NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	Integrated B.Tech.(CSE)-MBA
Course Code:	CSI0801
Course Title:	Internet of Things
Course Type:	Core
Year of Introduction:	2021-22

Credit Scheme

L	T	Practical Component				C
		LPW	**PW**	**W**	**S**	
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Course Learning Outcomes (CLO):

At the end of the course, students will be able to –
1. comprehend the architectural components and platforms of IoT ecosystem
2. apply appropriate access technology as per the application requirement
3. identify the need of various IoT protocols as per the problem characteristics
4. design applications with suitable lightweight data processing and communication methodology.

Syllabus: Total Teaching hours: 30

Unit	Syllabus	Teaching hours
Unit-I	Introduction, applications, need and scope of IoT, Various IoT architectures, functional stack, Processors and Operating Systems for resource constrained devices	05
Unit-II	Sensors and actuators, Smart objects, Connecting objects, protocols and access technologies like IEEE802.15.4, BLE, LoRaWAN, LTE-M, NB-IoT	09
Unit-III	IoT network layer, IPv6: IPv6 structure, addressing, routing, interconnecting issues, 6LoWPAN: forwarding, addressing, header compression, neighbour discovery, Routing in LLN, RPL	05
Unit-IV	Application layer protocols, CoAP, MQTT, AMQP, Sensor data models and representation, Integrating IoT Services with Interoperable data encoding standards: JSON and CBOR	06
Unit V	Securing IoT, Challenges in IoT security, Fog and Edge Computing, Connected Vehicles, Autonomous Vehicles, Industrial Applications of IoT	05

Self-Study: The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents

Suggested Readings/ 1. Jean-Philippe Vasseur, Adam Dunkels, Interconnecting Smart

References:		Objects with IP: The Next Internet, Morgan Kaufmann
	2.	David Hanes, G. Salgueiro, IoT Fundamentals - Networking Technologies, Protocols, and Use Cases for Internet of Things, Cisco Press
	3.	Pethuru Raj, Anupama Raman, The Internet of Things - Enabling Technologies, Platforms and Use Cases, CRC Press
	4.	Peter Waher, Learning Internet of Things, Packt Publishing Ltd
	5.	Daniel Kellmereit, Daniel Obodovski, The Silent Intelligence: The Internet of Things, DND Ventures
	6.	Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, Wiley Publications

Suggested List of Experiments:	Sr. No.	Title	Hours
	1	Building basic electronic circuits using various components and exploring ESP8266, ESP32 and Arduino IDE.	02
	2	Programming with the ESP8266/ESP32 boards	02
	3	Access sensors and control actuator using HTTP protocol	02
	4	Reverse parking sensor for car with sensors and boards	02
	5	Integrating Bluetooth, RFID, LoRa transceiver with different IoT platforms	02
	6	Integrating IoT devices with cloud platform for data processing	02
	7	Publish and Subscribe with MQTT	02
	8	Application development using COAP	02
	9	Interfacing IoT boards with platforms like IFTTT	02
	10	Simulate IoT network on Cooja Simulator focusing on 6LowPAN	02

Suggested Case List: -NA-