SEMESTER S7

INTERNET OF THINGS

(Common to CS/CM/CA)

Course Code	**PECST755**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	**ESE Marks**	60
Credits	5/3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None		

Course Objectives:

1. To provide students with an understanding of IoT architecture, protocols, and integration techniques that enable device-to-device, device-to-cloud, and cloud-to-cloud communications.
2. To enable students with the ability to create and implement IoT solutions using platforms like Raspberry Pi, cloud-based services, and analytics tools to develop real-world IoT applications.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Introduction - Why IoT? Trends in IT Space, Internet of Things Era, Device-to-Device/Machine-to-Machine Integration, Device-to-Cloud (D2C) Integration, IoT Platform as a Service (PaaS), Cloud-to-Cloud (C2C) Integration, IoT Key Application Domains, Emerging IoT Flavors; IoT Ecosystem - Architecture for IoT, Mobile Technologies, Mobile Application Development Platforms, LPWAN.	**8**
2	Infrastructure and Service Discovery Protocols - Layered Architecture for IoT, Protocol Architecture of IoT, Infrastructure Protocols, Device or Service Discovery for IoT, Protocols & products for IoT Service Discovery; Integration Technologies and Tools - Smart Enterprises and Environments, Sensor and Actuator Networks, The IoT Device Integration Concepts, Standards, and Implementations, The Device Integration Protocols and Middleware, The Protocol Landscape.	**10**
3	Platforms for IoT Applications and Analytics - The IoT Building Blocks, Usecases, M2M Application Platform, IoT Architectural Building Blocks, Data Analytics Platforms, IoT Data Virtualization Platforms and capabilities, The IoT Edge Data Analytics; Clouds for IoT Applications and Analytics -	**8**

	Reflecting the Cloud Journey, The Key Motivations for Cloud-Enabled Environments, IoT and Cloud-Inspired Smarter Environments, Hybrid, Federated, and Special-purpose cloud, The Emergence of Edge/Fog Clouds, SDN and SDS.	
4	Introduction to Raspberry Pi, Creating your first project, Creating a Sensor to Measure Ambient Light, Creating an Actuator for Controlling Illumination, Publishing Information Using MQTT & HTTP, Creating Web Pages for Your Devices.	**10**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	*Internal Ex*	*Evaluate*	*Analyse*	*Total*
5	**15**	**10**	**10**	**40**

Criteria for Evaluation(Evaluate and Analyse): 20 marks

Students must be assessed to analyze various data collection, analytics, and actuation used in various IoT applications. Evaluation of the technologies and recommendation based on parameters should be done to propose appropriate technologies.

End Semester Examination Marks (ESE):

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	• 2 questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 subdivisions. • Each question carries 9 marks. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Understand IoT trends, architecture layers, and key technologies, including Device-to-Device, Device-to-Cloud, and Cloud-to-Cloud integration.	**K2**
CO2	Identify and differentiate between various IoT infrastructure, service discovery, and integration protocols, as well as their roles in IoT ecosystems.	**K3**
CO3	Develop simple IoT projects using Raspberry Pi, integrating sensors, actuators, and protocols such as MQTT and HTTP to create interactive systems.	**K3**
CO4	Evaluate cloud and edge computing models, including hybrid and federated environments, and apply these concepts to build scalable and efficient IoT applications.	**K5**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									3
CO2	3	3	3	3								3
CO3	3	3	3	3								3
CO4	3	3	3	3								3

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	The Internet of Things	Pethuru Raj, Anupama C. Raman	CRC Press	1/e, 2017
2	Mastering Internet of Things	Peter Waher	Pact	1/e, 2018

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Internet of Things : Architecture and Design Principles	Raj Kamal	McGraw Hill	2/e, 2023
2	Internet of Things : Principles and Paradigms	Rajkumar Buyya Amir Vahid Dastjerdi	Morgan Kaufman	1/e, 2016
3	Introduction to IoT	Sudip Misra, Anandarup Mukherjee, Arijit Roy	Cambridge University Press	1/e, 2021

Video Links (NPTEL, SWAYAM…)	
No.	**Link ID**
1	https://archive.nptel.ac.in/courses/106/105/106105166/