Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Third Year Bachelor of Engineering (Computer Engineering)

(In Effect From Academic Year 2019-20)

Subject Code: CE605D-N	**Subject Title:** Internet of Things
Pre-requisite	--

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	5	4	3	70	30	20	30	150

Course Objective:

- The aim of this course is to make students aware about 'Internet of Things'-IOT, which is an emerging technology through which all the manual process is to be converted in to system operated process and also integrates with the business.
- Students will understand the concepts of Internet of Things and can able to build IoT applications.

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hour
1	Introduction to IoT	5
2	IoT & M2M	8
3	Network & Communication aspects.	10
4	Web Infrastructure for Managing IoT Resources	4
4	Challenges in IoT.	6
5	Domain specific applications of IoT	5
6	Developing IoTs	6
7	Iot Tools	4

Total hours (Theory): 48
Total hours (Practical) :32
Total hours: 80

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Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weightage(%)
1	**Introduction to IoT** • Defining IoT. • Characteristics of IoT. • Physical design of IoT, Logical • design of IoT, • Functional blocks of IoT, • Communication models & APIs	5	10
2	**M2M to IoT** – • A Basic Perspective– Introduction, • Some Definitions, • M2M Value Chains, • IoT Value Chains, • An emerging industrial structure for IoT. • An Architectural Overview– Building architecture, Main design principles and needed capabilities. **M2M** -- Machine to Machine, Difference between IoT and M2M, Software defined Network.	8	17
3	**Networks & Communication aspects** • Wireless medium access issues, • MAC protocol survey, • Survey routing protocols, • Sensor deployment & Node discovery, • Data aggregation & dissemination, • Multicast and unicast. • RTS and CTS in details.	10	21
4	**Web Infrastructure for Managing IoT Resources** • OpenIoT Architecture for IoT/Cloud Convergence. • Scheduling Introduction. • Process and IoT Service Lifecycle. • Scheduling and Resource Management. • Device/Cloud Collaboration Framework. • Applications of Device/Cloud Collaboration.	4	8
5	**Challenges in IoT** • Design challenges, • Development challenges, • Security challenges, • Other challenges	6	13

6	**Domain specific applications of IoT** • Home automation, • Industry applications, • Surveillance applications, • Other IoT applications.	5	10
7	**Developing IoTs** • Introduction to Python, • Introduction to different IoT tools, • Developing applications through IoT tools, • Developing sensor based application through embedded system platform, Implementing IoT concepts with python.	6	13
8	**IoT Tools.** • Introduction to Arduino Programming. • Integration of Sensors and Actuators with Arduino. • Implementation of IoT with Raspberry Pi.	4	8
	Total	48	100

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

STUDENTS LEARNING OUTCOMES:

- On successful completion of the course, the student will:
- Understand the concepts of Internet of Things
- Analyze basic protocols in wireless sensor network
- Design IoT applications in different domain and be able to analyze their performance
- Implement basic IoT applications on embedded platform

List of Tutorials:

- Study of IoT based on amazon.
- IoT application supported by cloud environment.
- different application used to build IoT..
- IoT design implementation and challenges.

E-Resources:

1. https://internet-of-things-innovation.com/insights/
2. https://opensource.com/resources/internet-of-things

Reference Books:

1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”
2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks:
3. Internet of Things Principles and Paradigms, Edited By Rajkumar Buyya, Amir Vahid Dastjerdi, Morgan Kaufmann, ELSEVIER
4. Fundamentals of Wireless Sensors Networks Theory and Practice, Waltenegus Dargie and Christian Poellabauer, WILEY Series
5. Rethinking the Internet of Things A Scalable approach to connecting everything, Francis daCosta, Apress Open
6. Arduino Cookbook, Michael Margolis, O’REILLY
7. Internet of Things - From Research and Innovation to Market Deployment, Edited By Ovidiu Vermesan and Peter Friess, River Publishers

List of experiments

No	Name of Experiment
1	Introduction to Arduino Board, Arduino IDE and Cables
2	Perform Practical to blink LED on Arduino Board and external LED as well.
3	Design an IOT application to use the concept of RFID Sensor.
4	Design and implement the concept of Flex Sensor.
5	Implement the concept of IR Sensor.
6	Implement the concept of Piezo Vibration Sensor.
7	Implement the concept of Accelerometer.
8	Implement the concept of Temperature and Humidity Sensor.
9	Implement the concept of flame Sensor.
10	Implement the concept of buzzer Sensor.