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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

**SUMMER TERM END TERM EXAMINATION - AUGUST 2024**

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| **Semester :5TH** | **Date : 06-08-2024** |
| **Course Code :ECE3075** | **Time :9.30am to 12.30pm** |
| **Course Name :IoT Architecture and Protocols** | **Max Marks :100** |
| **Program :B Tech** | **Weightage : 60%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 4 QUESTIONS 4Q X 5M=20M** | | | |
| 1 | The technology called IoT refer to the interconnectedness of physical devices, such as appliances and vehicles, that are embedded with software, sensors, and connectivity which enables these objects to connect and exchange data. **Relate all these functions with a simple formula. List and define all the components of**  **the functional blocks.** | (CO 1) | [Comprehension] |
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| 2 | IoT is a trend that is driving the ongoing digitization and datafication of society in many new and amazing ways. Self-driving cars, autonomous manufacturing robots, and remote medical devices that let doctors diagnose patients and even carry out surgery are all possible due to these networks of connected things.  **Discuss the technological trends in details that has shaped the IoT.** | (CO 1) | [Comprehension] |
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| 3 | To access, store and distribute the data through the IoT network we need communication models. The data may be transferred between clients and servers as well as between brokers and subscribers in the IoT network. Classify the communication models available in any IoT system. **Discuss the features of communication protocol which transfers data between brokers and**  **subscribers in an IoT system.** | (CO 3) | [Comprehension] |
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| 4 | An IoT system comprises of a number of blocks that provide the system the capabilities for identification, sensing, actuation, communication and  management. **Elaborate the differences between Sensor and Actuator.** | (CO 1) | [Comprehension] |
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| 5 | SoC, is a single integrated chip (IC) that include components normally found in a standard computer system. **List and explain the components of the SOC with a**  **neat diagram.** | (CO 1) | [Comprehension] |
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| 6 | Things are connected to each other through local networks and generated  enormous data which is sent to cloud. **Discuss any 2 communication models available for IOT design.** | (CO 3) | [Comprehension] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 7 | IoT World Forum offers a clean, simplified perspective on IoT and includes edge  computing, data storage, and access, also provides a succinct way of visualizing IoT from a technical perspective. **With a simple diagram discuss the**  **architecture of IoT world reference model.** | (CO 1) | [Comprehension] |
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| 8 | IoT devices communicate using IoT protocols. Internet protocol is a set of rules that dictates how data sent over the internet. IoT protocols ensure that information from one device or sensor gets read and understood by another device, a gateway, a service. **Differentiate between AMQP and HTTP**  **protocols with their working principle and neat diagram**. | (CO 3) | [Comprehension] |
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| 9 | IoT software addresses areas of networking and action through platforms, partner systems, and middleware. The individual and master applications are responsible for Data Collection, Application and Process Extension**. Briefly explain the**  **different processing steps of IoT Software.** | (CO 2) | [Comprehension] |
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| 10 | Cloud storage is a cloud computing model that enables storing data and files on the internet through a cloud computing provider that you access either through the public internet or a dedicated private network connection. **Elaborate the**  **importance of Cloud storage. Also explain the different types of Cloud Storage.** | (CO 2) | [Comprehension] |
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| 11 | The machine-to-machine (M2M) paradigm implies a system of communication between two or more machines/devices without human intervention. **Explain the**  **features that are directly identifiable with M2M along with its Architectural components.** | (CO 1) | [Comprehension] |
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| 12 | Cloud storage delivers cost-effective, scalable storage. You no longer need to worry about running out of capacity, maintaining storage area networks (SANs), replacing failed devices, adding infrastructure to scale up with demand, or operating underutilized hardware when demand decreases. **Discuss the Cloud**  **service model and Cloud Deployment model.** | (CO 2) | [Comprehension] |
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| 13 | Embedded systems are computer systems that are programmed to perform specific tasks and they can be found in phones, automobiles, and most household appliances. **Discuss the Characteristics, Challenges and Components of an**  **Embedded System.** | (CO 4) | [Apply] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 14 | A mobile robot system, capable of performing various tasks for the physically disabled, has been developed to avoid collision with unexpected obstacles, the mobile robot uses ultrasonic range finders for detection and mapping. **a) Name the suitable sensor for the application mentioned and draw the interfacing diagram. b) Write a program to interface the same with Arduino alongwith**  **methodology to calculate the distance.** | (CO 4) | [Apply] |
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| 15 | Traffic is one the most well-understood pain points for any city. It is the leading cause of accidental death globally, causes immense frustration, and heavily contributes to pollution around the globe. A smart city traffic solution would combine crowd counts, transit information, vehicle counts, and so on and send events regarding incidents on the road so that other controllers on the street could take action. **Design a typical Smart Traffic Control to regulate the standard traffic flow speed in a stop-and-go traffic. (Assume your own design for the**  **Traffic control)** | (CO 4) | [Apply] |
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| 16 | The environment monitoring system consist of multiple nodes at different location monitoring temperature, humidity and Co2 level in forest. The end nodes are these sensors the coordinator node collects data from end nodes as gateway and connects the system to internet. The controller services on coordinator sends collected data to cloud. Data is stored in cloud computation is done in cloud to modify the data and make decisions and A cloud base application is used to view the data. **Discuss the Case Study on IoT System for Weather Monitoring with respect to Process**  **specification, Domain model and Information model.** | (CO 4) | [Apply] |