LNCT University
Diploma EX, VI Semester Syllabus

<u>INTERNET OF THINGS (DEX-603-C)</u>

COURSE OUTCOMES:

After Completing the course student should be able to:

CO-1	Understand the fundamental concepts, evolution, architecture, and ecosystem of the Internet of Things (IOT).
CO-2	Demonstrate the ability to work with microcontrollers (Arduino, ESP8266, ESP32), interface sensors and actuators
CO-3	Analyse various communication protocols and distinguish between wired, wireless, and internet-based IOT communication techniques.
CO-4	Utilize cloud platforms and tools for IOT data management, visualization, and mobile integration, while ensuring basic data security practices.
CO-5	Design and develop simple IOT-based applications for domains such as smart homes, agriculture, and industry, including planning, implementation, testing, and deployment.

UNIT 1: INTRODUCTION TO IOT AND ARCHITECTURE
What is IoT? Definition and Scope, Evolution and Applications of IOT, IOT Ecosystem and Layers. IoT Reference Architecture (Perception, Network, Application Layers). Basic Components: Sensors, Actuators, Microcontrollers, Gateways.

UNIT 2: HARDWARE PLATFORMS AND EMBEDDED SYSTEMS
Introduction to Microcontrollers: Arduino, ESP8266, ESP32. GPIO, ADC, PWM, Timers. Interfacing Sensors and Actuators. Embedded C / Arduino Programming Basics, Data Acquisition from Sensors. Serial Communication (UART).

UNIT 3: IOT COMMUNICATION AND NETWORKING
Wired vs Wireless Communication. Protocols: I2C, SPI, UART. Wireless Protocols: Wi-Fi, Bluetooth, Zigbee and LoRa. Internet Protocols: HTTP, MQTT, CoAP. Node-to-Node and Node-to-Cloud Communication. Cloud Connectivity Basics.

UNIT 4: CLOUD AND DATA MANAGEMENT
Introduction to IoT Cloud Platforms: Thing Speak, Firebase, AWS IOT. Data Logging and Visualization. Trigger-Based Actions (IFTTT, Blynk, etc.). Introduction to Mobile App Integration. Basic Data Security in IoT: HTTPS, API Keys, Encryption.

UNIT 5: IOT APPLICATIONS AND PROJECT DEVELOPMENT
Smart Home, Smart Agriculture and Smart Industry. Real-Time Monitoring and Control. Introduction to Edge and Fog Computing. Mini Project Design: Planning, Hardware, Software. Testing and Deployment.

List of Suggestive Experiments: -

1. Interface digital I/O switch -LED Turn ON &OFF
2. Automatic Identification Based on IR sensor, Ultrasonic sensor
3. Display entered Keypad message in serial monitor
4. Acquired Analog Sensor signal data (LDR/LM35) and display on LCD
5. Interface Digital I/O-LED-Turn ON LED
6. Send or receive SMS using GSM
7. Interface Arduino with display service (RGB LED) to convey signal information
8. Pi connected with Actuator
9. Pi Connected with LDR sensor
10. Pi connected with PIR sensor and also Cloud to Write data 11 Pi connected with LDR sensor and cloud to Read data

Reference Books: -

1. Electric Vehicle Technology Explained James Larminie & John Lowry.
2. Modern Electric, Hybrid Electric, and Fuel Cell Vehicles Mehrdad Ehsani.