

BCSE310L	IoT Architectures and Protocols	L	T	P	C
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<b>Pre-requisite</b>	NIL	<b>Syllabus version</b>			
		1.0			
<b>Course Objectives</b>					
<ol style="list-style-type: none"> <li>1. To impart knowledge on the infrastructure, sensor technologies and networking technologies of Internet of Things.</li> <li>2. To analyze, design and develop solutions for Internet of Things.</li> <li>3. To explore the real-life aspects of Internet of Things.</li> </ol>					
<b>Course Outcomes</b>					
At the end of this course, student will be able to:					
<ol style="list-style-type: none"> <li>1. Identify the hardware and software components, challenges of Internet of Things.</li> <li>2. Assess different Internet of Things technologies and their applications.</li> <li>3. Design basic circuits using sensors interfacing, data conversion process and shield libraries to interface with the real world.</li> <li>4. Build and demonstrate the project successfully by sensor requirements, coding, emulating and testing.</li> </ol>					
<b>Module:1</b>	<b>IoT Fundamentals</b>	<b>5 hours</b>			
Definition and Characteristics of Internet of Things (IoT) - Challenges and Issues - Physical Design of IoT - Logical Design of IoT - IoT Functional Blocks.					
<b>Module:2</b>	<b>IoT Communication Architectures and Protocols</b>	<b>7 hours</b>			
Control Units – Communication modules – Bluetooth – Zigbee – WiFi – GPS - IoT Protocols (IPv6, 6LoWPAN, RPL, CoAP) – MQTT - Wired Communication - Power Sources.					
<b>Module:3</b>	<b>Technologies Behind IoT</b>	<b>5 hours</b>			
Four pillars of IoT paradigm: RFID, Wireless Sensor Networks, Supervisory Control and Data Acquisition (SCADA) - M2M - IoT Enabling Technologies: BigData Analytics, Cloud Computing, Embedded Systems.					
<b>Module:4</b>	<b>Programming the Microcontroller for IoT</b>	<b>5 hours</b>			
Working principles of sensors – IoT deployment for Raspberry Pi /Arduino/Equivalent platform – Reading from Sensors, Communication: Connecting microcontroller with mobile devices - Communication through Bluetooth - WiFi and USB - Contiki OS - Cooja Simulator.					
<b>Module:5</b>	<b>Resource Management in IoT</b>	<b>5 hours</b>			
Scalability: Network Configuration Protocol, Open vSwitch Database Management Protocol - Routing and Protocols: Collection Tree, LOADng.					
<b>Module:6</b>	<b>IoT to Web of Things</b>	<b>9 hours</b>			
Scope of Web of Things (WoT) – IoT Data Management: Set up cloud environment, Cloud access from sensors, Data Analytics Platforms for IOT- Resource Identification: Richardson Maturity Model - REST API.					
<b>Module:7</b>	<b>Applications of IoT</b>	<b>7 hours</b>			
Business models for IoT - Green energy buildings and infrastructure - Smart farming - Smart retailing and Smart fleet management					
<b>Module:8</b>	<b>Contemporary Issues</b>	<b>2 hours</b>			
		<b>Total Lecture hours:</b>			<b>45 hours</b>

<b>Text Book(s)</b>			
1.	Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri. Internet of Things: Architectures, Protocols and Standards, 2019, 1 <sup>st</sup> Edition, Wiley Publications, USA.		
<b>Reference Books</b>			
1.	Bahga, Arshdeep, and Vijay Madiseti. Internet of Things: A Hands-on Approach, 2014, 1 <sup>st</sup> Edition, Universities press, India.		
2.	Vlasios Tsiatsis, Jan Holler, Catherine Mulligan, Stamatis Karnourkos and David Boyle. Internet of Things: Technologies and Applications for a New Age of Intelligence, 2018, 2 <sup>nd</sup> Edition, Academic Press, USA.		
Mode of Evaluation: CAT, Written Assignment, Quiz, FAT, Project			
Recommended by Board of Studies		04-03-2022	
Approved by Academic Council		No. 65	Date 17-03-2022