PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST 1

Winter Semester: 2021 - 22

Course Code: ECE 297

Course Name: INTERNET OF THINGS

Program & Sem: B.Tech & VI

Date: 27/04/2022

Time: 10:00 a.m-11:00 a.m

Max Marks: 30

Weightage: 15%

Instructions:
Read the all questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries 2 marks.   **(5Qx 2M= 10M)**

Q.NO.1 Given the huge number of devices requiring simultaneous connectivity. What is the key challenges associated with the requirement.   (C.O.No.1) [Knowledge level]

Q.NO.2 BLE is designed for low-powered devices can help IoT devices conserve energy by maintaining the devices in sleep mode-until they are connected_____is the wireless technology standard for exchanging data over short distances among fixed and mobile device   (C.O.No.1) [Knowledge level]

Q.NO.3 The architecture of IoT depends upon its functionality and implementation in different sectors. Still, there is a basic process flow based on which IoT is built. _____ Lowest layer in the IoT architecture
(C.O.No.1)[Comprehension Level]

Q.NO.4 _____computing can also provide a path to accelerate and simplify data processing and provide needed insights where and when we need them   (C.O.No.2) [Knowledge level]

Q.NO.5 _____ acts as a network router, routing data between IoT devices and the cloud

(C.O.No.2) [Knowledge level]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries 6 marks.   **(2Qx6M=12M)**

Q.NO. 6 There will have millions and billons of devices connected and will be part of IOT network Each of them try to communicate with each device inside the network and outside the network.

A) How do they identify the correct device and which method is used for the same?

B) Which the way these devices are named?

C) Differentiate these addressing ways in terms of no of devices they can name and other distinguishable points?   (C.O.No.1) [Comprehension level]

Q.NO. 7 A smart "Digital Camera Pen Recorder" is used for recording pictures (or videos) unobtrusively in situations like spying, meetings, taking lecture notes etc. The images or videos could be stored locally as well as they could be transmitted to cloud via a gateway. The central command (assume a military scenario, although debatable) may use the information for identification of the speaker's location, meeting scenarios and instruct the wearer for further necessary activities to be performed maybe on his/her mobile. Your task is to map the activities of all the processes for this system, that will be taken care at all the levels of The IoT World Forum (IoTWF) Standardized Architecture   (C.O.No.1) [Comprehension level]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries 8 marks.   **(1Qx8M=8M)**

Q.NO. 8. India's smart city program hopes to revolutionize city life and improve the quality of life for India's urban population. In the absence of a zonal plan, many parts of Dehradun have witnessed haphazard development over the years, which has already caused much damage to the vision of a planned smart city. Smart City would require smart economy, bright people, smart organization, smart communication, smart engineering, smart transit, fresh environment and bright living. Nevertheless, with mass migration leading to basic problems, like water shortages and overcrowding, the rate at which these cities will be developed will be the key. Several initiatives are being led by the Government of India to convert 100 Cities into Smart Cities.

List and illustrate various design challenges faced to promote the sustainable development of urban development of the cities   (C.O.No. 2) [Application level]

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TEST 1

Winter Semester: 2021 - 22

Course Code: ECE 297

Course Name: INTERNET OF THINGS

Program & Sem: B.Tech & VI Sem

Date: 27th April 2022

Time: 10:00 AM to 11:00 AM

Max Marks: 30

Weightage: 15%

Instructions:
Read the all questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries 2 marks. **(5Qx 2M= 10M)**

1 IoT Technology is playing a key role in industry 4.0 a future technology. List the IoT components that are part of IoT architecture. (C.O.No.1) [Knowledge level]

2 Devices connected in IoT technology has Capability to adapt with changing context and take necessary actions based on condition. Statement- Within IoT architecture they have to work with different communication protocol to communicate with other devices and infrastructure. Which are the two property we will be expecting to support above statement. (C.O.No.1) [Knowledge level]

3 IoT allows things in the physical world to interact with the virtual world through a communication network enabling exchange and sharing of context aware information with each other. List minimum two physical world and virtual world things. (C.O.No.1) [Knowledge level]

Q.No.4. IoT devices can connect to cloud or other devices directly This communication is possible through application layer protocol like. Match them correctly.

1. MQTT.
2. CoAP
3. DDS-
4. AMQP-

A) Data Distribution Service
B) Advanced Message Queuing Protocol
C) Message Queuing Telemetry Transport
D) Constrained Application Protocol

(C.O.No.1) [Comprehension Level]

4. The physical layer of the IoT architecture deals with physical quantity while processing them we need to have different representation of them----------- is the device usually used which converts one form of energy into another. (C.O.No.2) [Knowledge level]

5 This sensor measure distance of the object. Based on the velocity how much time it takes the sound wave to transmit and the deflected wave received back. Identify the type of sensor mentioned in the statement above. (C.O.No.2) [Knowledge level]

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries 6 marks. **(2Qx6M=12M)**

6 Secure communication, resulting in a secure exchange of data between Operational Technology (OT) and Information Technology (IT), is the backbone of digitalization. Industrial networks and office networks both use Ethernet-based communication, but they differ in several ways. Both networks have highly specific requirements in IOT ecosystems.

   A. Discuss the importance of IT and OT system in Internet of Things systems.
   B. Explain with architecture diagram.

(C.O.No.1) [Comprehension level]

Q.NO 7. The IoT based surveillance cameras system consist of several cameras, can change their modes from normal to infrared night mode based on weather and based on day or night. The camera can modify the resolution from lower to higher when they detect the motion and communicate with other cameras to modify themselves.

   A. Identify the characteristic in the above application which is making it more demandable for IoT based application.
   B. List 4 more characteristic of IoT application design.

(C.O.No.1) [Comprehension level]

Part C [Problem Solving Questions]

Answer the Question. The question carries 8 marks. **(1Qx8M=8M)**

Q.NO. 8 You have been asked to design an assisting device (sensors and actuators fitted in the foldable stick) for persons suffering with blindness. Among the 7 design principles of IoT, discussed in lectures: Focus on value, take a holistic view, put safety first, Consider the context, Build a strong brand, Prototype early and often, Use data responsibly. Which of the important four characteristics will influence your design and why? Justify your answer in a tabular format by citing the sensors and actuators used in your design. (C.O.No.1) [Comprehension level]

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST 2

Winter Semester: 2021 - 22

Course Code: ECE 297

Course Name: INTERNET OF THINGS

Program & Sem: B.Tech & VI sem

Date: 2nd June 2022

Time: 10:00 AM to 11:00 AM

Max Marks: 30

Weightage: 15%

Instructions:
Read the all questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks. **(5Qx 2M= 10M)**

Q.NO.1 Prototyping the IoT devices is costly affair hence many development boards are used for this purpose suggest 2 commonly used such development boards. (C.O.No.2) [Knowledge level]

Q.NO.2 SoC, is a single integrated chip (IC) that include components normally found in a standard computer system. List the components of the SOC (C.O.No.1) [Knowledge level]

Q.NO.3 Embedded devices use an on-chip bus to connect different peripherals to the ARM core. Name the bus classes and architecture level, also name the widely used on-chip bus architecture on ARM processors. (C.O.No.2) [Knowledge level]

Q.No.4.Various IoT development Boards are available in the market such as ARM Processors and Controllers. What are the crucial points based on it we will make a decision to choose a correct board. (C.O.No.2) [Knowledge Level]

Q.NO.5 To write a code we need to plug Arduino with the help of USB Cable and then we need to identify the port at which the board is visible. Write the interfacing steps required to do the Job. (C.O.No.2) [Knowledge level]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries SIX marks. **(2Qx6M=12M)**

Q.NO.6 Memory devices which are as smaller, faster are costlier where the memory devices in which are larger, slower are cheaper. How the memory selection process is made for embedded system or IoT system.? Explain the concept using suitable diagram.

(C.O.No.2) [Comprehension level]

Q.NO 7. Cloud computing has changed the way of living. Keeping all the data on the cloud and processing has been proved as efficient way for data processing in IoT application since computing power outclasses the capability of the things at the edge.

a) Compare the cloud Vs edge computing in terms of bandwidth, speed.
b) Give one example for each one.   (C.O.No.2) [Comprehension level]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries EIGHT marks.   (1Qx8M=8M)

Q.NO. 8 IoT based system is designed for dairy farm. Where more than 200ltr milk is processed step by step. The process needs to be monitored through various parameter to keep displaying the data to the super wiser for appropriate decision. To design a prototype for the same the following 3 conditions were mandatory.

1. The data is displayed on two LEDs.
2. The temp of the system should be 100 degrees centigrade.
3. When the temp goes above 100 degrees the LED must glow.

Design a architecture block diagram by showing the important components and write the program for the same.   (C.O.No.2) [Application Level]

PRESIDENCY UNIVERSITY
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SCHOOL OF ENGINEERING

END TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: ECE 297

Course Name: INTERNET OF THINGS

Program & Sem: B.Tech & VI Sem

Date: 1ˢᵗ July 2022

Time: 09.30 AM to 12.30 PM

Max Marks: 100

Weightage: 50%

Instructions:
Read all questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries 2 marks. **(15Qx 2M= 10M)**

Q.NO.1. A System on a Chip (SoC), is a single integrated chip (IC). List the major components present in it. [2] (C.O.No.2) [Knowledge level]

Q.NO.2. Prototype of IoT application is the need before final testing and many steps are used to design the prototype. What is the right sequence in prototyping a hardware module? A. Simulate B. Test C. Deploy D. Build [2] (C.O.No.2) [Knowledge level]

Q.NO.3. A standard interface for connecting a single-board computer or microprocessor to other devices is through General-Purpose Input/ Output (GPIO) pins. How many pins are used as digital input pins in Arduino? [2] (C.O.No.2) [Knowledge level]

Q.NO.4. LoRa network uses a star topology in which an end node can send messages to multiple gateways that communicate with the network server. Draw the LoRA network Architecture? [2] (C.O.No.2) [Knowledge level]

Q.NO.5. The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. Mention the two functions present in IDE. [2] (C.O.No.2) [Knowledge level]

Q.NO.6. To write a code we need to plug Arduino with the help of a USB Cable and then we need to identify the port at which the board is visible. Write the interfacing steps required to do the job. [2] (C.O.No.2) [Knowledge level]

Q.NO.7. Prototyping the IoT devices is a costly affair hence many development boards are used. For this purpose, suggest 2 commonly used development boards. [2] (C.O.No.2) [Knowledge level]

Q.NO.8. Various IoT development Boards are available in the market such as ARM Processors and Controllers. What are the crucial points based on which we will make a decision to choose the correct board? [2] (C.O.No.3) [Knowledge level]

Q.NO.9. Wearable technologies, known mostly just as "wearables," these are electronic devices that are physically worn by individuals in order to track, analyze and transmit personal data. List the architectural elements of Wearable IoT.   [2] (C.O.No.3) [Knowledge level]

Q.NO.10. Near Field Communication (NFC) technology allows users to make secure transactions, exchange digital content, and connect electronic devices with a touch. Mention the two modes of communication in it.   [2] (C.O.No.3) [Knowledge level]

Q.NO.11. In RFID, the data can be read from a distance with no contact or even line of sight necessary. List the components of RFID.   [2] (C.O.No.3) [Knowledge level]

Q.NO.12. Cloud computing refers to storing and accessing the data and programs on remote servers that are hosted on the internet instead of the computer's hard drive or local server. Mention the three of the main branches of cloud computing.   [2] (C.O.No.3) [Knowledge level]

Q.NO.13. Wearable Computer is a small portable computer that is designed to be worn on the body during use. List a few wearable device properties.   [2] (C.O.No.3) [Knowledge level]

Q.NO.14 The LAN, WAN, PAN are type of network which connects objects with each other. The----------- is the network of interconnected heterogeneous objects such as smart devices, smart objects, sensors, actuators, embedded computers, etc. uniquely addressable and based on standard communication protocols.   [2] (C.O.No.1) [Knowledge level]

Q.NO.15 A sensor node is a type of transducer that uses one type of energy, a signal of some sort, and converts it into a readable value for the purpose of information transfer. Mention the components of sensor nodes.   [2] (C.O.No.1) [Knowledge level]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries 10 marks.   **(3Qx10M=30 M)**

Q.NO.16 IoT application deals with large amount of data at the edge level, the final product expects the exact and precise visualization of the data by end user. Explain how the problem of this data handing is dealt in IoT application. What are various domains and methods used for converting the data into exact information. Explain with an example?   (C.O.No.2) [Comprehension level]

Q.NO17. Cloud is a utility which has helped the organization to reduce or eliminate their reliance on on-premises server, storage, and networking infrastructure.   (C.O.No 2) [Comprehension level]

   A. What are the cloud components?
   B. What are the benefits of cloud architecture?
   C. Describe three models presently used in IoT cloud?
   D. How cloud Architecture Works?

Q.NO.18 The Bruhat Bengaluru Mahanagara Palike (BBMP) has a plan to install NB-IoT enabled Smart Parking and Lighting System in Bangalore due to limited parking spaces in certain key areas. The NarrowBand-Internet of Things (NB-IoT) is a standards-based low power wide area (LPWA) technology developed to enable a wide range of new IoT devices and services. Some of the important features of NB-IoT: improves the power consumption of user devices, battery life of more than 10 years can be supported, can co-exist with 2G, 3G, and 4G mobile networks, all the security

and privacy features of mobile networks supported such as user identity confidentiality, entity authentication, confidentiality, data integrity, and mobile equipment identification.

BBMP will install sensors embedded into the street under the parking spaces which can sense when a space is free or empty by the presence of a vehicle above them. This status is then communicated through a Network Operator's NB-IoT radio access network which is linked to a Telecom network. The parking data are then collected by a local partner of the Network Operator (in turn connected to cloud), who provide a parking app that residents can use to view where there are parking spaces available. The app is then able to guide the driver direct to the available parking spot.

Your task is to map the activities of all the processes for this system, that will be taken care at all the levels of The IoT World Forum (IoTWF) Standardized Architecture. You can present your solution using a table by showing the activities and applicable resources.

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries 8 marks. **(2Qx20M=40M)**

Q.NO.19 Consider the scenario of a Smart Office Building situated in Delhi. On a humid evening after the normal working hours (6 PM), when all employees had left the office, the Manager gets a call (at 7.30PM IST) from an international collaborator in USA, that he needs to meet at least the manager himself and three of his subordinates in the boardroom of the office in Delhi. The manager informs immediately all three subordinates that they should reach before 8PM (all including the manger leave in nearby areas). Considering the smart connected building concepts, identify and list out at least four important activities that will be performed by various smart sensors and actuators till the meeting gets over in 2 hrs. (Please write you answer in minimum four bulleted points)
(C.O.No.3) [Comprehension level]

Q.NO.20 You have been asked to design an assisting device (sensors and actuators fitted in a wheel chair) for persons suffering with paralysis with movement impairments. Among the 7 design principles of IoT, discussed in lectures: Focus on value, Take a holistic view, Put safety first, Consider the context, Build a strong brand, Prototype early and often, Use data responsibly. Which of the important four characteristics will influence your design and why? Justify your answer by citing the sensors and actuators used in your design.
(C.O.No.3) [Application Level]