MINOR DEGREE IN ELECTRONICS & COMMUNICATION ENGINEERING (ECE)
Scheme of Instruction and Examination
(Effective from 2017-2018)

Scheme: 2017

S. No	Course No.	Course Title	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks				Total
				L	D /T	P	End Exam Assessment		Internal Assessment		
							Theory	Practical	Theory	Practical	
1	IOT 01	Introduction to Internet of Things	3	2	0	1	40	30	30	-	100
2	IOT 02	IoT Architecture and Protocols	3	3	0	0	70	-	30	-	100
3	IOT 03	Programming with Arduino and Raspberry-Pi	3	2	0	1	40	30	30	-	100
4	IOT 04	Wireless, Adhoc and Sensor Networks	3	3	0	0	70	-	30	-	100
5	IOT 05	Design of Internet of Things	3	2	0	1	40	30	30	-	100
6	IOT 06	Project Work	5	0	0	5	-	-	-	100	100
		Total	**20**	**12**	**0**	**8**	**350**		**250**		**600**

IOT01: INTRODUCTION TO INTERNET OF THINGS (IIOT)

Course Code	Category	Hours/Week			Credits	Maximum Marks			
						Continuous Internal Assessment (Theory)	End Exam		TOTAL
							Theory	Practical	
IOT 01	Core	L	T	P	C	30	40	30	100
		3	0	2	4				
Sessional ExamDuration:2 Hrs					**EndExamDuration:3 Hrs**				

Course Outcomes: At the end of the course The students will be able to

CO1: Understand Internet of things and its hardware and software components

CO2:Interface I/O devices, Sensors& communication modules

CO3:Remotely monitor data and control devices

CO4: Develop real life IoT based projects

UNIT– I

Introduction to IoT: Architectural overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals-Devices and gateways, Data management, Business processes in IoT, Role of cloud in IoT

UNIT– II

Elements of IoT: Hardware components – computing (Arduino, Raspberry Pi), communication, Sensing,Actuation, I/O interfacesSoftware Components- Programming APIs (Using python/Arduino) for communication protocols-MQTT, Zigbee,Bluetooth, CoAP,UDP, TCP

UNIT– III

Sensing and Actuation: Definition of Sensor, Sensor features, Resolution, Classes, Different types of sensors, Actuator, Different types of Actuators, purpose of Sensors and Actuators in IoT

UNIT– IV

IoT Application Development: Solution frame work for IoT Applications-Implementation of Device integration, Data acquisition and Integration, Device data storage on cloud/local server, Authentication, authorization of Devices

UNIT– V

IoT Case Studies: IoT Casestudies and mini projects based on industrial Automation, Transportation, Agriculture, Healthcare, Home Automation

TextBooks :
Vijay Madisetti,ArshdeepBahga, Internet of Things, " A hands on Approach",University Press

ReferenceBooks :
1.Dr SRN Reddy, RachitThukral and Manasi Mishra ," Introduction to Internet of Things": A practical Approach" ETI Labs
2.Raj Kamal , " Internet of Things: Architecture and Design",McGraw Hill

IOT 02 : IoT Architectures and Protocols (IAP)

Course Code	Category	Hours/Week			Credits	Maximum Marks			
		L	T	P	C	Continuous Internal Assessment (Theory)	End Exam		TOTAL
							Theory	Practical	
IOT 02	Core	3	0	0	3	30	70	-	100
Sessional ExamDuration:2 Hrs					**EndExamDuration:3 Hrs**				

Course Outcomes: At the end of the course Students will be able to
CO1: Understand Basics of IoT Architectures.
CO2: Understand IoT Protocols
        CO3: Understand Programming the IoT applications using Microcontrollers.

UNIT– I

IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology

UNIT– II

IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference ArchitectureIntroduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT– III

Real-World Design: Constraints- Introduction, Technical Design constraintsData management, Business processes in IoT,Bluetooth Low Energy, Zigbee Smart Energy, WirelessHART

UNIT– IV

Transport & Session Layer Protocols: Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP.

UNIT– V

Service Layer Protocols & Security: Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4

TextBooks :
1. Jan Holler, From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014on.

ReferenceBooks :
1. Peter Waher [2006], "Learning of Internet of Things", Packt Publications.

IOT 03: Programmingwith ARDUINO and Raspberry -Pi

Course Code	Category	Hours/Week			Credits	Maximum Marks			
						Scheme: 2017			
		L	T	P	C	Continuous Internal Assessment (Theory)	End Exam		TOTAL
							Theory	Practical	
IOT 03	Core	3	0	2	4	30	40	30	100
Sessional ExamDuration:2 Hrs					EndExamDuration:3 Hrs				

Course Outcomes: At the end of the course Students will be able to
CO1: Understand Programming Loop Statements and Functions.
CO2: Understand different Algorithms and Data Structures using Python
CO3: Use programming in various case studies

UNIT– I

Python Programming -I: Installation of python , Numbers and Math in python, Variables and Inputs, built –in modules ,functions, strings, python lists, python slicing, Save and run python files

UNIT– II

Python Programming –II : If-else, python elif and nested if , comparison operators and logical operators, while loops and for loop, functions, default parameters and multiple parameters, classes, class constructors and destructors, subclasses, super classes and inheritance.

UNIT– III

Raspberry Pi –I : Linux basics, Linux File system, Navigating the File system, Text Editors, Accessing Files, Permissions , Processes, Linux Graphic user Interface , Raspberry Pi Processor, Raspberry Pi Vs Arduino, Operating system benefits, Raspberry Pi Set up, Configuration,

UNIT– IV

Raspberry-Pi -II: General Purpose IO Pins, Protocol pins, GPIO Access, Pulse width Modulation, Demo of a Blink, Graphic User Interface, Tkinter Library and Interaction.

UNIT– V

Shell Programming Connecting Raspberry-Pi to Internet: Accessing resources of Raspberry –Pi using shell, GPIO programming over shell, webcam accessing using shell, installing server on Raspberry –Pi, Sending email through programming, Simple Camera Accessing over Internet

TextBooks :
. 1. Martin C Brown [2001],“ The Complete Reference Python Programming”, 1st Edition, McGraw Hill

ReferenceBooks :
1.Alex Martelli,[2006], “ Python in a Nutshell”, 2nd Edition, Shroff Publishers & Distributors

IOT 04 : WIRELESS ADHOC AND SENSOR NETWORKS(WASN)

						Scheme: 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
IOT 04	Core	L	T	P	C	Continuous Internal Assessment (Theory)	End Exam	TOTAL
							Theory	Practical	
		3	0	0	3	30	70	-	100
Sessional ExamDuration:2 Hrs					EndExamDuration:3 Hrs			

Course Outcomes: At the end of the course, the students will be able to
CO1 : Understand the basic sensor network concepts,
CO2 : Know the physical layer Issues ,Understand and analyse
                MAC protocols
CO3: Understand the concepts of wireless sensor networks and
                underwater sensor networks

UNIT– I

Introduction: Wireless Ad Hoc Networks,Self-organizing Behaviour of Wireless Ad Hoc Networks Cooperation in Mobile Ad Hoc Networks

UNIT– II

MAC Protocols in MANETs MAC Protocols in MANETs, Routing in MANETs ,Multicasting in MANETs , Mobility Models for MANETs ,Transport Protocols for MANETs

UNIT– III

Opportunistic Mobile Networks- Opportunistic Mobile Networks ,UAV Networks

UNIT– IV

Wireless Sensor Networks: Wireless Sensor Networks WSN Coverage & Placement, Topology Mangement in Wireless Sensor Networks, Mobile Wireless Sensor Networks, Medium Access Control in Wireless Networks, Routing in Wireless Sensor Networks Congestion and Flow Control

UNIT– V

Underwater Sensor Networks- Underwater Sensor Networks, Security of Wireless Sensor Networks- Hardware Design of Sensor Node, Real Life Deployment of WSN

TextBooks :
WaltenegusDargie, Christian Poellabauer , "Fundamentals of Wireless Sensor Networks, Theory and Practice", Wiley Series on wireless Communication and Mobile Computing, 2011
ReferenceBooks :
1KazemSohraby, Daniel manoli , "Wireless Sensor networks- Technology, Protocols and Applications", Wiley InterScience Publications 2010.
2. BhaskarKrishnamachari , " Networking Wireless Sensors", Cambridge University Press, 2005

IOT 05 : DESIGN OF INTERNET OF THINGS (DIOT)

		Hours/Week			Credits	Maximum Marks			
Course Code	Category					Continuous Internal Assessment (Theory)	End Exam		TOTAL
							Theory	Practical	
IOT 05	Core	L	T	P	C				
		3	0	2	4	30	40	30	100

Scheme: 2017

Sessional ExamDuration:2 Hrs	EndExamDuration:3 Hrs

Course Outcomes: At the end of the course Students will be able to

CO1: Understand Basics of IoT Architectures.

CO2: Understand IoT Interfacing

CO3: Understand real time applications with case studies.

UNIT– I

Introduction to IoT s Improving quality of life : Introduction to IOTs – Part I Introduction to IOTs- Part II Introduction to IOTTs—Examples IOT applications - I IOT applications - II

UNIT– II

System design and overview of Power supply section : Overview of system design and introduction to power supply - I Complete Overview of system design and introduction to power supply - II Overview of system design and introduction to power supply – III Overview of system design and introduction to power supply - IV

UNIT– III

Designing with LDO's, Switching Regulators and Case Studies Power Conditioning with Energy Harvesters Battery less power supply and battery life calculation for embedded

UNIT– IV

IoTProtocols :Introduction to MQTT Quality of Service in MQTT Standards and Security in MQTT Introduction and Implementation of AMQP Implementation of CoAP and MDNS

UNIT– V

IoT LAN WAN Connectivities : Basics of RFID RFID Protocol and Applications BLE security LPWAN Technologies

Choice of Microcontrollers :Case Study 1 Case Study 2

TextBooks :
1. Peter Waher [2006], "Learning of Internet of Things", Packt Publication.

ReferenceBooks :
1. Cuno Pfister [2008], "Started with Internet of Things " O. Reilly Publications.

IOT 06 :PROJECT WORK

Course Code	Category	Hours/Week			Credits	Maximum Marks			
							Scheme: 2017		
						Continuous Internal Assessment	End Exam		TOTAL
		L	T	P	C		Theory	Practical	
IOT 06	Core	0	0	5	5	100	-	-	100