



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

COURSE PLAN

Department

:

Instrumentation and Control Engineering

Course Name & code

:

Industrial Internet of Things & ICE 4071

Semester & branch

:

VII & ICE

Name of the faculty

:

Dr. S. Meenatchi Sundaram

No of contact hours/week:

L	T	P	C
3	0	0	3

Course Outcomes (COs)

At the end of this course, the student should be able to:

		No. of Contact Hours	Marks
CO1:	Understand the fundamental concepts of IoT, IoT vs IIoT, network services, architecture, and key enabling technologies	6	17
CO2:	Design of IoT systems and understand the role of smart sensors	6	17
CO3:	Understand different Communication Protocols like WiFi, Bluetooth, UART, I2C, SPI and other IoT communication protocols	6	17
CO4:	Understand data exchange file formats, front end and back end programming methods, real time applications	8	22
CO5:	Be able to design and develop IoT systems using a variety of hardware and software platforms	10	27
Total		36	100

Assessment Plan

Components	Assignments	Sessional Tests	End Semester/ Make-up Examination
Duration	20 to 30 minutes	60 minutes	180 minutes
Weightage	20 % (4 X 5 marks)	30 % (2 X 15 Marks)	50 % (1 X 50 Marks)
Typology of Questions	Understanding; Applying; Analyzing; Evaluating; Creating	Remembering; Understanding; Applying	Understanding; Applying; Analyzing; Evaluating; Creating
Pattern	Answer one randomly selected question from the problem sheet (Students can refer their class notes)	MCQ (10 marks): 10 questions of 0.5 marks each Short Answers (10 marks): questions of 2 or 3 marks	Answer all 5 full questions of 10 marks each. Each question may have 2 to 3 parts of 3/4/5/6/7 marks
Schedule	As notified by Associate Director (Academics) at the start of each semester	Calendared activity	Calendared activity
Topics Covered	Assignment 1 (L _{x1-x2} & T _{y1-y2}) (CO x)	Test 1 (L _{a1-a2} & T _{b1-b2}) (CO x)	Comprehensive examination covering full syllabus. Students are expected to answer all questions (CO1-5)
	Assignment 2 (L _{x3-x4} & T _{y3-y4}) (CO x)		
	Assignment 3 (L _{x5-x6} & T _{y5-y6}) (CO x)	Test 2 (L _{a3-a4} & T _{b3-b4}) (CO x)	
	Assignment 4 (L _{x7-x8} & T _{y7-y8}) (CO x)		

Lesson Plan

L. No./ T. No.	Topics	Course Outcome Addressed
L0	Introduction to course content	CO1
L1	Basics of IoT, History, IoT versus IIoT	CO1
L2	Industry 4.0, Components of IIoT	CO1
L3	Role, Challenges and benefits of IIoT	CO1
L4	Network Services	CO1
L5	Reference architecture – ISO OSI, TCP-IP Models	CO1
L6	Architecture of IIoT	CO1
L7	Generic block diagram of an IoT Device, Common IoT Protocols	CO2
L8	Physical and Logical Design of IoT Device	CO2
L9	Communication models	CO2
L10	IoT Levels & Deployment Templates	CO2

L11	Smart Sensor architecture	CO2
L12	Role of sensors in IIoT, Basics of Sensor Interface, Data Acquisition	CO2
L13	Communication Protocols: Wi-Fi, Wi-Fi direct	CO3
L14	Bluetooth Stack, BLE	CO3
L15	Serial Communication - UART	CO3
L16	SPI	CO3
L17	I2C	CO3
L18	IIOT protocols –COAP, MQTT	CO3
L19	6lowpan, lwm2m, AMQP	CO4
L20	IIoT cloud platforms: Overview, Firebase: creating projects	CO4
L21	Business models: Saas, Paas, Iaas	CO4
L22	Introduction to Node-Red, Interfacing sensors using Arduino with Node-Red	CO4
L23	web security, Privacy	CO4
L24	Threat analysis, Trust, IoT security tomography	CO4
L25	Access control, Message integrity	CO4
L26	Security model for IoT, Network security techniques	CO4
L27	Json file format, Object, Array, data type, Json Vs XML	CO5
L28	Introduction to Node.js	CO5
L29	Node.js architecture	CO5
L30	NodeJs REPL Mode	CO5
L31	Introduction to Raspberry Pi	CO5
L32	Difference between RPi and Arduino	CO5
L33	Introduction to Python	CO5
L34	Python basics examples	CO5
L35	Control statements	CO5
L36	Tuple sequence	CO5

References:

1. Arshdeep Bahga and Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 2014
2. Bernd Scholz-Reiter, Florian, Michahelles, "Architecting the Internet of Things", ISBN 978-3- 642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 2018
4. Qusay F. Hassan, "Internet of Things A to Z: Technologies and Applications", Wiley, 2018
5. Hakima Chaouchi, " The Internet of Things Connecting Objects to the Web" ISBN : 978-1-84821-140-7, Willy Publications
6. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2 nd Edition, Willy Publications
7. NPTEL Course – Introduction to Internet of Things, IITK – Dr.Sudip Misra, https://onlinecourses.nptel.ac.in/noc17_cs22

Submitted by: S Meenatchi Sundaram

(Signature of the faculty)

Date: 31-07-2023

Approved by: Dr. Shreesha C

(Signature of HOD)

Date: 31-07-2023

FACULTY MEMBERS TEACHING THE COURSE (IF MULTIPLE SECTIONS EXIST):

FACULTY	SECTION	FACULTY	SECTION
