INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

Course Title	**INTERNET OF THINGS**				
Course Code	AITB20				
Program	B.Tech				
Semester	VI	CSE			
Course Type	Elective				
Regulation	IARE - R18				
Course Structure	Theory			Practical	
	Lecture	Tutorials	Credits	Laboratory	Credits
	3	-	3	-	-
Course Coordinator	Ms. B Anupama, Assistant Professor				

COURSE OBJECTIVES:

The students will try to learn:

I	The significance of the Internet of Things
II	The sensors, actuators and communication protocols used for establishing communication in M2M.
III	The real time IoT applications related to smart environments.

COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Recall** design and characteristics of IoT for reuse of deployed IoT resources across application domains.	Remember
CO 2	**Illustrate** levels of IoT for storage of data either in local server or cloud.	Understand
CO 3	**Relate** most common ways of communication models for accessing data from sensors and actuators.	Understand
CO 4	**Identify** the differences between Machine to Machine and IoT for data exchange between devices.	Apply
CO 5	**Recall** network control functions (SDN &NFV) for communication with hardware infrastructure and direct traffic on a network.	Remember

CO 6	**Demonstrate** device management with NETCONFG-YANG for configuration data and manipulating configuration data on network.	Understand
CO 7	**Relate** architectural reference model for managing access control of IoT devices and the data they publish.	Understand
CO 8	**Identify** the necessity of communication protocols for overcoming issues like failure of any connected devices.	Apply
CO 9	**Demonstrate** importance of raspberry Pi interfaces (SPI, I2C) for connecting other devices/sensors to communicate with pi.	Understand
CO 10	**How** to set up the Raspberry Pi environment, get a Linux operating system running, for executing some basic Python code on the Raspberry Pi.	Remember
CO 11	**Choose** cloud storage models that are scalable & available on Demand	Apply
CO 12	**Identify** application program interface (REST, Communication)for better interchange of data between devices.	Apply

QUESTION BANK:

Q.No	QUESTION	Taxonomy	How does this subsume the level	CO's
MODULE I				
INTRODUCTIONTO INTERNET OF THINGS (IoT)				
PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				
1	Describe with an example of IoT service that uses Publish-subscribe and web socket based communication.	Understand	Recall the concept of IOT and Explain IoT service	CO1
2	Determine the IoT levels for designing home automation IoT system including smart lighting and intrusion detection.	Remember	—	CO1
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	Recall the concept of IOT and Explain various communication models	CO1

4	In Forest fire detection which level of IoT is used? Explain with a neat diagram and its working principle.	Understand	Recall the concept of IOT and Explain level of IoT	CO1
5	Determine the IoT levels for designing structural health monitoring. Explain with a neat diagram.	Remember	—	CO1
6	What is the role of coordinator in wireless sensor network	Understand	Recall the concept of IOT and Explain role of coordinator in wireless sensor network	CO1
7	What are architectural constraints of REST?	Understand	Recall the concept of IOT and Explain architectural constraints of REST	CO1
8	What is the role of controller service in IoT systems?	Understand	Recall the concept of IOT and Explain role of controller service	CO1
9	Describe an example of IoT service with an example of web-based communication model	Understand	Recall the concept of IOT service and Explain web-based communication model	CO1
10	What is the function of communication functional block in IoT systems?	Remember	—	CO1
PART-B LONG ANSWER QUESTIONS				
1	Discuss the characteristic of IoT. Explain them briefly.	Understand	Recall the concept of IOT and explain characteristic of IoT	CO1
2	What are applications of IoT? Explain in detail.	Remember	—	CO1
3	Demonstrate the physical design of IoT with Things of IoT and protocols of IoT.	Remember	—	CO1
4	Write the logical design of IoT with communication models.	Understand	Recall the concept of IOT and explain logical design of IOT	CO1
5	Explain the IoT communication APIs and its importance.	Understand	Recall the concept of IOT and explain communication APIs	CO1
6	Discuss about any three IoT enabling technologies.	Remember	—	CO1
7	Illustrate the IoT level 1 with neat diagram.	Understand	Recall the concept of IOT and explain IoT level 1	CO1

8	Differentiate the IoT level 2 and level 4 in detailed.	Understand	Recall the concept of IOT and explain IoT level 2	CO1
9	Explain the IoT level 3 and level 5 with diagrams.	Understand	Recall the concept of IOT and explain IoT level 3	CO1
10	Define the various domain specific of IoT	Understand	Recall the concept of IOT and explain various domain specific of IoT	CO1
11	Explain domain specific of IoT with home automation.	Remember	—	CO1
12	Explain physical design of IoT in detail.	Understand	Recall the concept of IOT and explain physical design of IoT	CO1
13	Explain Logical design of IoT in detail.	Understand	Recall the concept of IOT and explain Logical design of IoT	CO1
14	Write the logical design of IoT with communication models?	Remember	—	CO1
15	Explain the IoT communication APIs with neat diagrams.	Understand	Recall the concept of IOT and explain communication APIs	CO1
16	Discuss about Trending IoT technologies.	Understand	Recall the concept of IOT and explain Trending IoT technologies	CO1
17	Illustrate the IoT level 1 with diagram.	Understand	Recall the concept of IOT and explain level 1 with diagram	CO1
18	Differentiate the IoT level 2, level 3 and level 4 in detailed.	Understand	Recall the concept of IOT and explain IoT level 2, level 3 and level 4 in detailed.	CO1
19	Differentiate logical design and physical design of IoT.	Remember	—	CO1
20	Explain domain specific of IoT with home automation example.	Understand	Recall the concept of IOT and Explain domain specific of IoT with home automation example.	CO1
PART-C SHORT ANSWER QUESTIONS				
1	What is IoT? Write short notes on IoT.	Remember	—	CO1
2	List any four characteristics of IoT.	Remember	—	
3	State the importance of IoT.	Remember	—	CO1

4	What is the Thing in IoT?	Understand	Recall the thing of IOT and explain process done in IOT	CO1
5	State about the importance of Thing in IoT.	Remember	—	CO1
6	Write the any three functions of IoT?	Understand	Recall the function of IOT and explain about three functions of IOT	CO1
7	What are design factors IoT?	Understand	Recall the function of IOT and explain about design factors of IOT	CO1
8	What are the interfaces of WSN?	Remember	—	CO1
9	Define link layer protocols in IoT.	Remember	—	CO1
10	State any four domain specific IoT applications.	Remember	—	CO1
11	State about the importance of Thing in IoT.	Understand	Recall the function of IOT and explain about importance of Thing in IoT	CO1
12	Write the functions of IoT.	Understand	Recall the function of IOT and explain about functions of IoT	CO1
13	What are design factors IoT?	Remember	—	CO1
14	What are applications of IoT?	Remember	—	CO1
15	Explain the IoT communication.	Remember	—	CO1
MODULE II				
IoT AND M2M				
PART-A PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				
1	What is the function of centralized network Controller in SDN? Differentiate between SDN and NVF	Understand	Recall the concept of M2M and explain function of centralized network Controller in SDN, Analyze Differentiate between SDN and NVF?	CO2
2	What are the differences between Machines in M2M and things in IoT and communication protocols in M2M and IoT?	Understand	Recall the concept of M2M and explain communication protocols in M2M and IoT	CO2

3	Why is network wide configuration important for IoT systems with multiple nodes? Explain with an Illustration.	Understand	Recall the concept of M2M and explain network wide configuration important for IoT systems	CO2
4	What is NETCONF server explain its significance in IoT system Management with NETCONF- YANG?	Understand	Recall the concept of M2M and explain NETCONF server	CO2
5	Describe the roles of YANG and Trans API modules in device management, with a neat sketch.	Understand	Recall the concept of YANG and Trans API modules in device management, with a neat sketch.	CO2
PART-B LONG ANSWER QUESTIONS				
1	Differentiate between IoT and M2M.	Remember	—	CO2
2	Explain the limitations of conventional network architectures.	Understand	Recall the concept of M2M and explain limitations of conventional network architectures.	CO2
3	Discuss about the key elements of SDN	Understand	Recall the concept of M2M and explain key elements of SDN	CO2
4	Describe how SDN can be used for various levels of IoT.	Remember	—	CO2
5	What is the function of a centralized network controller in SDN.	Understand	Recall the concept of M2M and explain centralized network controller in SDN.	CO2
6	Define network function virtualization and explain with neat diagram.	Remember	—	CO2
7	Discuss about network function virtualization with example.	Understand	Recall the concept of M2M and explain network function virtualization	CO2
8	Describe the IoT system management in detailed.	Remember	—	CO2
9	What is the role of IoT NETCONF-YANG management?	Remember	—	CO2
10	Discuss about the IoT NETCONF-YANG with components.	Remember	—	CO2

11	Differentiate between IoT and M2M.	Remember	—	CO2
12	Explain the limitations of conventional network architectures.	Understand	Recall the concept of M2M and explain limitations of conventional network architectures.	CO2
13	Discuss SDN architecture in detail	Understand	Recall the concept of M2M and explain SDN architecture in detail	CO2
14	Describe how SDN can be used for various levels of IoT.	Remember	—	CO2
15	Describe how SDN is used for different IoT levels	Remember	—	CO2
16	Describe how NFV is used for virtualization of IoT	Remember	—	CO2
17	Difference between SDN and NFV	Understand	Recall the concept of M2M and explain Difference between SDN and NFV	CO2
18	What is the function of centralized network controller in SDN.	Understand	Recall the concept of M2M and explain function of centralized network controller in SDN	CO2
19	Which communication protocols are used in M2M local area network?	Remember	—	CO2
20	Describe YANG hierarchical structure with data types	Remember	—	CO2
PART-C SHORT ANSWER QUESTIONS				
1	Write a short note on M2M?	Understand	Recall the concept of M2M and write a short note on it	CO2
2	Give the purpose of communication protocols used in M2M?	Remember	—	CO2
3	State Software Defined Networking?	Remember	—	CO2
4	Discuss the purpose of Conventional Networks?	Remember	—	CO2
5	List the advantages of SDN?	Understand	Recall the concept of M2M and explain advantages of SDN	CO2

6	What is Network Function Virtualization?	Understand	Recall the concept of M2M and explain Network Function Virtualization	CO2
7	State the differences and similarities between IoT and M2M?	Remember	—	CO2
8	How do data collection and analysis approaches differ in M2M and IoT?	Remember	—	CO2
9	Differentiate between configuration and state data?	Understand	Recall the concept of M2M and Differentiate between configuration and state data	CO2
10	What is the function of a data model manager?	Understand	Recall the concept of M2M and explain function of a data model manager.	CO2
11	Explain is M2M gate way?	Understand	Recall the concept of M2M and explain M2M gate way	CO2
12	State are communication protocols in IoT	Understand	Recall the concept of M2M and explain communication protocols in IoT	CO2
13	State are communication protocols in M2M	Understand	Recall the concept of M2M and explain communication protocols in M2M	CO2
14	Write a short note on SDN?	Understand	Recall the concept of M2M and explain short note on SDN	CO2
15	Write a short note on M2M?	Understand	Recall the concept of M2M and explain short note on M2M	CO2
MODULE III				
IoT ARCHITECTURE AND PYTHON				
PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				
1	An Architectural Reference Model (ARM) can be visualized as the matrix that eventually derives into alarge set of concrete IoT architectures. Justify your answer with neat diagram.	Understand	Analyze the Architectural Reference Model and visualized as the matrix that eventually derives into a large set of concrete IoT architectures.	CO2

2	In any metamorphic representation IoT ARM canrepresented in the form of a tree. Represent it and explain its parts relate to IoT.	Understand	Analyze the Architectural Reference Model and represent in the form of a tree	CO2
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 Virtual Entities (VE). Justify your answer with a neat sketch and explain.	Understand	Recall the concept of IOT Architecture and explain IoT Domain Model with introduces the main concepts of the Internet of Things like Devices,IoT C	O2
4	What is the difference between a Python module and a package? Illustrate with an example.	Understand	Recall the concept of IOT Architecture and explain difference between a Python module and a package	CO2
5	How is function overriding implemented in Python? Explain with an example.	Understand	Recall the concept of IOT Architecture and explain function overriding implemented in Python	CO3
6	Difference between physical and virtual entry	Understand	Recall the concept of IOT Architecture and explain Difference between physical and virtual entry	CO3
7	What is the purpose of information model?	Understand	Recall the concept of IOT Architecture and explain purpose of information model	CO3
8	Discuss in detail about IoT reference model with diagram.	Understand	Recall the concept of IOT Architecture and explain IoT reference model with diagram.	CO3
9	Discuss State of the art introduction of IoT architecture?	Understand	Recall the concept of IOT Architecture and explain State of the art introduction of IoT architecture	CO3
PART-B LONG ANSWER QUESTIONS				
1	Explain the architecture reference model IoT.	Remember	—	CO2

2	Demonstrate the IoT architecture with diagram and explain.	Understand	Analyze the concept of IOT Architecture and explain IoT architecture with diagram	CO2
3	Describe the working of modules in Python.	Understand	Analyze the concept of IOT Architecture and explain working of modules in Python	CO2
4	Illustrate the IoT data types and data structures with example.	Remember	—	CO2
5	Explain about i) control flow ii) packages iii) file handling of IoT.	Remember	—	CO2
6	What type of Architecture reference model is used for IoT and explain.	Understand	Analyze the concept of IOT Architecture and explain Architecture reference model CO2	
7	Discuss about IoT reference model with diagram.	Remember	—	CO2
8	What is State of the art introduction of IoT architecture?	Understand	Recall the concept of IOT Architecture and explain State of the art introduction of IoT architecture	CO2
9	Explain about various stages of IoT with neat diagram.	Remember	—	CO2
10	What is the importance of IoT architecture and explain?	Understand	Recall the concept of IOT Architecture and explain importance of IoT architecture	CO2
PART-C SHORT ANSWER QUESTIONS				
1	Define node.	Understand	Recall the concept of IOT Architecture and Define node	CO2
2	What is gateway?	Remember	—	CO2
3	State node structure used in IoT.	Understand	Recall the concept of IOT Architecture and State node structure	CO2
4	What is state of art?	Remember	—	CO2
5	List out various IoT devices used in reference model?	Understand	Recall the concept of IOT Architecture and List out various IoT devices used in reference model	CO2

6	Define package?	Remember	—	CO2
7	Differentiate procedure oriented programming and object oriented programming?	Understand	Recall the concept of IOT Architecture and Differentiate procedure oriented programming and object oriented programming	CO2
8	What is the use of keyword argument in Python?	Understand	Recall the concept of IOT Architecture and explain keyword argument in Python	CO2
9	Illustrate the IoT data types and data structures with example?	Remember	—	CO2
10	Explain working with lists in Python?	Understand	Recall the concept of IOT Architecture and explain working with lists in Python	CO2
11	Explain control flow in computer networks	Remember	—	CO2
12	Illustrate importing of packages from Arduino software	Understand	Recall the concept of IOT Architecture and explain packages from Arduino software	CO2
13	List out packages required for humidity sensor	Remember	—	CO2
MODULE IV				
IoT PHYSICAL DEVICES AND ENDPOINTS				
PART A- PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				
1	How Rasberry Pi different from a desktop computer? Justify your answer with an illustration.	Understand	Analyze different physical devices and justify Rasberry Pi different from a desktop computer	CO7
2	Write a Python program for controlling an LED with a switch.	Understand	Remember the physical devices and construct Python program for controlling an LED with a switch	CO9
3	Write a Python program for sending an email on switch press.	Understand	Remember the physical devices and construct Python program for sending an email on switch press.	CO7

4	Write a Python program for switching LED/Light based on reading LDR reading.	Understand	Remember the physical devices and construct Python program for switching LED/Light based on reading LDR reading	CO8
5	Which are alternatives to Rasberry Pi? Explain with neat diagrams.	Understand	Recall the concept of physical devices in IoT and explain Which alternatives to Raspberry Pi are? Explain with neat diagrams.	CO8
PART-B LONG ANSWER QUESTIONS				
1	Discuss various building blocks of IoT with help of neat sketch.	Understand	Recall the concept of IoT physical devices and explain various building blocks of IoT with help of neat sketch.	CO5
2	What is Raspberry Pi? Explain Raspberry Pi board with various components?	Remember	—	CO5
3	Discuss Raspberry Pi GPIO with PINs.	Remember	—	CO4
4	Demonstrate Raspberry Pi with interfacing LED.	Understand	Remember the concept of IoT physical devices and explain Raspberry Pi with interfacing LED	CO5
5	Explain about Raspberry Pi interfaces.	Understand	Remember the concept of IoT physical devices and explain Raspberry Pi interfaces	CO6
6	Write a Python program for blinking LED with Raspberry Pi?	Remember	—	CO7
7	What is the impact of Internet of Things having on Healthcare sector?	Understand	Remember the concept of IoT physical devices and explain impact of Internet of Things having on Healthcare sector	CO7
8	What are the different sectors where the Internet of Things can actually add value to the current processes?	Understand	Remember the concept of IoT physical devices and explain different sectors where the Internet of Things can actually add value to the current processes	CO6

9	Explain why energy consumption will be an issue when the Internet of Things is implemented?	Understand	Remember the concept of IoT physical devices and explain why energy consumption will be an issue when the Internet of Things is implemented?	CO6
10	What are the main challenges of the Internet of Things implementation?	Remember	—	CO6
11	Discuss various building blocks of IoT with help of neat sketch.	Understand	Remember the concept of IoT physical devices and explain various building blocks of IoT with help of neat sketch	CO6
12	Discuss the steps to download Arduino software	Remember	—	CO6
13	Illustrate an LED with Arduino	Understand	Remember the concept of IoT physical devices and explain LED with Arduino	CO6
PART-C SHORT ANSWER QUESTIONS				
1	What are the basic building blocks of an IoT device?	Remember	—	CO4
2	List out the Raspberry Pi interfaces?	Remember	—	CO4
3	Write about Raspberry Pi?	Remember	—	CO4
4	Write the purpose of Serial Raspberry Pi interface?	Remember	—	CO4
5	Write the purpose of SPI Raspberry Pi interface?	Remember	—	CO4
6	Write the purpose of I2C Raspberry Pi interface?	Remember	—	CO4
7	What are the various components/peripherals labeled with the Raspberry Pi board?	Understand	Recall the concept of IoT physical devices and explain various components/peripherals labeled with the Raspberry Pi board	CO4
8	How is Raspberry Pi different from a Desktop computer?	Understand	Recall the concept of IoT physical devices and explain How is Raspberry Pi different from a Desktop computer	CO4
9	What is the use of GPIO pins?	Remember	—	CO4

10	What is Cubie board?	Remember	—	CO4
11	Write short note on pc Duino?	Remember	—	CO4
12	Discuss abot Beagle Bone Black.	Remember	—	CO4
13	Write about Arduino	Understand	Recall the concept of IoT physical devices and explain Arduino	CO4
14	Write the purpose of Arduino digital pins	Remember	—	CO4
15	Write about the purpose of analog pin	Remember	—	CO3
MODULE V				
IoT PHYSICAL SERVERS AND CLOUD OFFERINGS				
PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)				
1	What does a MapReduce job comprise of? Explain with an example.	Understand	Analyze the concept of python through IoT and explain MapReduce job	CO10
2	What are the uses of message queues? What are the message formats supported by Amazon SQS?Explain.	Understand	Analyze the concept of python through IoT and explain the uses of message queues	CO10
3	What is Amazon DynamoDB? Describe an application that can benefit from Amazon DynamoDB.	Understand	Analyze the concept of python through IoT and explain application that can benefit from Amazon DynamoDB	CO12
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	Analyze the concept of python through IoT and explain functionality of the home intrusion detection IoT system by interfacing a webcam	CO11
5	Implement the air pollution monitoring system using the webSocket approach.	Understand	Analyze the concept of python through IoT and explain air pollution monitoring system using the webSocket approach.	CO12

PART-B LONG ANSWER QUESTIONS				
1	Define WAMP protocol and explain WAMP concept.	Remember	—	CO7
2	With an example discuss about IoT application with Amazon Auto Scaling by using Python code.	Understand	Remember the concept of python with IoT and give example to discuss about IoT application with Amazon Auto Scaling by using Python code.+	CO7
3	Explain about IoT cloud with home automation.	Understand	Remember the concept of python with IoT and give example to discuss about IoT cloud with home automation	CO8
4	Discuss about the analysis of IoT with smart environment.	Remember	—	CO4
5	Explain about Xively Cloud for IoT.	Understand	Remember the concept of Xively Cloud and Explain about it.	CO6
6	What are the risks and challenges that we should be aware of when it comes to the Internet of Everything?	Understand	Remember the concept of physical servers and explain about risks and challenges	CO8
7	Explain the concept of Home Automation using IoT.	Remember	—	CO9
8	What are the impacts that can be observed in implementing internet of Things on Agriculture sector?	Understand	Remember the concept of physical servers and explain impacts that can be observed in implementing internet of Things on Agriculture sector	CO8
9	What Impacts will the Internet Of Things have on infrastructure and smart cities sector?	Understand	Remember the concept of physical servers and explain Impacts will the Internet Of Things have on infrastructure and smart cities sector	CO8
10	Compare the contrast the difference between Wireless Sensor Network (WSN) and Internet of Things (IoT)?	Remember	—	CO9

PART-C SHORT ANSWER QUESTIONS				
1	What is Arduino?	Remember	—	CO4
2	Write short note on web application messaging protocol?	Understand	Recall the concept of IoT server and explain web application messaging protocol	CO4
3	Discuss the importance of XML in IoT?	Understand	Recall the concept of IoT server and explain importance of XML in IoT	CO4
4	Define Virtual workspaces?	Remember	—	CO4
5	List out the cloud storage models?	Understand	Recall the concept of IoT server and explain cloud storage models	CO4
6	What is Xively cloud service?	Understand	Recall the concept of IoT server and explain Xively cloud service	CO4
7	What is Boto?	Remember	—	CO4
8	What is Autobahn for IoT?	Understand	Recall the concept of IoT server and explain Autobahn for IoT	CO4
9	What are the features of Autobahn?	Understand	Recall the concept of IoT server and explain features of Autobahn	CO7
10	Write a short note on about Scikit-learn package?	Remember	—	CO8

Course Coordinator:
Ms. B Anupama

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