K. S. INSTITUTE OF TECHNOLOGY

An Autonomous Institution under VTU, Approved by AICTE

Department of Computer Science & Engineering

M.Tech FIRST SEMESTER SYLLABUS

Course: Internet of Things		Semester	I
Course Code	**25MCS105D**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course Objectives (Course Skill Set)

1. Explore the knowledge on combination of functionalities and services of networking.
2. Explain the definition and significance of the Internet of Things.
3. Discuss the architecture, operation and business benefits of an IoT solution.

Module-1

What is The Internet of Things? Overview and Motivations, Examples of Applications, IPV6 Role, Areas of Development and Standardization, Scope of the Present Investigation. Internet of Things Definitions and frameworks-IoT Definitions, IoT Frameworks, Basic Nodal Capabilities. Internet of Things Application Examples-Overview, Smart Metering/Advanced Metering Infrastructure-Health/Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Tracking, Over The-Air-Passive Surveillance/Ring of Steel, Control Application Examples, Myriad Other Applications.

Module-2

Fundamental IoT Mechanism and Key Technologies-Identification of IoT Object and Services, Structural Aspects of the IoT, Key IoT Technologies. Evolving IoT Standards- Overview and Approaches, IETF IPV6 Routing Protocol for RPL Roll, Constrained Application Protocol, Representational State Transfer, ETSI M2M, Third Generation Partnership Project Service Requirements for Machine-Type Communications, CENELEC, IETF IPv6 Over Low power WPAN, Zigbee IP(ZIP), IPSO.

Module-3

Layer ½ Connectivity: Wireless Technologies for the IoT-WPAN Technologies for IoT/M2M, Cellular and Mobile Network Technologies for IoT/M2M, Layer 3 Connectivity: IPv6 Technologies for the IoT: Overview and Motivations. Address Capabilities, IPv6 Protocol Overview, IPv6 Tunneling, IPsec in IPv6, Header Compression Schemes, Quality of Service in IPv6, Migration Strategies to IPv6.

Module-4

Case Studies illustrating IoT Design-Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications.

Module-5

Data Analytics for IoT – Introduction, Apache Hadoop, Using HadoopMapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis, Structural Health Monitoring Case Study.

PRACTICAL COMPONENT OF IPCC:

Sl. No.	Experiments
1.	Develop a program to interface a relay with Arduino board.
2.	Develop a program to deploy an intrusion detection system using Ultrasonic and sound sensors.
3.	Develop a program to deploy smart street light system using LDR sensor.
4.	Develop a program to classify dry and wet waste with the Moisture sensor (DHT22).
5.	Develop a program to detect the gas leakage in the surrounding environment.
6.	Develop a program to demonstrate weather station readings using Arduino.
7.	Develop a program to setup a UART protocol and pass a string through the protocol.
8.	Develop a water level depth detection system using Ultrasonic sensor.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Three Unit Tests each of **25 Marks**
2. Two assignments each of **25 Marks** or **one Skill Development Activity of 25 marks** to attain the COs and Pos.
3. The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks.**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper consists of Part A and Part B. Part A consists of 10 questions from 5 modules, each carrying 2 marks.
3. Part B consists of 10 questions. Each full question is for 16 marks. There will be two full questions (with a maximum of three sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books:

1. Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications Daniel Minoli Wiley 2013.

2. Internet of Things: A Hands-on Approach ArshdeepBahga, Vijay Madisetti Universities Press 2015.

Reference Books:

3. The Internet of Things Michael Miller Pearson 2015 First Edition.
4. Designing Connected Products Claire Rowland,Elizabeth Goodman et.al O'Reilly First Edition, 2015.

Web links and Video Lectures (e-Resources):

- https://www.tutorialspoint.com/internet_of_things/index.htm#:~:text=IoT%20(Internet%20of%20Things)%20is,to%20any%20industry%20or%20system.
- https://www.javatpoint.com/iot-internet-of-things
- https://www.digimat.in/nptel/courses/video/106105166/L01.html**(Video Lectures)**

Skill Development Activities Suggested

The students with the help of the course teacher can take up relevant technical – activities which will enhance their skill

Course outcome (Course Skill Set):

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Choose appropriate schemes for the applications of IOT in real time scenarios	L2
CO2	Manage the Internet resources through different protocols used in each layer	L1
CO3	Compare various protocols and algorithms in different layers that facilitate effective communication mechanisms	L3
CO4	Identify how IoT differs from traditional data collection systems	L2

Program Outcome of this course:

	PO1	PO2	PO3	PO4	PO5	PO6
CO1			X	X		
CO2						
CO3			X			
CO4	X					