PROGRAM STRUCTURE

Module 1 **Introduction to IoT and Embedded Systems**	What is IoT, and why is it important? What are embedded systems? Fundamentals of Physical Interfacing. Connecting Input Devices, Advanced Physical Interfacing Circuit Prototyping techniques, Communication protocols for interfacing different blocks, UART, I2C, SPI, CAN, RS232, RS422, RS485, MODBUS
Module 2 **Programming the Things**	Python basics, Programming SBC (Orange PI, Raspberry Pi) Data acquisition and sensor integration. Graphical approach: Node Red, NodeMCU
Module 3 **Things Communication**	IoT communication protocols (MQTT, CoAP, HTTP). Wireless communication standards (Wi-Fi, Bluetooth, LoRaWAN, Zigbee). IoT device management and security. Connecting embedded systems to the Internet
Module 4 **Designing IoT Architecture**	Cloud platforms for IoT (AWS IoT, Azure IoT). Introduction to Event-Driven IoT Understanding event-driven architecture. Key concepts: events, publishers, subscribers. Event-driven vs. traditional IoT systems. Use cases and benefits of event driven IoT. Designing server Scalability of servers
Module 5 **Managing the Things and Data Analytics**	IoT device integration. Onboarding, Access controls Real-time analytics and dashboards.

Lab Hands-on

Physical Design	Basic Arduino UNo Thinker CAD simulator General I/O: UART, I2C, SPI, PWM, ADC, DAC, Digital I/O Basic Electronics Actuations: Motor, Stepper Motor, DC Motor, BLDC motor
Network Design	ESP32, Raspberry PI HTTS, RESTAPI, MQTT, AMQP, COAP, DDS, XMPP Wi-Fi, Bluetooth, LoRA, Zigbee, IPV4, IPV6, SDN Virtualization Technology: VM Hypervisor, Docker
Logical Design	Python Basic Programming Fundamentals Data Visualization, Data Analytics IoT Dashboard Design Technology Thinks Speak Cloud, AWS Cloud, Azure Cloud, Google Cloud Kubernetes, Flask, and Django Web development frameworks
Use cases and Demonstrations	Energy monitoring, Vehicle tracking systems, Smart cities projects, Smart Aquaculture.