KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)
S.P.G.Chidambara Nadar - C.Nagammal Campus
S.P.G.C. Nagar, K.Vellakulam – 625 701 (Near VIRUDHUNAGAR).

Department of Electronics and Communication Engineering

Course Code	Course Name	L	T	P	C
Value Added Course	**Integrated Full Stack Web Development with IoT Networks**	**20**	**0**	**25**	**2**

a. Preamble

The convergence of Full Stack Development and the Internet of Things (IoT) is redefining how modern applications are built and deployed. This course is designed to empower students with the essential skills required to design, develop, and deploy real-time, IoT-enabled full-stack applications. With hands-on exposure to frontend and backend technologies, cloud platforms, and IoT device integration, learners will be equipped to build complete, scalable systems that bridge the digital and physical worlds. The course emphasizes practical application through end-to-end projects and current industry tools and technologies.

b. Course Outcome

Upon successful completion of the course, the students will be able to

Cos	Course Outcome	Knowledge Level
CO1	Understand the fundamentals of full stack web development and IoT system architectures	K2
CO2	Design responsive, real-time dashboards using modern frontend technologies.	K3
CO3	Develop secure backend services and RESTful APIs for IoT data handling	K3
CO4	Integrate IoT devices and sensors with cloud platforms using standard communication protocols	K3
CO5	Build and deploy an end-to-end full stack IoT application using modern DevOps practice	K3

Introduction to Full Stack Development and IoT **5 Hours**

Overview of Full Stack Development - Frontend, Backend, Database, API basics, Introduction to IoT - IoT definition, applications, and real-world use cases, IoT Architecture

Sensing, Network, Data Processing, and Application layers, IoT Protocols - MQTT, HTTP/HTTPS, CoAP, Use Cases Smart Home, Healthcare, Industrial IoT (IIoT)

Frontend Development for IoT Dashboards **5 Hours**

HTML5 structure and semantic elements, CSS3 styling, layouts using Flexbox and Grid, responsive and mobile-first design principles. JavaScript (ES6+) fundamentals. Overview of frontend frameworks – React.js, Angular, Vue.js. Real-time data visualization using Chart.js and D3.js. WebSockets for live data updates and interactive IoT dashboards.

Backend Development and Data Management **5 Hours**

Server-side programming concepts using Node.js with Express or Python with Flask/Django. RESTful API design principles. Handling IoT data ingestion. Authentication and authorization using JWT and OAuth 2.0. Database management – SQL (MySQL/PostgreSQL) and NoSQL (MongoDB/Firebase). CRUD operations, logging, and monitoring basics.

IoT Communication and Cloud Integration **5 Hours**

IoT data transmission models. Wired and wireless communication technologies. Overview of Wi-Fi, Bluetooth, Zigbee, and LoRaWAN. MQTT architecture and publish–subscribe model. HTTP/HTTPS and WebSockets for IoT communication. Cloud-based IoT platforms – AWS IoT Core, Azure IoT Hub, and Google Cloud IoT. Device management, cloud messaging, and data analytics.

IoT Device Integration and End-to-End Projects **25 Hours**

Microcontroller platforms – Arduino, ESP8266/ESP32, Raspberry Pi. Sensor interfacing – temperature, humidity, motion, and light sensors. Device firmware programming and data preprocessing. Backend integration using MQTT/HTTP clients. Edge computing basics. Capstone project involving full stack development, IoT devices, database, cloud deployment, real-time dashboards, and system monitoring (e.g., Smart Home, Smart Agriculture, Industrial Monitoring).

SDG Mapping

CO's	SDG Mapping	
CO1	SDG – 04 Quality Education	SDG – 09 Industrial Innovation and Infrastructure
CO2	SDG – 04 Quality Education	SDG – 09 Industrial Innovation and Infrastructure
CO3	SDG – 04 Quality Education	SDG - 09 Industrial Innovation and Infrastructure
CO4	SDG – 04 Quality Education	SDG – 09 Industrial Innovation and Infrastructure
CO5	SDG – 04 Quality Education	SDG-09 Industrial Innovation and Infrastructure