



**DEPARTMENT MECHANICAL ENGINEERING**

**LESSON PLAN**

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
20RB5T02	Internet of Things	V	ROBOTICS	05	2024-25	05-06-2024

**COURSE OUTCOMES**

1	Summarize the basic principles, physical and logical design, functional blocks, communication systems and API of IoT systems. [K2]
2	Differentiate between IoT and M2M technologies, explain the concepts of Software Defined Networks (SDN) and Network Virtualization. [K2]
3	Describe hardware components used for computing, communicating, sensing, actuation, I/O interfaces in IoT. [K2]
4	Summarize the applications of IoT through various case studies. [K2]
5	Explain the concepts of IIoT and Industry 4.0, their requirements and benefits [K3]

UNIT	Outcomes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
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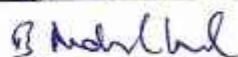
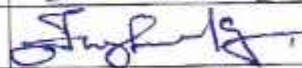

**INTRODUCTION TO IOT**

I	Summarize the basic principles, physical and logical design, functional blocks, communication systems and API of IoT systems. [K2]	1.1	Introduction to IOT, Definition & Applications of IoT	T1,T3, R1	1	Chalk & Talk PPT, PBL
		1.2	Characteristics of IoT	T1,T3	1	
		1.3	Physical design of IoT: Things in IOT	T1,T3	1	
		1.3.1	IOT Protocols: Link Layer	T1,T3	1	
		1.3.2	Network Layer, Transport Layer	T1,T3	1	
		1.3.3	Application Layer	T1,T3	1	
		1.4	logical design of IoT, Functional blocks of IoT	T3	1	
		1.4.1	IOT communication models: Request response	T3	1	
		1.4.1.1	Public subscribe communication model	T3	1	
		1.4.1.2	Push pull & Exclusive pair communication model	T3	1	

		1.4.2	IOT Communication APIs: REST based	T3	1	
		1.4.2.1	Web Socket based Communication APIs	T3	1	
					<b>Total</b>	<b>12</b>
<b>IOT &amp; M2M</b>						
<b>II</b>	Differentiate between IoT and M2M technologies, explain the concepts of Software Defined Networks (SDN) and Network Virtualization. [K2]	2.1	Introduction to Machine to Machine (M2M)	T3	1	Chalk & Talk PPT, Flipped class
		2.1.1	M2M system architecture	T3	1	
		2.1.2	M2M Gateway	T3	1	
		2.1.3	Difference between M2M and IOT	T3	1	
		2.2	IOT components	T3	1	
		2.3	IOT Levels and IOT cloud components	T3	1	
		2.4	Conventional Network Architecture	T3	1	
		2.5	Software Defined Networking (SDN): Architecture	T2,T3	1	
		2.5.1	SDN Layers	T2,T3	1	
		2.5.2	Key Elements of SDN	T2,T3	1	
		2.5.2.1	Open Flow switch	T2,T3	1	
		2.6	Network Function Virtualization (NFV)	T2,T3	1	
		2.6.1	NFV Architecture, Key Elements of NFV	T2,T3	1	
		2.6.2	Home network with home gateway and virtualized gateway	T3	1	
<b>TOTAL</b>					<b>13</b>	
<b>ELEMENTS OF IOT</b>						
<b>III</b>	Describe hardware components used for computing, communicating, sensing, actuation, I/O interfaces in IoT. [K2]	3.1	Introduction of hardware used in IoT	T1,T3	1	Chalk & Talk PPT, PBL
		3.2.1	Computing hardware-Raspberry Pi board components	T1,T3	1	
		3.2.2	Arduino Uno board components	T1,T3	1	
		3.3	Sensing, Sensor functions and types.	T1,T3, R2	1	
		3.4.1	Sensors used in IoT- Humidity and Temperature sensor	T1,T3	1	
		3.4.2	Color sensor, Raindrop sensor	T1,T3	1	
		3.4.3	Flame and gas sensors, Ultrasonic distance measurement sensor	T1,T3	1	
		3.5	Actuation, Actuator-characteristics	T1,T3	1	

		3.6.1	Actuator types, Hydraulic actuators	T1,T3	1		
		3.6.2	Pneumatic, thermal and electric actuators	T1,T3	1		
		3.6.3	Mechanical actuators, Shape memory Polymers	T1,T3	1		
		3.7	Communication devices	T1,T3, R2	1		
		3.8	Input/Output interfaces, GPIO Pins, UART, SPI, I2C,USB	T1,T3	1		
					<b>Total</b>	<b>13</b>	
<b>IOT CASE STUDIES</b>							
IV	Summarize the applications of IoT through various case studies. [K2]	4.1	Industrial Automation - Machine Diagnosis and Prognosis	T3	1	Chalk & Talk, PBL	
		4.2	Real time monitoring of Assembly line production	T3	1		
		4.3	Hazardous gas leakage detection	T3	1		
		4.4	Indoor air quality Monitoring-Case study	T3	1		
		4.5	Crime assistance in a smart IoT transportation system	T3,R3	1		
		4.6	Home automation- Smart Lighting	T3,R2	1		
		4.7	Home Intrusion Detection	T3	1		
		4.8	Agricultural IoT- Smart irrigation management system	T3	1		
		4.9	Green house Control	T3	1		
		4.10	Healthcare IoT	T1,T3	1		
		4.11	Smart Parking	T3	1		
		4.12	Weather monitoring system	T3	1		
					<b>Total</b>	<b>12</b>	
<b>INDUSTRIAL INTERNET OF THINGS (IIOT)</b>							
V	Explain the concepts of IIoT and Industry 4.0, their requirements and benefits [K2]	5.1	Key IIOT technologies	T2,R1	1	Chalk & Talk, PPT	
		5.2	Catalysts and precursors of the IIOT	T2	1		
		5.3	Innovation and the IIOT	T2	1		
		5.4	Intelligent devices	T2	1		
		5.5	Key opportunities and benefits	T2	1		
		5.6.1	Industry 4.0 - definition	T2,R1	1		
		5.6.2	Four main characteristics of Industry 4.0	T2,R1	1		
		5.6.3	Design principles	T2	1		

	5.6.4	Building blocks	T2	1
	5.6.5	Smart manufacturing	T2	1
<b>Total</b>				<b>10</b>
<b>CUMULATIVE PROPOSED PERIODS</b>				<b>60</b>
<b>Text Books:</b>				
<b>S.No.</b>	<b>AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION</b>			
T1	Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, Internet of Things, 2 <sup>nd</sup> edition, Wiley, 2019			
T2	Alasdair Gilchrist, Industry 4.0: The Industrial Internet of Things, 1 <sup>st</sup> edition, A press, 2017.			
T3	Arsheep Bahga, Vijay Madiseti, Internet of Things: A Hands-On Approach Paperback, 1st Edition, Orient Black swan Private Limited, 2015.			
<b>Reference Books:</b>				
<b>S.No.</b>	<b>AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION</b>			
R1	Dimitrios Serpanos, Marilyn Wolf, "Internet-of-Things (IoT) Systems: Architectures, Algorithms, Methodologies", 1 <sup>st</sup> Edition, Springer, 2018.			
R2	Marco Schwartz, Internet of Things with Arduino Cookbook, Packt Publishing Limited, 2016			
R3	Rajkumar Buyya, Amir Vahid Dastjerdi, Internet of Things: Principles and Paradigms, 1st edition, Morgan Kaufmann, 2016			
R4	Dieter Uckelmann, Mark Harrison, Florian Michahelles, Architecting the Internet of Things, Springer, 2011.			
<b>Web Details</b>				
1	<a href="https://archive.nptel.ac.in/courses/106/105/106105166/">https://archive.nptel.ac.in/courses/106/105/106105166/</a>			
2	<a href="https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf">https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf</a>			

SNO	Details	Name	Signature
i.	Faculty	Mr. B. Mahesh Krishna	
ii.	Course Coordinator	Mr. B. Mahesh Krishna	
iii.	Module Coordinator	Dr. M Francis Luther King	
iv.	Programme Coordinator	Dr. A Gopichand	

  
PRINCIPAL