MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8
(Affiliated to Krishna University, Machilipatnam)
SYLLABUS

Subject: Computer Science   Semester: V
Course Title: Internet of Things   Course Code: 20CSSEC21IT3
No. of Hours: 45   LTP: 300   Credits: 3

Objectives

- To understand the application areas of IOT
- To realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- To understand building blocks of Internet of Things and characteristics

Course Outcomes

CO1: Understand various concepts, terminologies and applications of IoT systems.

CO2: Learn how to use various sensors and wireless technologies for design of IoT.

CO3: Gain knowledge on how to connect various things to Internet.

CO4: Understand Arduino Simulation Environment.

CO5: Apply skills to develop simple IOT Devices.

UNIT-I   **(9 Hrs.)**
Fundamentals of IoT

Introduction, Definition, Trends & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Self - driven cars, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection – Programming Exercises

UNIT-II   **(9 Hrs.)**
Sensors Network

Definition, Types of Sensors, Types of Actuators, Examples and Working : Home Security, Environmental Monitoring, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, Applications The node, Connecting nodes, Networking Nodes – Programming Exercises.

UNIT-III (9 Hrs.)

Various Technologies

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC.

IP Based Protocols for IoT IPv6, 6LowPAN, LoRA, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocols – Programming Exercises

UNIT-IV (9 Hrs.)

Arduino Simulation Environment

Arduino Uno Architecture, Setting up the IDE, Writing Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino, Interfacing LED, push button and buzzer with Arduino, Interfacing Arduino with LCD.

Sensor & Actuators with Arduino: Overview of Sensors working, Analog and Digital Sensors, Interfacing of Temperature, Humidity, Motion, Light and Gas Sensors with Arduino, Interfacing of Actuators with Arduino, Interfacing of Relay Switch and Servo Motor with Arduino – Programming Exercises

UNIT-V (9 Hrs.)

Developing IOT's

Implementation of IoT with Arduino, Connecting and using various IoT Cloud Based Platforms such as AWS IoT, Google Cloud IoT Core etc. Cloud Computing, Fog Computing – Programming Exercises.

Co-Curricular Activities

- Assignments on problem solving
- Group discussions
- Student presentations and seminars
- Online quizzes
- Project work

Prescribed Books

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.
2. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on Approach)", 1st Edition, VPT, 2014.
3. Daniel Minoli, — "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications.

Reference Books

1. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press.
2. Open source software / learning websites.
   a. https://github.com/connectIOT/iottoolkit
   b. https://www.arduino.cc/
   c. https://onlinecourses.nptel.ac.in/noc17_cs22/course
   d. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html
   e. Contiki (Open source IoT operating system)
   f. Ardudroid (open source IoT project)
   g. https://blynk.io (Mobile app)
   h. IoT Toolkit -smart object API gateway service reference implementation

MARIS STELLA COLLEGE, VIJAYAWADA-8
(An autonomous college affiliated to Krishna University)
Blueprint

Subject: Computer Science   **Semester: V**

Course Title: Internet of Things   **Course Code: 20CSSEC21IT3**

Time: 3 Hrs.   **Max. Marks: 100**

SECTION – A

Answer **ALL** questions   **20 x 1 = 20M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
1	I	1	
2	I	1	
3	II	1	
4	II	1	
5	III	1	
6	III	1	**No. of questions to be set**
7	IV	1	RBT1 – 8
8	IV	1	RBT2 – 8
9	V	1	RBT3 – 2
10	V	1	RBT4 – 2
11	I	1	
12	I	1	
13	II	1	
14	II	1	
15	III	1	
16	III	1	
17	IV	1	
18	IV	1	
19	V	1	
20	V	1	

SECTION – B

Answer any **FOUR** questions   **4 x 8 = 32M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
21	I	8	**No. of questions to be set**
22	II	8	RBT1 – 2
23	III	8	RBT2 – 2
24	IV	8	RBT3 – 1
25	V	8	RBT4 – 1
26	I / II / III / IV / V	8	

SECTION – C

Answer any **FOUR** questions   **4 x 12 = 48M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
27	I	12	**No. of questions to be set**
28	II	12	RBT1 – 2
29	III	12	RBT2 – 2
30	IV	12	RBT3 – 1
31	V	12	RBT4 – 1
32	I / II / III / IV / V	12	

Subject: **Computer Science**   Semester: **V**
Course Title: **Internet of Things**   Course Code: **20CSSEC21IT3**
Time: **3 Hrs.**   Max. Marks: **100**

SECTION – A

Answer **ALL** questions   **20 x 1 = 20 M**

1. What is IoT?
    A. network of physical objects embedded with sensors
    B. network of virtual objects
    C. network of objects in the ring structure
    D. network of sensors

2. Which of the following is not an IoT device?
    A. Table
    B. Laptop
    C. Arduino
    D. Tablet

3. What is the Arduino UNO?
    A. Software
    B. Hardware device
    C. Network
    D. Protocol

4. Which of the following is not an application of IoT?
    A. Wearables
    B. Smart Grid
    C. Arduino
    D. Smart City

5. Which library is used to access I2C in Arduino IoT devices?
    A. EEPROM
    B. Wire
    C. DHT11
    D. ArduinoJson

6. IoT-A stands for _____
    A. Internet of Things Area
    B. Industrial of things Architecture
    C. Internet of Things Address
    D. Internet of Things Architecture

7. _____ allows the user to control electronic components.
    A. Android API
    B. RETful API
    C. MQTT API

D. CoAP API

8. Which one of the following protocols is lightweight?
    A. IP
    B. HTTP
    C. MQTT
    D. CoAP

9. What is the standard port number of secure MQTT?
    A. 1883
    B. 8000
    C. 8883
    D. 8888

10. What is Arduino?
    A. Programming language
    B. Image editing software
    C. Open-source electronics platform
    D. Text editor

11. What language is the Arduino IDE built on? _____

12. Which processor supports the Arduino Zero? _____

13. Where does the Arduino IDE search if it needs to find out the name of a type of Arduino Board? _____

14. _____ is the use of the Interrupt Service Routine in an Arduino.

15. _____ mode should we put the Arduino pin to, in order for object detection to work with the Ultrasonic Sensor.

16. _____ chipset is the LCD library for Arduino based on.

17. Full form of IoT is_____.

18. _____ is used to capture data from the physical world in IoT devices.

19. An IoT network is a collection of _____ devices.

20. _____ allows the user to control electronic components.

SECTION – B

Answer any **FOUR** questions   **4 x 8 = 32 M**

21. Explain in detail about trends & characteristics of IoT.
22. Illustrate the IoT architecture.
23. What are the different types of sensors? Explain in detail.
24. Describe in detail about IP based protocols.
25. Demonstrate Arduino Uno Architecture.
26. Explain in detail about Implementation of IoT with Arduino.

SECTION – C

Answer any **FOUR** questions   **4 x 12 = 48 M**

27. Describe in brief about the history of IoT.
28. Explain about the various applications of IoT.
29. What are the different types of acutators? Explain in detail.

30. Illustrate various wireless technologies used in IoT.
31. Explain the working of sensors & actuators with Arduino.
32. Describe about the usage of various IoT cloud based platforms.