



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	IoT & APPLICATIONS
Course Code	:	AEC802
Class	:	B. Tech VI Semester
Branch	:	ECE
Regulation	:	R16
Year	:	2019 – 2020
Course Coordinator	:	Mr. T Vinay Simha Reddy, Assistant Professor
Course Faculty	:	Mr. T Vinay Simha Reddy, Assistant Professor

COURSE OBJECTIVES:

The course should enable the students to:	
I	Understand the architecture of Internet of Things and connected world.
II	Explore on use of various hardware and sensing technologies to build IoT applications
III	Illustrate the real time IoT applications to make smart world
IV	Understand the available cloud services and communication API's for developing smart cities.

COURSE OUTCOMES (COs):

CO 1	Understand the design, characteristics and technologies of Internet of Things
CO 2	Understand basics of IoT networking ,system management and analyze the network function virtualization
CO 3	Understand the architecture of Internet of Things and connected world and Logical design using Python
CO 4	Analyze the IoT physical devices and endpoints along with programming concepts by using Raspberry PI with Python
CO 5	Understand the available cloud services and communication API's for developing different IoT applications

COURSE LEARNING OUTCOMES (CLOs):**Students, who complete the course, will have demonstrated the ability to do the following:**

CLO Code	At the end of the course, the student will have the ability to:
AEC802.01	Understand and intuition of the whole process line of extracting knowledge from data about the Internet of Things.
AEC802.02	Deep insight in one of the specializations within the network, depending on the study and the choice of the concepts of IoT.
AEC802.03	Solid knowledge in a broad range of methods based on design and implementation of IoT in network performance, analysis and problem solving with design of networks
AEC802.04	Experience in deriving theoretical properties of methods involved in IoT.
AEC802.05	Design and implementation/modification of methods involved in IoT.
AEC802.06	Describe what IoT is and the skill sets needed to be a network analysis.
AEC802.07	Motivate and explain trade-offs in IoT tool technique design and analysis of applications with IoT.
AEC802.08	Understand significance of models in IoT.
AEC802.09	Describe the Transport layer protocols and how its uses in IoT
AEC802.10	Apply basic IoT algorithms for predictive network performance
AEC802.11	Understand basic terms what security issues. Identify key distribution methods.
AEC802.12	Identify common approaches used for Feature Generation of IoT.
AEC802.13	Identify common approaches used for Feature Generation of IoT
AEC802.14	Create effective results by using various techniques in IoT application.
AEC802.15	Analyze the importance of IoT applications and work effectively as individual or teams on various IoT projects.

UNIT – I
INTRODUCTION TO INTERNET OF THINGS (IoT)

PART – A (SHORT ANSWER QUESTIONS)

S. No	Questions	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
1	What is IoT? Write short notes on IoT.	Remember	CO1	AEC802.1
2	List any four characteristics of IoT.	Remember	CO1	AEC802.1
3	State the importance of IoT.	Remember	CO1	AEC802.1
4	What is the Thing in IoT?	Understand	CO1	AEC802.1
5	State about the importance of Thing in IoT.	Remember	CO1	AEC802.2
6	Write the any three functions of IoT?	Understand	CO1	AEC802.3
7	What are design factors IoT?	Understand	CO1	AEC802.3
8	What are the interfaces of WSN?	Remember	CO1	AEC802.3
9	Define link layer protocols in IoT.	Remember	CO1	AEC802.3
10	State any four domain specific IoT applications.	Remember	CO1	AEC802.3
11	State about the importance of Thing in IoT.	Understand	CO1	AEC802.3
12	Write the functions of IoT.	Understand	CO1	AEC802.3
13	What are design factors IoT?	Remember	CO1	AEC802.3
14	What are applications of IoT?	Remember	CO1	AEC802.3
15	Explain the IoT communication.	Remember	CO1	AEC802.3

PART – B (LONG ANSWER QUESTIONS)

1	Discuss the characteristic of IoT. Explain them briefly.	Understand	CO1	AEC802.1
2	What are applications of IoT? Explain in detail.	Remember	CO1	AEC802.2
3	Demonstrate the physical design of IoT with Things of IoT and protocols of IoT.	Remember	CO1	AEC802.3
4	Write the logical design of IoT with communication models.	Understand	CO1	AEC802.3
5	Explain the IoT communication APIs and its importance.	Understand	CO1	AEC802.3
6	Discuss about any three IoT enabling technologies.	Remember	CO1	AEC802.2
7	Illustrate the IoT level 1 with neat diagram.	Understand	CO1	AEC802.2
8	Differentiate the IoT level 2 and level 4 in detailed.	Understand	CO1	AEC802.2
9	Explain the IoT level 3 and level 5 with diagrams.	Understand	CO1	AEC802.2
10	Define the various domain specific of IoT	Understand	CO1	AEC802.3
11	Explain domain specific of IoT with home automation.	Remember	CO1	AEC802.2
12	Explain physical design of IoT in detail.	Understand	CO1	AEC802.2
13	Explain Logical design of IoT in detail.	Understand	CO1	AEC802.2
14	Write the logical design of IoT with communication models?	Remember	CO1	AEC802.2
15	Explain the IoT communication APIs with neat diagrams.	Understand	CO1	AEC802.2
16	Discuss about Trending IoT technologies.	Understand	CO1	AEC802.2
17	Illustrate the IoT level 1 with diagram.	Understand	CO1	AEC802.2
18	Differentiate the IoT level 2, level 3 and level 4 in detailed.	Understand	CO1	AEC802.3

19	Differentiate logical design and physical design of IoT.	Remember	CO1	AEC802.2
20	Explain domain specific of IoT with home automation example.	Understand	CO1	AEC802.2
PART – C (CRITICAL THINKING QUESTIONS)				
1	Describe with an example of IoT service that uses publish-subscribe and web socket based communication.	Understand	CO1	AEC802.2
2	Determine the IoT levels for designing home automation IoT system including smart lighting and intrusion detection.	Remember	CO1	AEC802.3
3	Determine the various communication models that can be used for weather monitoring system. Which is a more appropriate model for this system. Describe the pros and cons.	Understand	CO1	AEC802.3
4	In Forest fire detection which level of IoT is used? Explain with a neat diagram and its working principle.	Understand	CO1	AEC802.3
5	Determine the IoT levels for designing structural health monitoring. Explain with a neat diagram.	Remember	CO1	AEC802.2
6	What is the role of coordinator in wireless sensor network	Understand	CO1	AEC802.3
7	What are architectural constraints of REST?	Understand	CO1	AEC802.2
8	What is the role of controller service in IoT systems?	Understand	CO1	AEC802.3
9	Describe an example of IoT service with an example of web-based communication model	Understand	CO1	AEC802.2
10	What is the function of communication functional block in an IoT systems?	Remember	CO1	AEC802.2
UNIT-II IoT AND M2M				
PART – A (SHORT ANSWER QUESTIONS)				
1	Write a short note on M2M?	Understand	CO2	AEC802.4
2	Give the purpose of communication protocols used in M2M?	Remember	CO2	AEC802.4
3	State Software Defined Networking?	Remember	CO2	AEC802.4
4	Discuss the purpose of Conventional Networks?	Remember	CO2	AEC802.4
5	List the advantages of SDN?	Understand	CO2	AEC802.4
6	What is Network Function Virtualization?	Understand	CO2	AEC802.5
7	State the differences and similarities between IoT and M2M?	Remember	CO2	AEC802.5
8	How do data collection and analysis approaches differ in M2M and IoT?	Remember	CO2	AEC802.5
9	Differentiate between configuration and state data?	Understand	CO2	AEC802.4
10	What is the function of a data model manager?	Understand	CO2	AEC802.4
11	Explain is M2M gate way?	Understand	CO2	AEC802.4
12	State are communication protocols in IoT	Understand	CO2	AEC802.4
13	State are communication protocols in M2M	Understand	CO2	AEC802.4
14	Write a short note on SDN?	Understand	CO2	AEC802.4
15	Write a short note on M2M?	Understand	CO2	AEC802.4
PART – B (LONG ANSWER QUESTIONS)				
1	Differentiate between IoT and M2M.	Remember	CO2	AEC802.4

2	Explain the limitations of conventional network architectures.	Understand	CO2	AEC802.5
3	Discuss about the key elements of SDN	Understand	CO2	AEC802.4
4	Describe how SDN can be used for various levels of IoT.	Remember	CO2	AEC802.5
5	What is the function of a centralized network controller in SDN.	Understand	CO2	AEC802.6
6	Define network function virtualization and explain with neat diagram.	Remember	CO2	AEC802.6
7	Discuss about network function virtualization with example.	Understand	CO2	AEC802.6
8	Describe the IoT system management in detailed.	Remember	CO2	AEC802.5
9	What is the role of IoT NETCONF-YANG management?	Remember	CO2	AEC802.6
10	Discuss about the IoT NETCONF-YANG with components.	Remember	CO2	AEC802.6
11	Differentiate between IoT and M2M.	Remember	CO2	AEC802.4
12	Explain the limitations of conventional network architectures.	Understand	CO2	AEC802.5
13	Discuss SDN architecture in detail	Understand	CO2	AEC802.4
14	Describe how SDN can be used for various levels of IoT.	Remember	CO2	AEC802.5
15	Describe how SDN is used for different IoT levels	Remember	CO2	AEC802.6
16	Describe how NFV is used for virtualization of IoT	Remember	CO2	AEC802.4
17	Difference between SDN and NFV	Understand	CO2	AEC802.5
18	What is the function of centralized network controller in SDN?	Understand	CO2	AEC802.4
19	Which communication protocols are used in M2M local area network?	Remember	CO2	AEC802.5
20	Describe YANG hierarchical structure with data types.	Remember	CO2	AEC802.6
PART – C (CRITICAL THINKING QUESTIONS)				
1	What is the function of centralized network controller in SDN? Differentiate between SDN and NVF?	Understand	CO2	AEC802.4
2	What are the differences between Machines in M2M and things in IoT and communication protocols in M2M and IoT?	Understand	CO2	AEC802.4
3	Why is network wide configuration important for IoT system with multiple nodes? Explain with an illustration.	Understand	CO2	AEC802.5
4	What is NETCONF server explain its significance in IoT system Management with NETCONF- YANG?	Understand	CO2	AEC802.4
5	Describe the roles of YANG and Trans API modules in device management, with a neat sketch.	Understand	CO2	AEC802.5
UNIT-III IOT ARCHITECTURE AND PYTHON				
PART – A (SHORT ANSWER QUESTIONS)				
1	Define node.	Understand	CO2	AEC802.7
2	What is gateway?	Remember	CO2	AEC802.7
3	State node structure used in IoT.	Understand	CO2	AEC802.7
4	What is state of art?	Remember	CO2	AEC802.8
5	List out various IoT devices used in reference model?	Understand	CO2	AEC802.8
6	Define package?	Remember	CO2	AEC802.7
7	Differentiate procedure oriented programming and object oriented programming?	Understand	CO2	AEC802.9

8	What is the use of keyword argument in Python?	Understand	CO2	AEC802.7
9	Illustrate the IoT data types and data structures with example?	Remember	CO2	AEC802.7
10	Explain working with lists in Python?	Understand	CO2	AEC802.8
11	Explain control flow in computer networks	Remember	CO2	AEC802.7
12	Illustrate importing of packages from Arduino software	Understand	CO2	AEC802.8
13	List out packages required for humidity sensor	Remember	CO2	AEC802.7
PART – B (LONG ANSWER QUESTIONS)				
1	Explain the architecture reference model IoT.	Remember	CO2	AEC802.7
2	Demonstrate the IoT architecture with diagram and explain.	Understand	CO2	AEC802.8
3	Describe the working of modules in Python.	Understand	CO2	AEC802.9
4	Illustrate the IoT data types and data structures with example.	Remember	CO2	AEC802.7
5	Explain about, i) control flow ii) packages iii) file handling of IoT.	Remember	CO2	AEC802.7
6	What type of Architecture reference model is used for IoT and explain.	Understand	CO2	AEC802.8
7	Discuss about IoT reference model with diagram.	Remember	CO2	AEC802.8
8	What is State of the art introduction of IoT architecture?	Understand	CO2	AEC802.9
9	Explain about various stages of IoT with neat diagram.	Remember	CO2	AEC802.8
10	What is the importance of IoT architecture and explain?	Understand	CO2	AEC802.8
PART – C (CRITICAL THINKING QUESTIONS)				
1	An Architectural Reference Model (ARM) can be visualized as the <i>matrix</i> that eventually derives into a large set of concrete IoT architectures. Justify your answer with neat diagram.	Understand	CO2	AEC802.8
2	In any metamorphic representation IoT ARM can be represented in the form of a tree. Represent it and explain its parts realte to IoT.	Understand	CO2	AEC802.7
3	The foundation of the IoT Reference Model is the IoT Domain Model, which introduces the main concepts of the Internet of Things like Devices, IoT Services and <i>Virtual Entities</i> (VE). Justify your answer with a neat sketch and explain.	Understand	CO2	AEC802.8
4	What is the difference between a Python module and a package? Illustrate with an example.	Understand	CO2	AEC802.9
5	How is function overriding implemented in Python? Explain with an example.	Understand	CO2	AEC802.8
6	Difference between physical and virtual entry	Understand	CO2	AEC802.9
7	What is the purpose of information model?	Understand	CO2	AEC802.9
8	Discuss in detail about IoT reference model with diagram.	Understand	CO2	AEC802.9
9	Discuss State of the art introduction of IoT architecture?	Understand	CO2	AEC802.9
UNIT – IV				
IoT PHYSICAL DEVICES AND END POINTS				
PART – A (SHORT ANSWER QUESTIONS)				
1	What are the basic building blocks of an IoT device?	Remember	CO3	AEC802.10
2	List out the Raspberry Pi interfaces?	Remember	CO3	AEC802.10

3	Write about Raspberry Pi?	Remember	CO3	AEC802.10
4	Write the purpose of Serial Raspberry Pi interface?	Remember	CO3	AEC802.11
5	Write the purpose of SPI Raspberry Pi interface?	Remember	CO3	AEC802.11
6	Write the purpose of I2C Raspberry Pi interface?	Remember	CO3	AEC802.12
7	What are the various components/peripherals labeled with the Raspberry Pi board?	Understand	CO3	AEC802.12
8	How is Raspberry Pi different from a Desktop computer?	Understand	CO3	AEC802.12
9	What is the use of GPIO pins?	Remember	CO3	AEC802.12
10	What is Cubieboard?	Remember	CO3	AEC802.12
11	Write short note on pcDuino?	Remember	CO3	AEC802.11
12	Discuss about BeagleBone Black.	Remember	CO3	AEC802.12
13	Write about Arduino	Understand	CO3	AEC802.12
14	Write the purpose of Arduino digital pins	Remember	CO3	AEC802.12
15	Write about the purpose of analog pin	Remember	CO3	AEC802.12
PART – B (LONG ANSWER QUESTIONS)				
1	Discuss various building blocks of IoT with help of neat sketch.	Understand	CO4	AEC802.12
2	What is Raspberry Pi? Explain Raspberry Pi board with various components?	Remember	CO4	AEC802.10
3	Discuss Raspberry Pi GPIO with PINs.	Remember	CO4	AEC802.12
4	Demonstrate Raspberry Pi with interfacing LED.	Understand	CO4	AEC802.11
5	Explain about Raspberry Pi interfaces.	Understand	CO4	AEC802.11
6	Write a Python program for blinking LED with Raspberry Pi?	Remember	CO4	AEC802.10
7	What is the impact of Internet of Things having on Healthcare sector?	Understand	CO4	AEC802.10
8	What are the different sectors where the Internet of Things can actually add value to the current processes?	Understand	CO4	AEC802.11
9	Explain why energy consumption will be an issue when the Internet of Things is implemented?	Understand	CO4	AEC802.12
10	What are the main challenges of the Internet of Things implementation?	Remember	CO4	AEC802.11
11	Discuss various building blocks of IoT with help of neat sketch.	Understand	CO4	AEC802.10
12	Discuss the steps to download Arduino software	Remember	CO4	AEC802.12
13	Illustrate an LED with Arduino	Understand	CO4	AEC802.11
PART – C (CRITICAL THINKING QUESTIONS)				
1	How Raspberry Pi different from a desktop computer? Justify your answer with an illustration.	Understand	CO4	AEC802.10
2	Write a Python program for controlling an LED with a switch.	Understand	CO4	AEC802.11
3	Write a Python program for sending an email on switch press.	Understand	CO4	AEC802.12
4	Write a Python program for switching LED/Light based on reading LDR reading.	Understand	CO4	AEC802.12
5	Which are alternatives to Raspberry Pi? Explain with neat diagrams.	Understand	CO4	AEC802.10

UNIT-V				
IoT PHYSICAL SERVERS AND CLOUD OFFERINGS				
PART – A (SHORT ANSWER QUESTIONS)				
1	What is Arduino?	Remember	CO4	AEC802.14
2	Write short note on web application messaging protocol?	Understand	CO4	AEC802.14
3	Discuss the importance of XML in IoT?	Understand	CO4	AEC802.13
4	Define Virtual workspaces?	Remember	CO4	AEC802.15
5	List out the cloud storage models?	Understand	CO4	AEC802.13
6	What is Xively cloud service?	Understand	CO4	AEC802.15
7	What is Boto?	Remember	CO4	AEC802.15
8	What is Autobahn for IoT?	Understand	CO4	AEC802.15
9	What are the features of Autobahn?	Understand	CO4	AEC802.15
10	Write a short note on about Scikit-learn package?	Remember	CO4	AEC802.14
PART – B (LONG ANSWER QUESTIONS)				
1	Define WAMP protocol and explain WAMP concept.	Remember	CO4	AEC802.14
2	With an example discuss about IoT application with Amazon Auto Scaling by using Python code.	Understand	CO4	AEC802.14
3	Explain about IoT cloud with home automation.	Understand	CO4	AEC802.13
4	Discuss about the analysis of IoT with smart environment.	Remember	CO4	AEC802.15
5	Explain about Xively Cloud for IoT.	Understand	CO4	AEC802.13
6	What are the risks and challenges that we should be aware of when it comes to the Internet of Everything?	Understand	CO4	AEC802.15
7	Explain the concept of Home Automation using IoT.	Remember	CO4	AEC802.15
8	What are the impacts that can be observed in implementing internet of Things on Agriculture sector?	Understand	CO4	AEC802.15
9	What Impacts will the Internet Of Things have on infrastructure and smart cities sector?	Understand	CO4	AEC802.15
10	Compare the contrast the difference between Wireless Sensor Network (WSN) and Internet Of Things (IoT)?	Remember	CO4	AEC802.14
PART – C (CRITICAL THINKING QUESTIONS)				
1	What does a Map Reduce job comprise of? Explain with an example.	Understand	CO4	AEC802.13
2	What are the uses of message queues? What are the message formats supported by Amazon SQS? Explain.	Understand	CO4	AEC802.15
3	What is Amazon Dynamo DB? Describe an application that can benefit from Amazon Dynamo DB.	Understand	CO4	AEC802.14
4	Extend the functionality of the home intrusion detection IoT system by interfacing a webcam. Implement a function in the controller to capture an image from the webcam and send it as an attachment in the email alert when an intrusion is detected.	Understand	CO4	AEC802.15
5	Implement the air pollution monitoring system using the web Socket approach.	Understand	CO4	AEC802.13

Prepared by:

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