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	**Full Stack Integrated Web Development using IoT Network**	**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 principles of full stack development and the architecture of IoT systems.	K2
CO2	Design responsive, real-time dashboards using modern frontend technologies.	K3
CO3	Develop secure backend APIs and data services to interact with IoT devices.	K3
CO4	Integrate microcontrollers and sensors with cloud and server platforms using standard communication protocols.	K3
CO5	Build and deploy a complete end-to-end IoT-enabled full stack application using modern DevOps practices.	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, CSS3, and JavaScript (ES6+)**,** Frontend Frameworks React.js, Angular, Vue.js**,** Building IoT Dashboards, Real-time data visualization (Chart.js, D3.js)**,** WebSockets for live updates**,** Responsive Design**,** Media Queries, Flexbox/Grid, Mobile-first design.

Backend Development and Data Management **5 Hours**

Server-Side Programming - Node.js with Express, Python with Flask/Django, RESTful APIs and WebSockets, Authentication and Authorization - JWT, OAuth 2.0, Database Management - SQL (MySQL, PostgreSQL), NoSQL (MongoDB, Firebase)

IoT Communication and Cloud Integration **5 Hours**

IoT Data Transmission, Wireless communication, MQTT Protocol & Brokers, HTTP/HTTPS for IoT APIs, WebSockets for Real-Time Communication, Cloud IoT Platforms

IoT Device Integration and End-to-End Projects **2****5 Hours**

Microcontroller Platforms - Arduino, ESP8266/ESP32, Sensor Data Collection and Transmission - Temperature, humidity, motion, and light sensors, Backend Integration MQTT/HTTP clients on devices, Edge Computing Basics - Processing at the device level, Capstone Project - Full-stack project integrating frontend, backend, database, cloud, and devices (e.g., Smart Home, Industrial Monitoring, Health Tracker)

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	SDG – 13 Climate Action SDG -15 Life and Land
CO3	SDG – 04 Quality Education	SDG - 09 Industrial Innovation and Infrastructure	SDG – 03 Good Health and Well Being
CO4	SDG – 04 Quality Education	SDG – 09 Industrial Innovation and Infrastructure	SDG – 06 Clean Water and Sanitation
CO5	SDG – 04 Quality Education	SDG-09 Industrial Innovation and Infrastructure	SDG – 11 Sustainable Cities and Communities