



CLUSTER UNIVERSITY OF SRINAGAR

Syllabus for PG Information Technology

Batch 2023

Course Code:

Credits: 4 (L- 3, T- 0, P-1)

Contact Hrs: 75 (Theory: 45, Tutorial: 30)

3rd SEMESTER: M.Sc. (IT) Batch 2023

Title: Internet of Things (IOT) CORE 3

[DSE 1] Max. Marks: 100

Theory External: 60; Min Marks: 24

Theory Internal (Continuous Assessment): 15 Marks,
Min Marks: 06

Practical Experimental Basis= 15, Min. Marks: 06

Practical Experimental (Continuous assessment) =10,
Min. Marks: 04

OBJECTIVES:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the implementation of web-based services on IoT devices

COURSE OUTCOMES:

1. Understand IoT value chain structure (device, data cloud), application areas and technologies involved.
2. Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules
3. Market forecast for IoT devices with a focus on sensors.
4. Explore and learn about Internet of Things with the help of preparing projects designed for Arduino/Raspberry Pi

Syllabus

Unit 1:

IoT Overview :Definition, characteristics, and evolution of IoT, IoT Architecture: Layered architecture, reference models (ITU-T, etc.), components and their roles (devices, gateways, cloud), IoT Protocols: Communication protocols (TCP/IP, UDP, HTTP), IoT-specific protocols (MQTT, CoAP, AMQP), sensor data formats, IoT Applications: Exploration of IoT in various domains (smart homes, agriculture, healthcare, industry, smart cities) including use cases and challenges.

Unit 2:

IoT Devices: Microcontrollers (Arduino, Raspberry Pi), sensors (types, characteristics, interfaces), actuators, power sources, Wireless Communication: RF fundamentals, modulation techniques,

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channel access methods, IoT Networks: Wireless sensor networks (WSN), cellular networks (2G, 3G, 4G, 5G), low-power wide-area networks (LPWAN) (LoRa, Sigfox, NB-IoT), Bluetooth, Zigbee, Network Protocols: Addressing, routing, security mechanisms in IoT networks.

Unit 3:

Data Generation: Data models, data formats (JSON, XML), data collection methods, Data Processing: Data preprocessing, cleaning, integration, and transformation, Data Storage: Cloud storage (AWS, Azure, GCP), edge computing, data lakes, data warehouses, Data Analytics: IoT data analytics techniques (descriptive, predictive, and prescriptive), big data technologies (Hadoop, Spark)

Unit 4:

IoT Security Challenges: Threats and vulnerabilities in IoT systems, Security Mechanisms: Authentication, Authorization, Encryption, Access Control, Privacy Issues: Data privacy, user privacy, ethical implications.

Hardware and Software Platforms: Hardware: Raspberry Pi, ESP8266 Wifi Module, Arduino. Implementation of Basic Sensors (Temperature, Humidity, Proximity, Gas, air Quality, Ultrasonic Sensors).

IoT Cloud Platform Integration (ThingSpeak),

Industrial Tour on Internet of Things (IoT) -

Course Title: Industrial Tour on IoT

Course Description:

This industrial tour aims to provide students with practical exposure to the Internet of Things (IoT) industry. Participants will visit IoT companies, labs, and research facilities to gain insights into the current trends, technologies, and applications in the IoT ecosystem. The tour will also include interactions with industry experts, hands-on workshops, and case studies to bridge the gap between theoretical knowledge and real-world applications.

TEXT BOOKS:

1. Internet of Things: A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
3. Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 7989352133895

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