Diploma
in
Computer Engineering

Course Code: 025020603

Internet of Things

Programme / Branch Name	Diploma in Computer Engineering				
Course Name	Internet of Things			**Course Code**	025020603
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends:
HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				Evaluation Scheme			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**TOTAL**
3	0	4	5	50	50	50	150

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

✓ IOT is futuristic and will require students to understand other technologies and current uses where IOT can be integrated to make a quantum jump in the efficiencies in application.

3. Rationale

Internet of Things plays an important role in connecting the things i.e. variety of devices through the internet. The IoT has emerged as a cutting-edge technology with applications in manufacturing, healthcare, agriculture, transport, mining, smart cities and many more. This subject covers the fundamentals of IoT with its architecture, protocols and applications. It also covers the overview and programming of two widely used IoT platforms Arduino and Raspberry Pi.

4. Objectives

✓ The theory should be taught and practiced in such a way that students are able to achieve different learning outcomes in the cognitive, psychomotor and affective domains to demonstrate the following learning outcomes.
- Understand how IoT is used in day to day life.
- Learn architecture of IoT.
- Various applications and challenges of IoT.
- Working with Arduino and Raspberry PI.

5. Contents

Unit No.	Topics	Sub-Topics	Learning Outcomes	% Weightage	Hours
1	**Introduction to Internet of Things**	1.1. Introduction of IoT 1.2. Characteristics of IoT Data (Streaming, High-volume, Semi-structured) 1.3. Models for IoT 1.4. Technology Roadmap 1.5. Benefits of IoT 1.6. Impact of IoT on the Business Landscape	● To understand basics of IoT. ● To understand models of IoT ● To understand benefits and impact of IoT	15	6
2	**IoT Architecture & Challenges**	2.1. Architecture 2.2. IoT reference Model & Architecture 2.3. Functional, Information, Deployment & Operational View. 2.4. Size & Space Considerations in IoT. 2.5. Scalability & Compatibility between Different Smart Sensors	● Understand IoT architecture ● Understand different views in IoT. ● To check scalability and compatibility of sensors	20	8
3	**IoT Applications in Industries.**	3.1. Building and Home Automation 3.2. Retail 3.3. Media 3.4. Supply Chain 3.5. Environmental Monitoring. 3.6. Infrastructure Management. 3.7. Manufacturing 3.8. Pharmaceuticals and Healthcare. 3.9. Transportation.	● To understand applications of IoT	25	10

				Total Hours	
4	**IoT Challenges**	4.1. Security & Privacy Concerns 4.2. Fragmentation of Standards 4.3. Scalability 4.4. Compatibility between Different Smart Sensors	• To understand privacy, security and governance in IoT. • To understand data aggregation.	20	10
5	**Introduction to Arduino & Raspberry Pi**	5.1. Architecture, Programming & Applications of Arduino. 5.2. Architecture, Programming & Applications of Raspberry Pi. 5.3. Raspberry Pi Setup & Configuration. 5.4. Raspberry Pi vs. Arduino	• To learn programming with Arduino and sensors • To learn programming with Raspberry Pi and sensors	20	8
			Total Hours		**42**

6. List of Practicals / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills so that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No.	Practical / Exercises	Key Competency	Hours
1	Familiarization with Raspberry Pi and perform necessary software installation.	To be able for software installation of Raspberry Pi	4
2	Prepare a case study on working with Raspberry Pi.	To be able to understand working with Raspberry Pi	4
3	Prepare a case study on working with Arduino.	To able to understand Arduino	4
4	Sketch the architecture of IoT Toolkit and prepare a report on each entity in brief.	To able to understand IoT Toolkit	4
5	Setup and operate the Arduino.	To able to Setup and operate Arduino	4
6	Prepare a report on how IoT has been helpful during the COVID pandemic.	To able to think about IoT during COVID	6
7	Prepare a case study on car featuring IoT.	To understand car featuring in IoT	6

8	Prepare a case study on featuring Smart city.	To understand smart city in IoT	6
9	Getting started with NodeMCU in the Arduino IDE.	To understand NodeMCU	6
10	Sensing temperature with temperature sensor.	To be able to use a temperature sensor	6
11	Sensing humidity with a humidity sensor.	To be able to use a humidity sensor	6
		Total Hours	**56**

7. Suggested Specification Table with Hours

| Unit No. | Chapter Name | Teaching Hours | Distribution of Topics According to Bloom's Taxonomy | | | | | |
			R %	U %	App %	C %	E %	An %
1	Introduction to Internet of Things	6	40	30	20	-	5	5
2	IoT Architecture & Challenges	8	30	30	20	10	5	5
3	IoT Applications in Industries.	10	20	30	30	10	5	5
4	IoT Challenges	10	20	20	20	10	15	15
5	Introduction to Arduino & Raspberry Pi	8	20	20	30	10	10	10

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

8. Textbooks

1) Internet of Things, Vasudevan, Nagrajan and Sundaram, Wiley India
2) IoT Based Projects, Rajesh Singh, BPB

9. Reference Books

1) IoT Fundamentals, David Hence, Cisco Press
2) Internet of Things: Architecture and Design Principles, Raj Kamal, McGraw Hill Education
3) Internet of Things (A Hands-on-Approach), Vijay Madisetti and Arshdeep Bahga, VPT
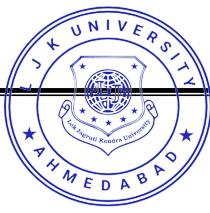
10. Open Sources (Website, Video, Movie)

1) https://www.microsoft.com/en-us/internet-of-things/
2) https://online.stanford.edu/courses/xee100-introduction-internet-things
3) https://www.coursera.org/learn/introduction-iot-boards
4) https://www.tutorialspoint.com/internet_of_things/index.htm