

Subject Code	Subject Name (Lab oriented Theory Courses)	Category	L	T	P	C
AI19644	IOT ARCHITECTURE AND ITS PROTOCOLS	PC	3	0	2	4

Objectives:						
●	To learn basics of Embedded Systems Architecture.					
●	To understand ISA Architecture Models and memory interfaces.					
●	To interpret Smart Objects and IoT Architectures.					
●	To familiarize about various IOT-related protocols.					
●	To build simple IoT Systems using Arduino and Raspberry Pi.					

UNIT-I	IOT FUNDAMENTALS	9
Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs. (Chapter 1 of T1)		
UNIT-II	IOT REFERENCE ARCHITECTURE, SOFTWARE DESIGN	9
Control Units – Communication modules – Bluetooth – Zigbee – Wifi – GPS- IOT Protocols (IPv6, 6LoWPAN, RPL, CoAP etc.), MQTT, Wired Communication, Power Sources. (Chapter 7 of R1)		
UNIT-III	RESOURCE MANAGEMENT IN IOT	9
Clustering - Clustering for Scalability - Clustering for routing - Clustering Protocols for IOT - The Future Web of Things – Set up cloud environment – Cloud access from sensors– Data Analytics for IOT. (Chapter 3 of R2)		
UNIT-IV	IOT ACCESS TECHNOLOGIES	9
IoT Access Technologies: Physical and MAC layers - topology and Security of IEEE 802.15.4 - 802.15.4g - 802.15.4e, Network Layer: Need for Optimization - Constrained Nodes - Constrained Networks – IP versions Optimizing IP for IoT: From 6LoWPAN to 6Lo - Routing over Low Power and Lossy Networks. Case studies: An IoT Blueprint for Public Safety. (Chapter 1, 12 of T2 and Chapter 4, 5 and 15 of R3)		
UNIT-V	DESIGN AND DEVELOPMENT OF IOT APPLICATION	9
Design Methodology - Embedded computing logic - Microcontroller - System on Chips – Basic building blocks of IoT - Arduino Board details - IDE programming - Raspberry Pi - Interfaces and Raspberry Pi with Python Programming case studies :illustrating to design home automation. (Chapter 7and 9 of T2)		
		Contact Hours
		: 45

List of Experiments		
1.	Familiarization with Arduino/Raspberry Pi and perform necessary software installation.	
2.	To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.	
3.	To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.	
4.	To interface Bluetooth/Wifi with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth/Wifi.	
5.	Mini Projects(any one for each group) i. Home Automation system with mobile Integration. ii. Weather Monitoring system using Raspberry Pi/Arduino iii. Automatic plant watering/irrigation system using Raspberry Pi/Arduino. iv. Vehicle Tracking System using Raspberry Pi/Arduino. v. Intrusion detection System using Raspberry Pi/Arduino. vi. Smart Parking System using Raspberry Pi/Arduino	
		Contact Hours
		: 30
		Total Contact Hours
		: 60

Course Outcomes:	
On completion of the course, the students will be able to	
●	Comprehend the architecture of Embedded systems.
●	Design and develop programs for specific embedded applications.
●	Apply the basic concepts of IoT.
●	Integrate various IoT Access Technologies.
●	Design and develop an IOT based real time application.

Text Books:	
1	ArshdeepBahga, Vijay Madiseti, “Internet of Things – A Hands-on Approach”, Universities Press, India PVT Limited 2014.
2	David Hanes, Gonzalo Salgueiro, Rob Barton “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”,Cisco Press June 2017.

Reference Books:	
1	Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things – Key Applications and Protocols”, Wiley, 2012 .(CH-4)
2	Vermesan, Ovidiu, and Peter Friess, eds. Internet of things-from research and innovation to market deployment, 1st edition, Aalborg: River publishers, 2014.
3	David Hanes, Gonzalo Salgueiro, Rob Barton “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, Cisco Press June 2017.

Web link:

- 1.<https://www.arduino.cc/>
- 2.<https://www.educba.com/applications-of-iot>
- 3.<https://www.edureka.co/blog/iot-applications>

CO - PO – PSO matrices of course

PO/PSO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
AI19644.1	1	2	3	3	1	-	2	1	-	-	2	-	1	2	2	
AI19644.2	1	1	3	3	3	2	-		2	1	2	2	2	2	1	
AI19644.3	2	2	2	-	1		2					3	2	2	2	
AI19644.4	2	1	1	2	3	2		1	2	1	2	2	2	2	3	
AI19644.5	2	3	2	2	3	2	1		2	1	2	3	2	2	1	
Average	1.8	1.8	2	2.3	2.5	2	1.5	1	2	1	2	2.5	2	2	1.8	

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

No correlation: “-”