COURSE PLAN (2024-2025 EVEN SEM)

Name of the Faculty				
Designation/Department	AP/IT			
Course Code/Name	**U20IT603/INTERNET OF THINGS**			
Year/Section/Department	III/ IT			
Credits Details	L: 3	T: 0	P: 0	C: 3
Total Contact Hours Required	45			

Syllabus:

UNIT I FUNDAMENTALS OF IoT	**No. of Periods 9**
Introduction - Definition and Characteristics of IoT - Physical design - Logical design - IoT communication models, IoT Communication APIs - Enabling technologies - Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates - Domain specific IoTs - IoT Architectural view	
UNIT II ELEMENTS OF IOT	**No. of Periods 9**
IoT and M2M- difference between IoT and M2M - Software Defined Networks - Network Function Virtualization - IoT systems management – Needs - NETCONF, YANG - IoT design methodology Sensors and actuators - Communication modules – LoRa - RFID - Wi-Fi - Power sources	
UNIT III IOT PROTOCOLS	**No. of Periods 9**
Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security	
UNIT IV BUILDING IoT WITH CLOUD AND DATA ANALYTICS	**No. of Periods 9**
IoT platforms – Arduino – Raspberry Pi - Cloud Computing in IoT - Cloud Connectivity - Big Data Analytics - Data Visualization.	
UNIT V CHALLENGES IN IOT AND CASE STUDIES	**No. of Periods :9**
Security Concerns and Challenges - Real time applications of IoT – Home automation – Automatic lighting – Home intrusion detection – Cities – Smart parking – Environment – Weather monitoring system – Agriculture – Smart irrigation.	

TOTAL: 45 PERIODS

Objective:

1. Identify the various IoT elements appropriate to the applications
2. Design a portable IoT using Arduino/Raspberry Pi incorporating cloud and analytics.
3. Implement IoT applications for real-time environment.
4. To learn about the basics of IOT protocols.

Text Book:

T1: Arshdeep Bahga, Vijay Madisetti, "Internet of Things-A hands-on approach", Universities Press, 2015

T2: Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key applications and Protocols", Wiley Publications 2nd edition, 2013.

Reference Book:

R1: Raj Kamal, "Internet of Things – Architecture and Design Principles", Mc Graw Hill Education Pvt. Ltd., 2017.

R2: "Internet of Things and Data Analytics", HwaiyuGeng, P.E, Wiley Publications, 2017.

R3: Manoel Carlos Ramon, Intel Galileo and Intel Galileo Gen 2: API Features and Arduino Projects for Linux Programmers, Apress, 2014.

R4: Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014.

R5: Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley Publications, 2012.

Website:

W1: https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/

W2: https://www.javatpoint.com/iot-internet-of-things

Online Mode of Study (if Any):

- https://www.digimat.in/nptel/courses/video/106105166/L01.html
- https://archive.nptel.ac.in/courses/106/105/106105166/

Course Plan:

Topic Number	Topic	Reference Detail	Page Number	Mode of teaching	Number of Periods Required	Cumulative Period
UNIT I FUNDAMENTALS OF IoT						
1	Introduction	T1	1-4	BB	1	1
2	Definition and Characteristics of IoT	T1	4-6	BB	1	2
3	Physical design -Logical design	T1	6-8	BB	1	3
4	IoT communication models	T1	8-14	BB	1	4
5	IoT Communication APIs	T1	16-17	BB	1	5
6	Enabling technologies - Wireless Sensor Networks, Cloud Computing,	T1	17-18	BB	1	6
7	Big data analytics, Communication protocols, Embedded Systems	R1	47-51	BB	1	7
8	IoT Levels and Templates - Domain specific IoTs	T1	21-24	BB	1	8
9	IoT Architectural view	T1	24-25	BB	1	9
Outcome of Unit I: **CO 1**: Summarize the characteristics, physical and logical designs, domains and architecture.						
UNIT II ELEMENTS OF IoT						
10	IoT and M2M	T1	26-27	PPT	1	10
11	difference between IoT and M2M	T1	27-28	BB	1	11
12	Software Defined Networks	T1	28-29	BB	1	12
13	Network Function Virtualization	T1	29-30	BB	1	13
14	IoT systems management	R2	67-71	PPT	1	14
15	Needs - NETCONF, YANG	T1	33-37	PPT	1	15
16	IoT design methodology Sensors and actuators	R1	98-99	BB	1	16
17	Communication modules	T1	44-55	BB	1	17
18	LoRa - RFID - Wi-Fi - Power sources	T1	55-61	BB	1	18
Outcome of Unit II: **CO 2**: Differentiate M2M and IoT, SDN and NFV design methodologies.						
UNIT III IOT PROTOCOLS						
19	Protocol Standardization for IoT	T1	62-66	PPT	2	19
20	Efforts – M2M and WSN Protocols	W1	-	BB	2	20

21	SCADA and RFID Protocols	T1	74-82	BB	2	21
22	Protocols – IEEE 802.15.4	T1	83-98	PPT	2	22
23	BACNet Protocol – Modbus	T1	98-120	PPT	1	23
24	Zigbee Architecture	T1	123-132	BB	1	24
25	Network layer	T1	136-139	BB	1	25
26	6LowPAN - CoAP	T1	140-143	BB	1	26
27	Security	T1	144-147	BB	1	27

Outcome of Unit III:

CO 3: Explain various IoT communication protocols and their role in data transmission.

UNIT IV BUILDING IoT WITH CLOUD AND DATA ANALYTICS

28	IoT platforms	T2	148-149	PPT	1	28
29	Arduino	W2	-	PPT	1	29
30	Raspberry Pi	T2	150-153	PPT	2	31
31	Cloud Computing in IoT	T2	154-156	BB	1	32
32	Cloud Connectivity	T2	157-162	BB	1	33
33	Big Data Analytics	T2	163-167	BB	1	34
34	Data Visualization	T2	168-174	BB	2	35

Outcome of Unit IV:

CO 4: Describe the integration of IoT with cloud computing and data analytics.

UNIT V CHALLENGES IN IOT AND CASE STUDIES

35	Security Concerns and Challenges	T2	175-177	PPT	2	37
36	Real time applications of IoT	W2	-	BB	1	38
37	Home automation	W2	-	BB	2	39
38	Automatic lighting	W1	-	PPT	2	40
39	Home intrusion detection	W1	-	PPT	1	41
40	Cities – Smart parking	W2	-	BB	1	42
41	Weather monitoring system	W2	-	BB	1	43
42	Agriculture	W2	-	BB	1	44
43	Smart irrigation	W2	-	BB	1	45

Outcome of Unit V:

CO 5: Discuss security challenges in IoT applications.

CO 6: Illustrate real-time IoT applications in smart environments.

Course Outcome:

At the end of course:

Students should be able to do:

CO 1: Summarize the characteristics, physical and logical designs, domains and architecture

CO 2: Differentiate M2M and IoT, SDN and NFV design methodologies

CO 3: Explain various IoT communication protocols and their role in data transmission.

CO 4: Describe the integration of IoT with cloud computing and data analytics.

CO 5: Discuss security challenges in IoT applications.

CO 6: Illustrate real-time IoT applications in smart environments.

Course Outcome Vs Program Outcome Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	1	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	1	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	1	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	1	-	-	-
CO5	3	2	-	1	-	-	-	-	-	-	1	-	-	-
CO6	3	2	1	-	-	-	-	-	-	-	1	-	-	-
AVG	3	2	1	1	-	-	-	-	-	-	1	-	-	-

Content beyond Syllabus:

- ❖ Industrial IoT

Internal Evaluation Components

Web Portal	Assignment	Components	Topic Number with Topic/Unit Details	Relevance to CO
Web Portal 1	--	**Assessment – I (60)**	**Unit I and II**	**CO 1 & CO2**
	1	**Assignment-Handwritten (20)**	6) Explain IoT Enabling technologies - Wireless Sensor Networks, Cloud Computing, 9)IoT Architectural view	**CO1**
	2	**Assignment – Poster Presentation / PPT (20)**	15) Explain NETCONF and YANG	**CO2**
Web Portal 2	--	**Assessment – II (60)**	**Unit III and IV**	**CO3 & CO4**
	3	**Seminar(20)**	21) Explain LORA,SCADA and RFID Protocols	**CO3**
	4	**Case Study Report (20)**	29)Explain Arduino and 30) Raspberry Pi	**CO4**
Web Portal 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:

Phase1(BeforeAT1)	Phase2(BeforeAT2)	Phase3(BeforeModel)
Assignment I	Assignment II	Assignment III

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	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
	30	30								-	-	-
AT-2	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
			30	30						-	-	-
MODEL	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
	20	20	20	20	10	10				-	-	-

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PRINCIPAL