common Cloud Protocols	Predictive Maintenance	Processing Layer	Security Considerations Using IIoT Overview	Industrial Control Systems
S-5	SLO-1	IIoT business models	Inventory Planning	Application Layer	Securing IIoT Local Area Networks (LAN)	Industrial Applications
	SLO-2	How IIoT changes business models	**Unit 4: Building Blocks of IIoT**	List of IIoT Protocols	Safe Data Transmission	Reading Data from Machines
S-6	SLO-1	IIoT Usecases	Building Blocks of IIoT Overview	MQTT	Secure Network Ports	Business Benefits of Reading Machine Data
	SLO-2	**Unit 2: Evolution of IIoT**	Applications	AMPQ	Secure User Endpoints	Business Challenges of Reading Machine Data
S-7	SLO-1	Milestones in IIoT Evolution	Gateways	CoAP	Secure Remote Access	**Unit 14: Working with Machine Data**
	SLO-2	IIoT Architecture	Processors	**Unit 7: Various Platforms for IIoT**	**Unit 10: Opportunities with IIoT**	Industrial Control Systems
S-8	SLO-1	Physical Layer	Sensors	Platforms for IIoT overview	Opportunities with IIoT Overview	Industrial Applications
	SLO-2	Edge Computing Layer	IoT layers	Benefits of IIoT Platforms	Improving data competence and knowledge	Reading Data from Wearables
S-9	SLO-1	Application Layer	Application	Types of IIoT platforms	Demand-driven manufacturing	Business Benefits of Reading Data from Wearables
	SLO-2	Economic Impact of IIoT	Management Service	Words of Caution with Industrial IoT Platform Vendors	Improvement of production processes	Business Challenges of Reading Data from Wearable
S-10	SLO-1	Challenges in IIoT adoption	Gateway and Network	Power of AI and IIoT	New levels of factory automation	**Unit 15:** Working with Web Logs

	SLO-2	Hardware Platforms	Sensors Connectivity and Network	Google Cloud IoT	**Unit 11: Opportunities with IIoT**	Industrial Control Systems
S-11	SLO-1	Data Planning	**Unit 5: IIoT Design and Development Consideration**	Cisco IoT Cloud Connect	Smart robotics	Industrial Applications
	SLO-2	Privacy and Security	Industrial IoT Enablement	Salesforce IoT Cloud	Reinventing warehousing	Reading Data from Web Logs
S-12	SLO-1	Technologies supporting IIoT Growth	Secure Onboarding	IBM Watson IoT	Minimize downtime in factories	Business Benefits of Reading Data from Web Logs
	SLO-2	**Unit 3: How IIoT is Transforming Digital World**	Configure, Monitor and Control	ThingWorx	Self-driving tractors, Air as a service, Connected Robotics, Intelligent Robotics, Smart Automotive manufacturing	Business Challenges of Reading Data Web Logs

Learning Resources	1. https://deepsphereai.litmos.com/ 2. Sudip Misra, Chandana Roy, Anandarup Mukherjee, (2021), "Introduction to Industrial Internet of Tings and Industry 4.0", CRC Press, Taylor & Francis Group 3. Giacomo Veneri, Antonio Capasso, (2018), "Hands-On Industrial Internet of Things - Create a powerful Industrial IoT infrastructure using Industry 4.0", Packt publishing	4. Sravani Bhattacharjee, (2018), "Practical Industrial Internet of Things Security – A Practitioner's guide to securing connected industries", Packt publishing 5. Alena Traukina, Jayant Thomas, Prashant Tyagi, Kishore Reddipalli, (2018), "Industrial Internet Application Development – Simplify IIoT development using the elasticity of Public cloud and Native Cloud Services", Packt publishing

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	40%	-	40%	-	40%	-	40%	-	40%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	20%	-	20%	-	20%	-	20%	-	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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