SILVER OAK UNIVERSITY
College of Computer Application (04)
Bachelor of Computer Applications
Subject Name: Internet of Things
Subject Code: 2040233303
Semester: 5th

Prerequisite: Basic knowledge of computer networking & C programming.

Objective:
1.) Student can understand basics of IoT.
2.) Understanding various IoT communication protocols.
3.) Recognizing various IoT platforms & associated hardware.
4.) Understanding IoT security and its challenge.
5.) To develop for various IoT based real world applications.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme				Total Marks
				Internal		External		
L	T	P	C	TH	PR	TH	PR	
4	0	2	5	40	20	60	30	150

Content:

Unit	Topics	Teaching Hours	Weightage %
1	**Introduction to Internet of Things** Evolution of IoT, IoT Definition, IoT characteristics, key components of IoT system, functioning of IoT system, M2M and IoT, End to End IoT Architecture, IoT levels and Deployment Templates, advantage & disadvantages, Interdependencies of IoT and Cloud computing.	12	**25**
2	**IoT Devices:** Sensors And Actuators For IoT Applications, Programming Of NodeMCU, Arduino & Raspberry PI, Embedded IoT Systems, With Edge Devices, Reading Sensor Data And Transmit To Cloud, Controlling Devices Through Cloud Using Mobile Application And Web Application.	12	**25**

3	**IoT Communication Protocols:** Link Layer Protocols, Network/Internet Layer Protocols, Messaging Protocols-MQTT, CoAP & XMPP, Transport Layer Protocols, Application Layer Protocols, Basics Of Sensor Network Topologies.	12	**15**
4	**IoT Platforms and Security:** Overview Of Various IoT Platforms, Data Analytics, Cloud Storage, IoT Security, Risks, Security Components, Challenges In IoT Security.	8	**15**
5	**Applications of IoT:** Various Real-World Iot Application Like Home Automation, Agriculture System, Medical & Health Care, Industrial IoT, Smart Cities, River Water Pollution Monitoring, Street Light Control And Monitoring, Voice Apps On IoT Device etc…	12	**20**

Course Outcome:

Sr. No.	CO-Statement	Unit
CO-1	To understand IoT architectures and functioning of IoT systems. To know various IoT levels and relationship between IoT & Cloud computing.	1
CO-2	To understand various sensors & actuators in IoT applications. To develop embedded IoT system using Arduino, Raspberry Pi and integrity with mobile & web application.	2
CO-3	Student will be able to explain Messaging and Transport protocols for IoT communication used in the IoT Applications.	3
CO-4	Student will be able to understand various IoT platforms, use as per application. To know IoT security issues & challenges in IoT security.	4
CO-5	Student will be able to illustrate the working of real world IoT based applications.	5

Teaching & Learning Methodology:

PPT Based Lectures
Demo Based Lectures
Activity Based Sessions
Flipped Classroom

List of Experiments: **Total Hours: 28**

Sr. No.	Practicals
1	Getting started with Arduino Board & NodeMCU-ESP32.
2	Software simulation for Arduino Board & NodeMCU-ESP32.
3	Led blinking using NodeMCU-ESP32.
4	Digital input-output interface with NodeMCU-ESP32.
5	Digital sensor interface with NodeMCU-ESP32.
6	Analog sensor interface with NodeMCU-ESP 32.

7	Web based device control with NodeMCU-ESP32.
8	Getting started with Raspberry Pi.
9	IoT based Agriculture system.
10	IoT based Home Automation system.

Major Equipment:

1. Computer system (PC) or Laptop
2. Arduino board, NodeMCU ESP32 module, Raspberry Pi board, sensors & related accessories
3. Wi-fi Router

Books Recommended:

1. I.A. Dhotre, "Internet of Things", Technical Publications, 1st Edition 2021.
2. Raj Kamal, "Internet of Things: Architecture and Design Principles, Mc Graw Hill Education.
3. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", , Paperback, 2015
4. Yashwant Kanetkar, "21 Internet of Things Experiments", Kindle edition.

List of Open-Source Software/learning website:

1. https://github.com/connectIOT/iottoolkit
2. https://www.arduino.cc/
3. https://wokwi.com/
4. https://www.raspberrypi.com/news/learn-the-internet-of-things-with-iot-for-beginners-and-raspberry-pi/
5. https://www.w3schools.com/training/aws/introduction-to-aws-iot.php
6. https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/
7. https://www.tutorialspoint.com/internet_of_things/index.htm
8. https://www.mooc-list.com/course/m2m-iot-interface-design-protocols-embedded-systems-coursera
9. https://www.mooc-list.com/course/introduction-and-programming-iot-boards-coursera

CO-PO-PSO Matrix:

Co. No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	2	1	2	-	1	1	-	-	-	-	-	-	1	-
CO-2	2	1	3	2	3	-	-	1	-	1	2	1	2	2
CO-3	2	-	1	-	2	1	-	-	-	-	1	1	1	1
CO-4	1	2	1	1	2	2	1	-	-	-	1	1	1	1
CO-5	1	3	3	2	2	2	-	2	-	2	2	1	2	2