SHORT SYLLABUS

BCSE310L IoT Architectures and Protocols **(3-0-0-3)**

IoT Fundamentals – IoT Communication Architectures – Protocols – Wireless Sensor Networks - IoT Enabling Technologies – Programming Microcontroller for IoT: IoT Deployment for Raspberry Pi /Arduino/Equivalent Platforms – Resource Management in IoT – IoT to Web of Things: IoT Data Management: Set up Cloud Environment, Cloud Access from Sensors, Data Analytics Platforms for IoT – Applications of IoT.

BCSE310L	IoT Architectures and Protocols	L	T	P	C
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Pre-requisite	NIL	\multicolumn{2}{c}{Syllabus version}		
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Course Objectives

1. To impart knowledge on the infrastructure, sensor technologies and networking technologies of Internet of Things.
2. To analyze, design and develop solutions for Internet of Things.
3. To explore the real-life aspects of Internet of Things.

Course Outcomes

At the end of this course, student will be able to:
1. Identify the hardware and software components, challenges of Internet of Things.
2. Assess different Internet of Things technologies and their applications.
3. Design basic circuits using sensors interfacing, data conversion process and shield libraries to interface with the real world.
4. Build and demonstrate the project successfully by sensor requirements, coding, emulating and testing.

Module:1	IoT Fundamentals	5 hours

Definition and Characteristics of Internet of Things (IoT) - Challenges and Issues - Physical Design of IoT - Logical Design of IoT - IoT Functional Blocks.

Module:2	IoT Communication Architectures and Protocols	7 hours

Control Units – Communication modules – Bluetooth – Zigbee – WiFi – GPS - IoT Protocols (IPv6, 6LoWPAN, RPL, CoAP) – MQTT - Wired Communication - Power Sources.

Module:3	Technologies Behind IoT	5 hours

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.

Module:4	Programming the Microcontroller for IoT	5 hours

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.

Module:5	Resource Management in IoT	5 hours

Scalability: Network Configuration Protocol, Open vSwitch Database Management Protocol - Routing and Protocols: Collection Tree, LOADng.

Module:6	IoT to Web of Things	9 hours

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.

Module:7	Applications of IoT	7 hours

Business models for IoT - Green energy buildings and infrastructure - Smart farming - Smart retailing and Smart fleet management

Module:8	Contemporary Issues	2 hours
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri. Internet of Things: Architectures, Protocols and Standards, 2019, 1st Edition, Wiley Publications, USA.
Reference Books	
1.	Bahga, Arshdeep, and Vijay Madisetti. Internet of Things: A Hands-on Approach, 2014,1st Edition, Universities press, India.
2.	Vlasios Tsiatsis, Jan Holler, Catherine Mulligan, Stamatis Karnourskos and David Boyle. Internet of Things: Technologies and Applications for a New Age of Intelligence, 2018, 2nd 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