



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited A++ Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

SCHOOL OF COMPUTING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

1.1.3 Courses having focus on employability/ entrepreneurship/ skill development

B.E Computer Science and Engineering With Specialization In Internet Of Things			
Employability			
S.No	Course Code	Course Name	Page No
	SITA1501	Wireless Sensor Networks and Architecture	2
	S11BLH31	Introduction to IoT	4
Entrepreneurship			
	S732APROJ1	Project Work(Phase 1)	
	S732APROJ2	Project (Phase 2)	

SITA1501	WIRELESS SENSOR NETWORKS AND ARCHITECTURE	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

To Learn basics of Sensor and Network technology

- Learn key routing protocols for sensor networks and main design issues
- Learn transport layer protocols for sensor networks, and design requirements
- Understand the medium access control protocols and address physical layer issues
- To learn the security features in WSN.

Unit 1 Introduction and Overview of Wireless Sensor Networks

9Hrs.

Introduction, Brief Historical Survey of Sensor Networks, and Background of Sensor Network Technology, Ad-Hoc Networks, Applications of Wireless Sensor Networks: Sensor and Robots, Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring, Another Taxonomy of WSN Technology, Basic Sensor Network Architectural Elements, Home Control, Medical Applications.

Unit 2 Routing protocols for Ad Hoc wireless networks

9 Hrs.

Designing issues, classification of routing protocols, table driven routing protocols, on demand routing protocol, Hybrid routing protocol, Hierarchical routing protocols. Multicast routing in Ad Hoc wireless networks: Operations and classification of multicast routing protocols, Tree based multicast routing protocol, Mesh based multicast routing protocol.

Unit 3 System architecture and design issues

9Hrs.

Design Constraints for Routing in Wireless Sensor Networks, Classification of Routing Protocols in Wireless Sensor Networks Hierarchy Role of Nodes in the Network, Data Delivery Model, Optimization Techniques for Routing in Wireless Sensor Networks, Application of the Optimization Techniques: Routing Protocols.

Unit 4 Routing Protocols for Wireless Sensor Networks

9hrs

Introduction, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks Network Scale and Time-Varying Characteristics, Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks: WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing.

Unit 5 Transport layer security protocols for Ad Hoc wireless networks

9Hrs.

Designing issues, classification of transport layer solutions, feedback based TCP, TCP bus, Ad Hoc TCP, Security in Ad hoc wireless networks, Issues and challenges in security provisioning, Key management, Secure routing in Ad hoc wireless networks. Quality of Service: Issues and challenges in providing QoS in Ad Hoc wireless networks, classification of QoS solutions.

Max.45Hours

COURSE OUTCOMES:

On completion of the course the student will be able to

CO1: An Ability to understand the concepts of sensors.

CO2: An Ability to analyse modelling and simulation of various communication networks.

CO3: Demonstrate knowledge of MAC protocols developed for WSN.

CO4: Demonstrate knowledge of routing protocols developed for WSN.

CO5: Understand and explain mobile data-centric networking principles

CO6: An Ability to understand the security features in WSN

TEXT/REFERENCE BOOKS:

1. Ibrahim M. M. Emary, Ramakrishnan.S “Wireless Sensor Networks from Theory to Applications”, CRC Press, 2013.
2. Fei Hu, Xiaojun Cao, “Wireless sensor networks Principles and Practice”, CRC Press, 2010.
3. MounirFrikha, “Adhoc Networks Routing, Qos and Optimization”, Wiley, 2011.
4. Raheem, Beyah, Janise McNair, Cherita Corbett, Security in Ad hoc

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100

Exam Duration

: 3 Hrs.

PART A : 10 Questions of 2 marks each-No choice

20 Marks

PART B : 2 Questions from each unit with internal choice, each carrying 16 marks

80 Marks

S11PLU24	INTRODUCTION TO IOT	L	T	P	EL	Credits	Total Marks
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		3	0	0	0	3	100
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COURSE OBJECTIVES

- To understand the concepts of Internet of Things To identify the various elements of an IoT System.
- To understand the various means of communication from Node / Gateway to Cloud Platforms.
- To transfer data from IoT devices to various cloud providers.
- To make students aware of various domain specific applications and challenges while implementing IoT solutions.

UNIT 1 INTRODUCTION TO IoT 9 Hrs.

Introduction to IoT, Current technological trends and future prospects- Evolution of IoT - IoT Devices - IoT Devices vs. Computers - Trends in the Adoption of IoT - Societal Benefits of IoT -, Business Scope, Relation with embedded system - IoT Reference Architecture physical-logical design of IOT-From M2M to IoT, Software define Network.

UNIT 2 ELEMENTS OF IoT 9 Hrs.

Application Sensors & Actuators - Edge Networking (WSN) Gateways - IoT Communication Model WPAN & LPWA, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards, Wearable Development Boards .

UNIT 3 COMMUNICATION AND CONNECTIVE TECHNOLOGIES 9 Hrs.

IoT Communication Model - Wireless medium access issues - MAC protocol survey - Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination. Communication technologies, Long-range Wireless Protocols : LoRa WAN, Ingenu, Satellite Communications, Short- range Wireless Protocols : ANT+, WiFi, ZigBee, WHART, EnOcean, Z-Wave, NFC communication technologies : Zigbee Wifi - Zwave.

UNIT 4 IoT AND CLOUD 9 Hrs.

Interoperability in IoT - Introduction to Arduino Programming - Integration of Sensors and Actuators with Arduino - Cloud computing in IoT, IoT in cloud architecture, Logging on to cloud,- cloud based IoT platforms - IBM Watson, Google cloud.

UNIT 5 DOMAIN SPECIFIC APPLICATIONS OF IoT 9 Hrs.

Home automation, Industry applications, Surveillance applications, Other IoT applications - Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform case studies : Soil moisture monitoring, Weather monitoring, Air quality Monitoring, Movement Detection.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand general concepts of Internet of Things (IoT).

CO2 - Recognize various devices, sensors and applications.

- CO3** - Apply design concept to IoT solutions.
CO4 - Analyze various M2M and IoT architectures.
CO5 - Evaluate design issues in IoT applications.
CO6 - Create IoT solutions using sensors, actuators and Devices.

TEXT / REFERENCE BOOKS

1. Boswarthick, Omar Elloumi., The Internet of Things: Applications and Protocols, Wiley publications., 2012.
2. Dieter Uckelmann, Mark Harrison, Florian Michahelles., Architecting the Internet of Things, Springer publications.2011.
3. Marco Schwatz Internet of Things with Arduino Cookbook, Packt Publications.2016 .
4. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Kamouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
5. Vijay Madisetti, Arshdeep Bahga, “Internet of Things : A Hands on Approach”, published by Vijay Madisetti 2014.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100 Exam Duration : 3 Hrs.

PART A : 10 Questions of 2 marks each-No choice **20 Marks**
PART B : 2 Questions from each unit with internal choice, each carrying 16 marks **80 Marks**