



**DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE
(AUTONOMOUS)**

(Approved by AICTE & Affiliated to Anna University, Chennai)
Re-Accredited by NAAC with 'A' Grade
Accredited by NBA for AERO, BME, CSE, ECE, EEE, IT & MECH.
PE RAMBALUR-621212, TAMILNADU, INDIA.
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COURSE PLAN

Name of the Faculty				
Designation/Department	ASSISTANT PROFESSOR/ECE			
Course Code/Name	U23ECV63 /INDUSTRIAL IOT AND INDUSTRY 4.0			
Year/Section/Department	III/A/ECE			
Credits Details	L: 3	T: 0	P: 0	C: 3
Total Contact Hours Required	45			

Syllabus:

UNIT I/UNDERSTANDING IOT CONCEPT AND DEVELOPMENT PLATFORM	No. Of Periods: 9
IOT Definition, Importance of IoT, Applications of IOT, IoT architecture, Understanding working of Sensors, Actuators, Sensor calibration, Study of Different sensors and their characteristics	
UNIT II/ ANALYZING & DECODING OF COMMUNICATION PROTOCOL USED IN IOT DEVELOPMENT PLATFORM	No. Of Periods: 9
UART Communication Protocol, I2C Protocol device interfacing and decoding of signal, SPI Protocol device interfacing and decoding of signal, WIFI and Router interfacing, Ethernet Configuration, Bluetooth study and analysis of data flow, ZigBee Interfacing and study of signal flow	
UNIT III/ IOT PHYSICAL DEVICES AND ENDPOINTS AND CONTROL HARDWARE AND SENSORS	No. Of Periods: 9
IoT Physical Devices and Endpoints- Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins. Controlling Hardware-Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors; Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor.	
UNIT IV/ CLOUD SERVICES USED IN IOT DEVELOPMENT PLATFORM	No. Of Periods:9
Configuration of the cloud platform, Sending data from the IOT nodes to the gateways using different communication options; Transferring data from gateway to the cloud; Exploring the web services like mail, Messaging (SMS) and Twitter etc.;Tracking of cloud data as per the	

requirement; Google Cloud service architect; AWS cloud Services architect; Microsoft Azure cloud services Architect; OEN source Cloud Services; Initial State Iot Dashboard & Cloud Services

UNIT V/ CHALLENGES IN IOT SYSTEM DESIGN – HARDWARE & SOFTWARE

**No. Of
Periods:9**

Antenna design and placement, Chip-package system development, Power electronics, electromagnetic interference/compatibility (EMI/EMC), Electronics reliability; Battery simulation

Objective:

The main learning objective of this course is to prepare the students for:

- ❖ IoT Nodes & Sensors
- ❖ IoT Gateways
- ❖ IoT Cloud Systems
- ❖ IoT Cloud Dashboards
- ❖ Challenges in Iot system Design – Hardware & Software

Text Book:

T1: Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.

T2: Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.

Website:

W1: https://www.geeksforgeeks.org/iot-internet-of-things/?utm_source=chatgpt.com

W2: https://www.tinkercad.com/circuits?utm_source=chatgpt.com

W3: https://www.netacad.com/courses/packet-tracer?utm_source=chatgpt.com

W4: https://appinventor.mit.edu/?utm_source=chatgpt.com

Online Mode of Study:

W1: https://nptel.ac.in/courses/106/105/106105166/?utm_source=chatgpt.com

W2: https://www.vlab.co.in/?utm_source=chatgpt.com

W3: https://docs.arduino.cc/?utm_source=chatgpt.com

W4: https://www.raspberrypi.com/documentation/?utm_source=chatgpt.com

W5: https://colab.research.google.com/?utm_source=chatgpt.com

Course Plan:

Topic Number	Topic	Reference Detail	Page Number	Mode of teaching	Number of Periods Required	Cumulative Period
UNIT I - UNDERSTANDING IOT CONCEPT AND DEVELOPMENT PLATFORM						
1	IOT Definition	T1	22	BB	1	1
2	Importance of IoT	T1	23-24	BB	1	2
3	Applications of IOT	T1	25-28	BB	1	3
4	IoT architecture	T1	29-35	BB	1	4
5	Working of Sensors	T1	76-80	BB	1	5
6	Working of Actuators	T1	81-85	BB	1	6
7	Sensor calibration	T1	86-87	BB	1	7
8	Types of Sensors	T1	88-95	BB	1	8
9	Characteristics of Sensors	T1	96-99	BB	1	9
Outcome of Unit I:						
CO1: Understand the building blocks of IoT technology and explore the vast spectrum of IoT applications						
UNIT II - ANALYZING & DECODING OF COMMUNICATION PROTOCOL USED IN IOT DEVELOPMENT PLATFORM						
10	UART Communication Protocol	T1	174-178	BB	1	10
11	I2C Protocol Overview	T1	179-183	BB	1	11
12	I2C Protocol device interfacing and decoding of signal	T1	184-185	BB	1	12
13	SPI Protocol Overview	T1	186-188	BB	1	13
14	SPI Protocol device interfacing and decoding of signal	T1	189-191	BB	1	14
15	WIFI and Router interfacing	T1	220-225	BB	1	15
16	Ethernet	T1	226-229	BB	1	16

	Configuration					
17	Bluetooth study and analysis of data flow	T1	230-233	BB	1	17
18	ZigBee Interfacing and study of signal flow	T1	234-238	BB	1	18
Outcome of Unit II:						
CO2: Use processors & peripherals to design & build IoT hardware						
UNIT III -IOT PHYSICAL DEVICES AND ENDPOINTS AND CONTROL HARDWARE AND SENSORS						
19	IoT Physical Devices and Endpoints	T1	65-70	BB	1	19
20	Introduction to Arduino and Raspberry Pi	T2	67-72	BB	1	20
21	Installation and Interfaces (serial, SPI, I2C), Programming	T2	69-80	BB	1	21
22	Python program with Raspberry PI with focus on interfacing external gadgets	T2	95-105	BB	1	22
23	Controlling Hardware - Connecting LED, Buzzer, Switching High Power devices with transistors	T2	110-115	BB	1	23
24	Controlling AC Power devices with Relays	T2	116-118	BB	1	24
25	Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors	T2	119-125	BB	1	25
26	Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11	T1	76-95	BB	1	26
27	Motion Detection Sensors, Wireless Bluetooth Sensors, TLevel Sensors, USB	T1	96-105	BB	1	27

	Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor					
Outcome of Unit III:						
CO3: Assess, select and customize technologies for IoT applications						
UNIT IV - CLOUD SERVICES USED IN IOT DEVELOPMENT PLATFORM						
28	Configuration of the cloud platform	T1	250-254	BB	1	28
29	Sending data from the IOT nodes to the gateways using different communication options	T1	255-258	BB	1	29
30	Transferring data from gateway to the cloud	T1	259-263	BB	1	30
31	Exploring the web services like mail, Messaging (SMS) and Twitter etc	T1	264-268	BB	1	31
32	Tracking of cloud data as per the requirement	T1	269-271	BB	1	32
33	Google Cloud service architect	T1	272-275	BB	1	33
34	AWS cloud Services architect	T1	276-280	BB	1	34
35	Microsoft Azure cloud services Architect	T1	281-285	BB	1	35
36	OEN source Cloud Services; Initial State Iot Dashboard & Cloud Services	T1	286-290	BB	1	36
Outcome of Unit IV:						
CO4: Connect numerous IOT applications with the physical world of humans and real life problem solving.						
UNIT V - CHALLENGES IN IOT SYSTEM DESIGN – HARDWARE & SOFTWARE						
37	Fundamentals of Antenna Design	T1	310-315	BB	1	37
38	Antenna Placement	T1	316-318	BB	1	38
39	Chip-package system development	T1	319-322	BB	1	39

40	Power electronics	T1	323-326	BB	1	40
41	Power Supply Design and Management	T1	327-331	BB	1	41
42	Electromagnetic Interference (EMI)	T1	332-334	BB	1	42
43	Electromagnetic Compatibility (EMC)	T1	335-338	BB	1	43
44	Electronics Reliability	T1	339-341	BB	1	44
45	Battery Simulation	T1	342-345	BB	1	45

Outcome of Unit V:

C05: Design and implement IOT applications that manage big data

C06: Develop end-to-end IoT solutions by integrating sensors, communication protocols, and cloud services.

Course Outcome:

At the end of course: Students should be able to do:

C01: Articulate the main concepts, key technologies, strength and limitations of IoT.

C02: Identify the architecture, infrastructure models of IoT.

C03: Analyze the networking and how the sensors are communicated in IoT .

C04: Analyze and design different models for IoT implementation.

C05: Identify and design the new models for market strategic interaction.

C06: Develop end-to-end IoT solutions by integrating sensors, communication protocols, and cloud services.

Course Outcome Vs Program Outcome Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	3	2	-	-	3	2	3	-	3	3	3
C02	3	2	2	2	2	-	-	3	2	2	-	3	3	3
C03	3	2	2	3	3	-	-	3	2	2	-	3	3	3
C04	3	2	2	3	2	-	-	3	2	2	-	3	3	3
C05	3	2	2	1	1	-	-	3	2	2	-	3	3	3
C06	3	2	1	1	2	-	-	2	2	2	-	2	2	2
AVG	3	2	1.8	2.2	2.0	-	-	2	2	2.2	-	2.8	2.8	2.8

Content beyond Syllabus:

- ❖ Smart City IoT Architecture
- ❖ Edge and Fog Computing Integration

Internal Evaluation Components:

Webportal	Assignment	Components	Topic Number with Topic / Unit Details	Relevance to CO
Webportal 1	--	Assessment - I (60)	Unit I and II	CO 1 & CO2
	1	Assignment - Handwritten (20)	<ul style="list-style-type: none"> IoT Architecture and Its Layers Understanding Actuators and Their Role in IoT 	CO1
	2	Assignment - Poster Presentation / PPT (20)	<ul style="list-style-type: none"> Wi-Fi and Router Interfacing Ethernet Configuration 	CO2
Webportal 2	--	Assessment - II (60)	Unit III and IV	CO3 & CO4
	3	Seminar (20)	<ul style="list-style-type: none"> Communication Interfaces: Serial, SPI, and I2C Protocols Distance Measurement Using Ultrasonic Sensors 	CO3
	4	Case Study Report (20)	<ul style="list-style-type: none"> Google Cloud Platform Tools Setting Up AWS IoT Core 	CO4
Webportal 3	--	Model Exam (75)	Unit I to V	CO1 to CO6
	5	MCQ (15)	Unit I to V	CO1 to CO6
	-	Course Attendance (10)	--	--

Submission Details:

Phase 1 (Before AT 1)		Phase 2 (Before AT 2)		Phase 3 (Model)
Assignment 1	Assignment 2	Assignment 3	Assignment 4	Assignment 5

Google Class Code Details:

Class Name:

PLAN OF ASSESSMENT TEST -DISTRIBUTION OF MARKS:

TEST	CO- MARK WISE DISTRIBUTION						BLOOM'S LEVEL MARK WISE DISTRIBUTION					
AT-1	C01	C02	C03	C04	C05	C06	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
AT-2	C01	C02	C03	C04	C05	C06	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
MODEL	C01	C02	C03	C04	C05	C06	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6

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Verified By

Approved By