K S INSTITUTE OF TECHNOLOGY

Bangalore – 560109

Department of Computer Science &Engineering

CIE Question paper Scrutiny format

Course Name	**Internet Of Things**
Course Code	**18CS81**
Course In charge	**Mr. Laxmikantha K**
Academic year	**2022-2023**
Semester	**8th**
CIE #	**IInternal Test**
Set	**A**
Scrutiny parameters	
Whether questions are according to assessment plan?	Yes / No; If No, Suggestions:
Whether questions prepared are within the covered syllabus?	Yes / No; If No, Suggestions:
Whether all questions are mapped to CO/PO properly?	Yes / No; If No, Suggestions:
Whether questions framed are according to Blooms level?	Yes / No; If No, Suggestions:
Whether marks distribution for each question are correct?	Yes / No; If No, Suggestions:
Whether questions paper follows the format displayed?	Yes / No; If No, Suggestions:
Difficulty level	Very High/ High/ Moderate/ Low
Final decision	Accepted without corrections/ Accepted with minor corrections/ Not accepted

10/3/23

Signature with date
of CIE Question paper setter

10/3/23

Name and Signature with date
of CIE Question paper Scrutiniser

K S INSTITUTE OF TECHNOLOGY

Bangalore – 560109

Department of Computer Science and Engineering

CIE Question paper Scrutiny format

Course Name	Internet of Things
Course Code	18CS81
Course Incharge	Krishna Gudi
Academic year	2022-2023
Semester	VIII
CIE #	I
Set	B
Scrutiny parameters	
Whether questions are according to assessment plan?	Yes / No; If No, Suggestions:
Whether questions prepared are within the covered syllabus?	Yes / No; If No, Suggestions:
Whether all questions are mapped to CO/PO properly?	Yes / No; If No, Suggestions:
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Name and Signature with date
of CIE Question paper Scrutiniser

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
FIRST INTERNAL TEST QUESTION PAPER 2022-23EVENSEMESTER

SET: A

USN

Degree	:	**B.E.**	**Semester**	:	**VIII**
Branch	:	**Computer Science &Engineering**	**Course Code**	:	**18CS81**
Course Title	:	**Internet of Things**	**Date**	:	**13/03/2023**
Duration	:	**90 Minutes**	**Max Marks**	:	**30**

Note: Answer **ONE full** question from each part.

K-Levels: K1-Remebering, K2-Understanding, K3-Applying, K4-Analyzing, K5-Evaluating, K6-Creating

Q No.	Questions	Marks	CO	K-Level
	PART-A			
1(a)	**Demonstrate** in detail the Genesis of IOT with a suitable sketch	6	CO1	K2
(b)	**Classify** IOT Challenges in detail	6	CO1	K2
(c)	**Discuss in detail** IOT impact on Connected cars & Connected Factory	6	CO1	K2
	OR			
2(a)	**Explain** core IOT functional stack in detail	6	CO1	K2
(b)	**Discuss** oneM2M IOT standardized Architecture with its elements	6	CO1	K2
(c)	**Draw**(IOTWF) world Forum Standardized architecture with suitable sketch	6	CO1	K2
	PART –B			
3(a)	**Construct** with neat diagram how sensors & actuators interact with outside world classify actuators based on energy type	6	CO2	K3
(b)	**Identify** different types of sensors available in detail	6	CO2	K3
	OR			
4(a)	**Show that** Wireless sensor network in detail	6	CO2	K3
(b)	**Obtain the** Characteristics of Smart objects in detail	6	CO2	K3

Lavanikantha K

Name & Signature of Course In charge:

10/3/23

Name & Signature of Module Coordinator:

Sanjoy das

HOD CSE

Principal

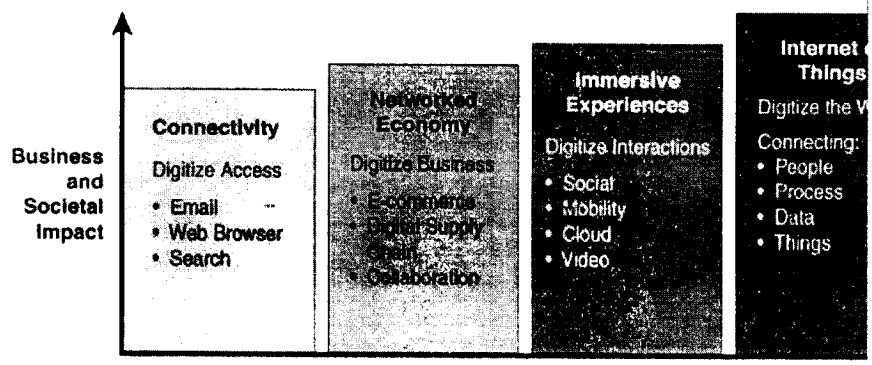
K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

I SESSIONAL TEST

Set A

SCHEME AND SOLUTION

Degree	:	**B.E**	**Semester**	:	**VIII**
Branch	:	**CSE**	**Course Code**	:	**18CS81**
Course Title	:	**Internet of Things**	**Max Marks**	:	**30**

Q. NO.	POINTS	MARKS
1(a)	The person credited with the creation of the term "Internet of Things" is Kevin Ashton. Whileworking for Procter & Gamble in 1999, Kevin used this phrase to explain a new idea related to linking the company's supply chain to the Internet, the evolution of the Internet can be categorized into four  phases. Each of these phases has had a profound impact on our society and our lives. These four phases are further defined inTable below.	3+3=6M
(b)	**Listing IOT challenges – 1 mark; Explanation: 5Marks** 1) Scale 2)Security 3)Privacy 4)Big data Analytics 5)Interoperability – Each carries 1Mark Explanation(5M) Listing (1M)	1+5=6M
(c)	**Discuss in detail** IOT impact on Connected cars & Connected Factory	3+3=6M

Connected cars: Explanation – 3Marks

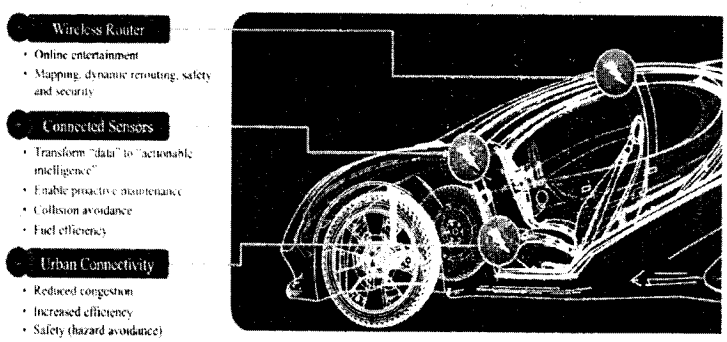


Figure 1-5 The Connected Car

Connected Factory: Explanation – 3Marks

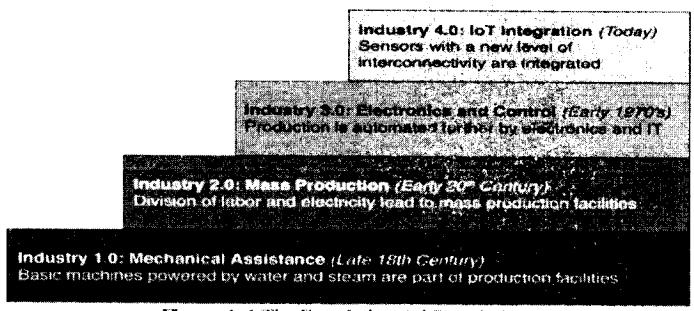


Figure 1-6 The Four Industrial Revolutions

2(a)	**Diagram :2Marks; Explanation:4 Marks** IoT networks are built around the concept of "things," or smart objects performing functions and delivering new connected services. These objects are "smart" because they use a combination of contextual information and configured goals to perform actions. From an architectural standpoint, several components have to work together for an IoT network to be operational: Things" layer, Communications network layer, Access network sub layer, Gateways and backhaul network, IoT network management sub layer, Application and analytics layer The following sections examine these elements and help you architect your IoT communication network.	2+4=6M
2(b)	M2M IOT standardized Architecture with its elements	3+3=6M

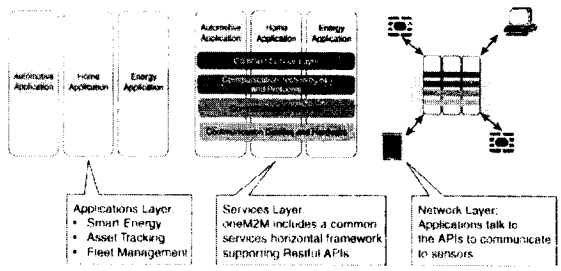
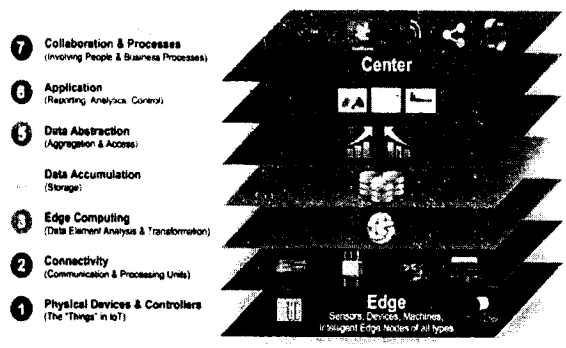
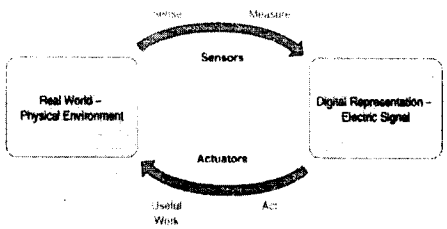
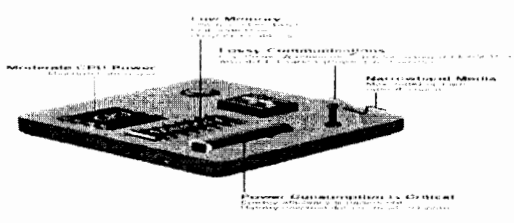
	Diagram – 3marks; Explanation – 3marks  	
2(c)	(IOTWF) world Forum Standardized architecture **Diagram- 3Marks; Explanation 3Marks;** This publish a seven-layer IoT architectural reference model. While various IoT reference  models exist, the one put forth by the IoT World Forum offers a clean, simplified perspective on IoT and includes edge computing, data storage, and access. It provides a succinct way of visualizing IoT from a technical perspective. Each of the seven layers is broken down into specific functions, and security encompasses the entire model.	3+3=6M
3 (a)	**Diagram- 3Marks; Explanation 3Marks;**  Figure 3-4 How Sensors and Actuators Interact with the Physical World Actuators are natural complements to sensors.	3+3=6M

	Figure demonstrates the symmetry and complementary nature of these two types of devices. • Sensors are designed to sense and measure practically any measurable variable in the physical world. • They convert their measurements (typically analog) into electric signals or digital representations that can be consumed by an intelligent agent (a device or a human). • Actuators, on the others hand, receive some type of control signal (commonly an electric signal or digital command) that triggers a physical effect, usually some type of motion, force, and so on. Figure shows How Sensors and Actuators Interact with the Physical World Much like sensors, actuators also vary greatly in function, size, design, and so on. Some common ways that they can be classified include the following	
3(b)	**Listing sensors :2Marks ; Explanation:4Marks** • Active or passive • Invasive or non-invasive • Contact or no-contact • Absolute or relative • Area of application • How sensors measure • What sensors measure	6M
4(a)	**Diagram : 3Marks; Explanation: 3Marks** Wireless sensor networks are made up of wirelessly connected smart objects, which are sometimes referred to as motes. The following are some of the most significant limitations of the smart objects in WSNs: • Limited processing power • Limited memory • Lossy communication • Limited transmission speeds • Limited power These limitations greatly influence how WSNs are designed, deployed, and utilized. Figure 2.3 below shows an example of such a data aggregation function in a WSN where temperature readings from a logical grouping of temperature sensors are aggregated as an average temperature reading 	3+3=6M
4(b)	The characteristics and attributes considered when selecting and dealing with connecting smart objects are 1) Range: It defines how far does the signal need to be propagated? That is, what will be the area of coverage for a selected wireless technology? The below figure 2.4 shows the range considered Short range, medium range, long range, frequency bands, power consumption, Topology	6 M

Signature of Course in charge

Signature of HOD

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
FIRST INTERNAL TEST QUESTION PAPER 2021-22 ODD SEMESTER

SET: B

USN										

Degree : B.E | **Semester : VIII**
Branch : CSE | **Course Code : 18CS81**
Course Titl : Internet of Things | **Date : 13-03-2023**
Duration : 90 Minutes | **Max Marks : 30**

Note: Answer **ONE full** question from each part.
K-Levels: K1-Remebering, K2-Understanding, K3-Applying, K4-Analyzing, K5-Evaluating, K6-Creating

Q No.	Questions	Marks	CO	K-Level
	PART-A			
1(a)	**Explain** the Internet of Things along with its potential impact on business.	6	CO1	K2
(b)	**Outline** and elaborate the various challenges that industry may face with respect to IoT data lifecycle management.	6	CO1	K2
(c)	Why do IoT systems have to be self-adapting and self-configuring? **Discuss** with suitable example.	6	CO1	K2
	OR			
2(a)	The Internet of Things and the pervasive web is changing how we control things. **Explain** the three key areas of the IoT and provide an example of each.	6	CO1	K2
(b)	**Discuss** IoT architecture and its layers as well as main components.	6	CO1	K2
(c)	**Outline** threats and opportunities that were identified in process digitization. Consider usage of IoT with logic to overcome threats or tap in opportunities.	6	CO1	K2
	PART –B			
3(a)	With a neat diagram, **determine** how actuators and sensors interact with physical world.	6	CO2	K3
(b)	**Identify** and describe an example of IoT service that uses WebSocket-based communication.	6	CO2	K3
	OR			
4(a)	How would you pick the right network architecture and the IoT platform for a manufacturing organization, which is part of a wider value chain? **Obtain** the steps and justify your decision.	6	CO2	K3
(b)	**Identify** the limitations of smart objects in WSNs and mention the need of communication protocols for WSNs.	6	CO2	K3

Krishna Gudi
Name & Signature of Course In charge:

10/3/23
Name & Signature of Module Coordinator:

10/3/23
HOD CSE

Principal

Selected

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

FIRST SESSIONAL 2021 – 22 EVEN SEMESTER

SET: B

SCHEME AND SOLUTION

Degree	:	**B.E**	**Semester**	:	**VIII**
Branch	:	**Computer Science and Engineering**	**Course Code**	:	**18CS81**
Course Title	:	**Internet of Things**	**Max Marks**	:	**30**

Q.NO.		MARKS
1(a)	IoT have huge impact on business as it helps company know and better understand their consumers habits, preference and buying pattern. Also, they track each consumer interaction along with gathered data from IoT devices to customize marketing messages and approaches. IoT has a potential to speaks what is on the consumer's mind and help business to offer exactly what their target market is looking for.	4 Marks
	Example	2 Marks
(b)	Many industries benefit from IoT data collecting since it allows for real-time monitoring and administration of remote systems. IoT devices, for example, can monitor patients in the hospital or at home, control production processes remotely, and track shipments and vehicles across long distances. IoT device manufacturers and consumers face significant challenges related to IoT data collection and management. These include the following: • Bad Password (other unique identifier) Security: • Vulnerabilities that haven't been patched: • Data Privacy	6 Marks
(c)	Self-Adapting and Self-configuring IoT systems are required because they need to be responsive and flexible, as they work in an unpredictable environment with multiple types of sensors. They also need to adapt dynamically to changes in configuration, demand, or other factors.	4 Marks
	Example	2 Marks

2(a)	When it comes to the internet of things (IoT), the term refers to a system that enables the movement of data across a network without the need for human-to-human or human-to- computer contact between gadgets, machines, animals, or humans. It doesn't matter if it's a person with a heart monitor implant, a farm animal with a biochip transponder, or a car with built- in sensors to alert the driver when the tire pressure is low; any natural or man-made object that can be assigned an Internet Protocol (IP) address and can transfer data over a network is a "thing in the internet of things.	4 Marks
	Example	2 Marks
(b)	• Perception/Sensing Layer • Network layer • Processing Layer • Application Layer	1 Mark
	Explanation of above 4 layers	5 Marks
(c)	Digitalization is the utilization of computerized innovation to change a business model and give new income and worth delivering open doors it is the most common way of moving to a computerized business. There are many strings in the method of digitalization.	3 Marks
	Computerized ignorance for foundation, low web speed, absence of coordination among different divisions, issues relating to tax collection, and so on. These provokes should be addressed to lead to the maximum capacity of this program.	3 Marks
3(a)	The sensor (the thermocouple) provides both the energy and the signal for the actuator (the shutoff valve). In other systems, the setup may be more complex with multiple sensors and actuators working in tandem to perform a given task. However, the basic principle remains—the sensor provides a signal, and the actuator adjusts based on that signal. Likewise, the movement from an actuator may register on a sensor, allowing it to control other components of a system accordingly or provide performance data for condition- based maintenance.	4 marks
	Diagram	2 Marks
(b)	An example of IoT service that uses WebSocket-based communication is Tape Recorder. It is a program that enables developers to create real-time, interactive applications for tablets, smartphones and computers. Tape allows users to record their voice or keyboard input for video-based recordings and then send them immediately to anyone in the world through an email message.	4 Marks
	Example	2 Marks

4(a)	Collecting critical data from IoT in the supply chain powered by a private cellular network can help manufacturers meet current and future. How to choose the right IoT platform: • Market Longevity- how long a vendor has been in the market is an essential factor to consider when choosing any tool., and this is no different when selecting an IoT platform. • Hardware. • Connectivity. • Device Management. • IoT Data. • Security/Privacy • Integrations. • Domain expertise	6 Marks
4(b)	Wireless sensor networks were first developed for battlefield surveillance in military engagements, situations where building a wired network of sensor devices would essentially be impossible. These difficult conditions created a need for a wireless sensor network that could be deployed with minimal risk and used to monitor environmental conditions in the battlefield. Wireless sensor nodes can be dropped out of a plane into any target area where they immediately begin to relay data and information back to the main location for analysis. Example	4 Marks 2 Marks

Signature of Course in charge

Signature of HOD

K S INSTITUTE OF TECHNOLOGY

Bangalore – 560109

Department of Computer Science and Engineering

CIE Question paper Scrutiny format

Course Name	Internet of Things
Course Code	18CS81
Course Incharge	Krishna Gudi
Academic year	2022-2023
Semester	VIII
CIE #	II
Set	A
Scrutiny parameters	
Whether questions are according to assessment plan?	Yes / No; If No, Suggestions:
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Lavanthra K

Signature with date
of CIE Question paper setter

(SANJOY DAS)

Name and Signature with date
of CIE Question paper Scrutiniser

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Bangalore – 560109

Department of Computer Science and Engineering

CIE Question paper Scrutiny format

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12/4/23

Signature with date
of CIE Question paper setter

(SANJOY DAS)

Name and Signature with date
of CIE Question paper Scrutiniser

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
SECOND INTERNAL TEST QUESTION PAPER 2022-23EVEN SEMESTER

SET: A

USN										

Degree	:	**B.E.**	**Semester**	:	**VIII**
Branch	:	**Computer Science &Engineering**	**Course Code**	:	**18CS81**
Course Title	:	**Internet of Things**	**Date**	:	**17-04-2023**
Duration	:	**90 Minutes**	**Max Marks**	:	**30**

Note: Answer **ONE full** question from each part.

K-Levels: K1-Remebering, K2-Understanding, K3-Applying, K4-Analyzing, K5-Evaluating, K6-Creating

Q No.	Questions	Marks	CO	K-Level
	PART-A			
1(a)	**Identify** the key advantages of Internet protocol.	6	CO3	K3
(b)	**Construct** the MQTT framework & message format in detail.	6	CO3	K3
(c)	**Develop** the working of IP as the IOT network layer.	6	CO3	K3
	OR			
2(a)	**Design** 6LoWPAN protocol header compression & fragmentation.	6	CO3	K3
(b)	**Determine** why power optimization is required for IoT applications	6	CO3	K3
(c)	**Identify** the various types of IoT technologies and data analytics that have been implementing by air cargo company in India.	6	CO3	K3
	PART –B			
3(a)	**Illustrate** the Zigbee protocol stack using IEEE 802.15.4	6	CO2	K2
(b)	**Identify** LoRWAN standard, alliance MAC Layer & security.	6	CO4	K3
	OR			
4(a)	**Explain** the common applications of machine learning for IOT.	6	CO2	K2
(b)	**Identify** and discuss big data analytics tools and technology.	6	CO4	K3

Lavanibatha.b
Lavbatha
(SANJOY DAS)

Name & Signature of Course In charge: | **Name & Signature of Module Coordinator:** | **HOD CSE** | **Principal**

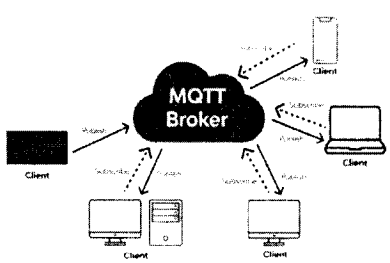
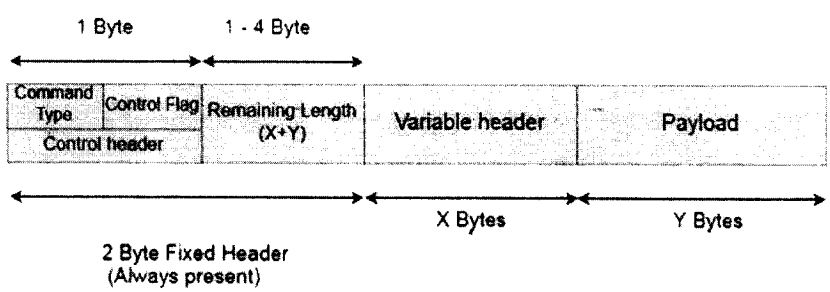
K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

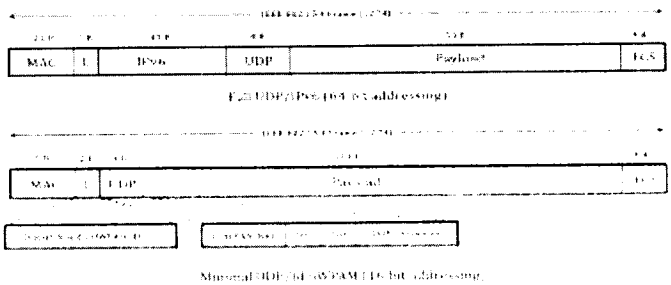
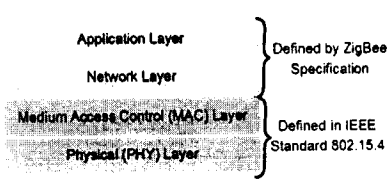
II SESSIONAL TEST

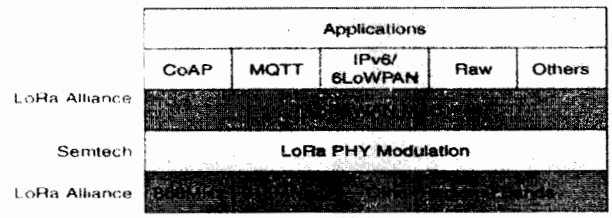
Set A

SCHEME AND SOLUTION

Degree	:	**B.E**	**Semester**	:	**VIII**
Branch	:	**CSE**	**Course Code**	:	**18CS81**
Course Title	:	**Internet of Things**	**Max Marks**	:	**30**

Q. NO.	POINTS	MARKS
1(a)	**Listing – 1Mark; Brief Explanation - 4Marks** **Explain** the key advantages of Internet protocol: Open and standards-based • Versatile • Ubiquitous • Scalable • Manageable and highly secure • Stable and resilient • Consumers' market adoption • The innovation factor	1+5=6M
1(b)	**MQTT framework – 3Marks & message format – 3Marks** MQTT is a standards-based messaging protocol, or set of rules, used for machine-to-machine communication. Smart sensors, wearables, and other Internet of Things (IoT) devices typically have to transmit and receive data over a resource-constrained network with limited bandwidth.  **Message format** 	3+3=6M

1(c)	**Listing – 1Mark; brief explanation – 5marks** IP as the IoT Network Layer: Composed of; • The Business Case for IP • The Need for Optimization • Optimizing IP for IoT • Profiles and Compliances	1+5=6M
2(a)	**Diagram- 3Marks; Explanation- 3Marks** 6LOWPAN protocol header compression & fragmentation 	3+3=6M
2(b)	Application protocols for IOT When considering constrained networks and/or a large-scale deployment of constrained nodes, verbose web-based and data model protocols, may be too heavy for IoT applications. • To address this problem, the new lightweight protocols that are better suited to large numbers of constrained nodes and networks. • Two of the most popular protocols are • CoAP • MQTT	6M
2(c)	Business case for IP Business case for the IoT is that it allows carriers and the enterprise to make better use of existing infrastructure. For carrier networks, the IoT presents the opportunity to provide tiered services for data that is more or less critical. This can be achieved through software solutions that enable new revenue streams and also limit additional overhead.	6M
3 (a)	**Diagram- 3marks; Explanation – 3marks** Zigbee protocol stack using IEEE 802.15.4  It is an IoT solution for interconnecting smart objects. • ZigBee solutions are aimed at smart objects and sensors that have low bandwidth and low power needs. • The Zigbee specification has undergone several revisions. • In the 2006 revision, sets of commands and message types were introduced, and increased in number in the 2007 (called Zigbee pro) iteration, to achieve different functions for a device, such as metering, temperature, or lighting control. • These sets of commands and message types are called clusters. •	3+3=6M

	Ultimately, these clusters from different functional domains or libraries form the building blocks of Zigbee application profiles.	
3(b)	**Diagram 3Marks; Explanation – 3Marks** LoRWAN standard :  **Figure 4-15** LoRaWAN Layers  	3+3=6M
4(a)	**Identify** the common applications of machine learning for IOT self-driving vehicles, abnormal pattern recognition, Monitoring, Behavior control, Operations optimization, self-optimizing	1+5=6M
4(b)	data & analytics for IOT is the act of evaluating data generated and gathered by IoT devices using a specific set of data analytics tools and techniques. Hadoop, NoSQL, Map Reduce, and MPP are the tools & techniques for data analytics In the world of IoT, the creation of massive amounts of data from sensors is common and one of the biggest challenges—not only from a transport perspective but also from a data management standpoint. Structured data and unstructured data are important classifications as they typically require different toolsets from a data analytics perspective.	6 M

Lakshmikantha K

Signature of Course in charge

Signature of HOD

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
SECOND INTERNAL TEST QUESTION PAPER 2022-23 ODD SEMESTER

USN										

SET: B

Degree : B.E | **Semester : VIII**
Branch : CSE | **Course Code : 18CS81**
Course Titl : Internet of Things | **Date : 17-04-2023**
Duration : 90 Minutes | **Max Marks : 30**

Note: Answer **ONE full** question from each part.
K-Levels: K1-Remebering, K2-Understanding, K3-Applying, K4-Analyzing, K5-Evaluating, K6-Creating

Q No.	Questions	Marks	CO	K-Level
	PART-A			
1(a)	**Construct** 6LoWPAN header stack, protocol header compression and fragmentation.	6	CO3	K3
(b)	**Design** MQTT framework and message format in detail.	6	CO3	K3
(c)	**Identify** the various types of IoT technologies and data analytics that have been implement by air cargo company in india.	6	CO3	K3
	OR			
2(a)	**Determine** why power optimization is required for IoT applications	6	CO3	K3
(b)	**Develop** the working of IP as the IoT network layer.	6	CO3	K3
(c)	**Identify** the transport methods for the following IoT application protocols. i) Supervisory control and data acquisition (SCADA) ii) Generic web-based protocols - Ethernet, Wi-Fi and 4G/LTE	6	CO3	K3
	PART –B			
3(a)	Briefly **explain** protocol stack utilization IEEE 802.15.4	6	CO2	K2
(b)	**Identify** and discuss bigdata analytics tools and technology.	6	CO4	K3
	OR			
4(a)	**Discuss** LoRaWAN standard and alliance MAC layer and security.	6	CO2	K2
(b)	**Develop** OCTAVE and FAIR formal risk analysis.	6	CO4	K3

Krishna Gudi
Name & Signature of Course In charge:

(SANJOY DAS)
Name & Signature of Module Coordinator:

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K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

SECOND SESSIONAL 2022 – 23 EVEN SEMESTER

SET: B

SCHEME AND SOLUTION

Degree	:	**B.E**	**Semester**	:	**VIII**
Branch	:	**Computer Science and Engineering**	**Course Code**	:	**18CS81**
Course Title	:	**Internet of Things**	**Max Marks**	:	**30**

Q.NO.		MARKS
1(a)	6LoWPAN is an open standard defined in RFC 6282 by the Internet Engineering Task Force (IETF), the standards body that defines many of the open standards used on the Internet such as UDP, TCP and HTTP to name a few.	1 Marks
	Explanation of protocol header compression	3 Marks
	Explanation of fragmentation.	2 Marks
(b)	MQTT clients include publishers and subscribers, terms that refer to whether the client is publishing messages or subscribed to receive messages. These two functions can be implemented in the same MQTT client. When a device (or client) wants to send data to a server (or broker) it is called a publish. When the operation is reversed, it is called a subscribe. Under the pub/sub model, multiple clients can connect to a broker and subscribe to topics in which they are interested.	3 Marks
	Message format	3 Marks
(c)	Low Power Wide Area Networks (LPWANs)	
	Cellular (3G/4G/5G)	2 Marks
	Zigbee and Other Mesh Protocols	
	Bluetooth and BLE	
	Types of data analytics with respect to Indian cargo company	4 Marks

2(a)	Power optimization is critical for IoT (Internet of Things) applications because many IoT devices are battery-powered and may need to operate for long periods without being recharged. Therefore, optimizing power consumption can help extend the lifespan of the device's battery and reduce the overall cost of the system.	2 Marks
	Example	4 Marks
(b)	IP (Internet Protocol) is a key network layer protocol used in IoT (Internet of Things) networks to facilitate communication between devices. The primary function of IP is to provide a logical addressing scheme that enables devices to locate and communicate with each other over the network.	2 Marks
	Example	4 Marks
(c)	SCADA stands for Supervisory Control and Data Acquisition, and it is a type of control system used in industries and infrastructure to monitor and control processes and operations. SCADA systems use a combination of hardware and software components to provide real-time monitoring, control, and data acquisition capabilities.	3 Marks
	Generic web-based protocols refer to a set of standard protocols that are used to facilitate communication and data exchange between web-based applications and services. These protocols are designed to work across different platforms, operating systems, and programming languages, enabling interoperability between different systems.	3 Marks
3(a)	The protocol stack of IEEE 802.15.4 consists of five layers, including the physical layer, MAC layer, network layer, transport layer, and application layer. The physical layer is responsible for transmitting and receiving data over the wireless medium. It defines the transmission power, modulation scheme, and channel access mechanism.	3 Marks
	In practical implementations, not all layers of the protocol stack may be utilized, depending on the specific use case and application requirements. For example, in some simple sensor network applications, only the physical and MAC layers may be used, while in more complex applications, all five layers may be utilized.	3 Marks
(b)	Big data analytics tools and technologies are used to process, manage, and analyze large and complex data sets. Here are some of the commonly used tools and technologies in the field of big data analytics: 1. Hadoop: Hadoop is an open-source framework that is used for distributed storage and processing of large data sets. It allows for parallel processing of data across multiple servers, making it easier to handle large volumes of data.	1 Marks

	2. Apache Spark: Apache Spark is an open-source data processing engine that is used for large-scale data processing. It provides high-speed data processing capabilities and supports batch processing, stream processing, and machine learning workloads. 3. NoSQL databases: NoSQL databases are non-relational databases that are used for storing and managing unstructured or semi-structured data. Some commonly used NoSQL databases include MongoDB, Cassandra, and Couchbase. 4. Apache Storm: Apache Storm is an open-source distributed real-time data processing system that is used for streaming data processing. It provides high-speed processing of streaming data and can handle large volumes of data in real-time.	5 Marks
4(a)	LoRaWAN is a low-power, wide-area networking (LPWAN) protocol that is designed to enable long-range communication with low power consumption. It operates in the unlicensed spectrum, and its long-range capabilities make it well-suited for applications such as smart cities, agriculture, and industrial IoT.	2 Marks
	Explanation of MAC layer and security	4 Marks
4(b)	OCTAVE is a risk assessment methodology that is used to identify, analyze, and address risks to critical assets in an organization. It is a self-directed process that involves a team of people who have knowledge of the business processes and information technology of the organization.	3 Marks
	FAIR is a quantitative risk analysis framework that is used to analyze and measure information security risks. It is based on the Factor Analysis of Information Risk (FAIR) model, which uses a set of variables to calculate the probable frequency and impact of a given risk.	3 Marks

Signature of Course in charge

Signature of HOD

K S INSTITUTE OF TECHNOLOGY

Bangalore – 560109

Department of Computer Science and Engineering

CIE Question paper Scrutiny format

Course Name	Internet of Things
Course Code	18CS81
Course Incharge	Krishna Gudi
Academic year	2022-2023
Semester	VIII
CIE #	III
Set	A
Scrutiny parameters	
Whether questions are according to assessment plan?	Yes / No; If No, Suggestions:
Whether questions prepared are within the covered syllabus?	Yes / No; If No, Suggestions:
Whether all questions are mapped to CO/PO properly?	Yes / No; If No, Suggestions:
Whether questions framed are according to Blooms level?	Yes / No; If No, Suggestions:
Whether marks distribution for each question are correct?	Yes / No; If No, Suggestions:
Whether questions paper follows the format displayed?	Yes / No; If No, Suggestions:
Difficulty level	Very High/ High/ Moderate/ Low
Final decision	Accepted without corrections/ Accepted with minor corrections/ Not accepted

Laxmikantha K 9/5/23

Signature with date
of CIE Question paper setter

(SANJOY DAS)

Name and Signature with date
of CIE Question paper Scrutiniser

K S INSTITUTE OF TECHNOLOGY

Bangalore – 560109

Department of Computer Science and Engineering

CIE Question paper Scrutiny format

Course Name	Internet of Things
Course Code	18CS81
Course Incharge	Krishna Gudi
Academic year	2022-2023
Semester	VIII
CIE #	III
Set	B
Scrutiny parameters	
Whether questions are according to assessment plan?	Yes / No; If No, Suggestions:
Whether questions prepared are within the covered syllabus?	Yes / No; If No, Suggestions:
Whether all questions are mapped to CO/PO properly?	Yes / No; If No, Suggestions:
Whether questions framed are according to Blooms level?	Yes / No; If No, Suggestions:
Whether marks distribution for each question are correct?	Yes / No; If No, Suggestions:
Whether questions paper follows the format displayed?	Yes / No; If No, Suggestions:
Difficulty level	Very High/ High/ Moderate/ Low
Final decision	Accepted without corrections/ Accepted with minor corrections/ Not accepted

9/5/23

Signature with date
of CIE Question paper setter

(SANJOY DAS)

Name and Signature with date
of CIE Question paper Scrutiniser

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
THIRD INTERNAL TEST QUESTION PAPER 2022-23 EVEN SEMESTER

USN										

SET: A

Degree : B.E | **Semester : VIII**
Branch : CSE | **Course Code : 18CS81**
Course Title : Internet of Things | **Date : 11-05-2023**
Duration : 90 Minutes | **Max Marks : 30**

Note: Answer **ONE full** question from each part.
K-Levels: K1-Remebering, K2-Understanding, K3-Applying, K4-Analyzing, K5-Evaluating, K6-Creating

Q No.	Questions	Marks	CO	K-Level
	PART-A			
1(a)	**Identify** the difference between Raspberry Pi and Arduino in terms of an operating system? Explain in your own words.	6	CO5	K3
(b)	**Determine** how this can be accomplished by writing a simple program to perform the following task continuously on an Arduino UNO: Read a digital input from an external push button and print the state of the button as "Pressed" or "Not Pressed" to the serial Monitor. The push button is connected to digital pin Z and is configured as active low. Apply the proper Arduino C setup and loop structure, and present suitable comments with each line of your program.	6	CO5	K3
(c)	**Identify** the key IoT challenges and solutions for Smart City deployment? Explain in detail by including a case study in your example.	6	CO5	K3
	OR			
2(a)	**Select** and explain the two main components of MapReduce which is a part of the Hadoop architecture.	6	CO5	K3
(b)	**Develop** the connection of DHT11 sensor and Arduino UNO and LCD 16*2 by using interface and give the Arduino program.	6	CO5	K3
(c)	**Identify** with an example, how data read from sensor and devices.	6	CO5	K3
	PART –B			
3(a)	**Develop** the extended concept of analytics in the new integrated world. How analytics will change the way we do business.	6	CO4	K3
(b)	**Obtain** three IoT applications where analytics is useful. Discuss how IoT analytics is made use of in each of the applications to improve aspects of life quality, economy.	6	CO4	K3
	OR			
4(a)	Assume that you are recently appointed as an International IT Consultant and IoT Specialist in a Multi-national IT Company. As first project, you are assigned by the Managing Director (MD) and the smart city assigned to you is Bengaluru, a. **Design** and draw the technical architecture for the IoT ecosystem that you propose to be implemented in Bengaluru.	6	CO4	K3

(b)	**Identify** the relationship between OT and IT systems for monitoring security and their response?	6	CO4	K3

Krishna Gudi
Name & Signature of Course In charge:

Krishna Gudi
Name & Signature of Module Coordinator:

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K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

THIRD SESSIONAL 2022 – 23 EVEN SEMESTER

SET A

SCHEME AND SOLUTION

Degree	:	**B.E**	**Semester**	:	**IV**
Branch	:	**Computer Science and Engineering**	**Course Code**	:	**18CS81**
Course Title	:	**Internet of Things**	**Max Marks**	:	**10**

Q.NO.	POINTS	MARKS
1.a)	Raspberry Pi is a single-board computer designed to offer a full-fledged computing experience. It supports various operating systems like Linux distributions (such as Raspbian, Ubuntu, or Fedora), Windows 10 IoT Core, and others. Raspberry Pi is capable of running complex applications, browsing the internet, handling multimedia tasks, and performing general-purpose computing.	3 Marks
	Arduino is a microcontroller-based platform specifically designed for embedded systems and electronics projects. Arduino boards use a simple, lightweight operating system known as the Arduino bootloader. It is a bare-bones system that facilitates programming and interacts directly with the hardware components connected to the Arduino board.	3 Marks

b.	const int pushbutton = 9;
	int nowstate= 0; // current state of the button
	int prevstate = 0; // previous state of the button
	void setup() {
	pinMode(pushbutton, INPUT);
	Serial.begin(9600);
	}
	void loop() {
	// read the pushbutton input pin:
	nowState = digitalRead(pushbutton);
	if (nowstate != prevstate) {
	if (nowstate == HIGH) {
	// if the current state is HIGH then the button went from off to on:
	Serial.println("Pressed");
	} else {
	// if the current state is LOW then the button went from on to off:
	Serial.println("Not pressed");
		6 Marks

	}
	/bounce delay
	delay(50);
	}
	// save the current state as the last state, for next time through the loop
	prevstate = nowstate;
	}	

c.	• Connectivity • Data Security and Privacy • Interoperability and Standardization • Citizen Engagement and Participation	1 Mark
	Explanation of each challenge	5 Marks
2 a.	• Map Task • Reduce Task	1 Mark
	Explanation of each component	5 Marks

b.	#include <LiquidCrystal.h>
	#include <dht.h>
	
	LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
	int greenPin = A0;
	dht sensor;
	
	void setup()
	{
	lcd.begin(16,2); //16 by 2 character display
	}
	
	void loop()
	{
	delay(1000); //wait a sec (recommended for DHT11)
	sensor.read11(greenPin);
	lcd.clear();
	lcd.setCursor(0,0);
	lcd.print("Humidity = ");
	lcd.print(sensor.humidity);
	lcd.setCursor(0,1);
	lcd.print("Temp = ");
	lcd.print(sensor.temperature);
	}
		6 Marks

c.	Data reading from sensors and devices depends on the specific technology and communication protocol employed. • Analog Data Reading • Sensing • Signal Conditioning • ADC Conversion • Digital Processing	2 Marks
	Detail explanation of above	4 Marks
3.a	Analytics has the potential to revolutionize the way we do business across various industries. • Data-Driven Decision Making • Customer Understanding and Personalization • Operational Efficiency and Process Optimization • Risk Management and Fraud Detection • Innovation and Product Development	6 Marks
b.	1. Smart Manufacturing 2. Smart Cities 3. Healthcare	1 Mark
	Explanation of above IoT applications	5 Marks
4.a	• IoT Devices and Sensors • Connectivity • Gateway • Cloud Infrastructure • Data Processing and Analytics	1 Mark
	Explanation of above 5 list	5 Marks
b.	• OT Systems • IT Systems • Convergence of OT and IT • Security Monitoring • Incident Response	1 Mark
	Explanation of above identification	5 Marks

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K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
THIRD INTERNAL TEST QUESTION PAPER 2022-23 EVEN SEMESTER

USN | | | | | | | | | | |

SET: B

Degree : B.E | **Semester : VIII**
Branch : CSE | **Course Code : 18CS81**
Course Title : Internet of Things | **Date : 11-05-2023**
Duration : 90 Minutes | **Max Marks : 30**

Note: Answer **ONE full** question from each part.
K-Levels: K1-Remebering, K2-Understanding, K3-Applying, K4-Analyzing, K5-Evaluating, K6-Creating

Q No.	Questions	Marks	CO	K-Level
	PART-A			
1(a)	**Determine** how technology drivers moves the IoT area and provide some examples of IoT based services in a smart homes / smart city context.	6	CO5	K3
(b)	**Develop** an Arduino program to control five LEDs blinking together every 5 seconds.	6	CO5	K3
(c)	**Identify** the key IoT challenges and solutions for Smart City deployment? Explain in detail by including a case study in your example.	6	CO5	K3
	OR			
2(a)	**Show that**, how will a smart city with integrated IoT and 5G technologies look like in the future to generate information and maintained by such technologies may become useful for investigators?	6	CO5	K3
(b)	**Determine** how this can be accomplished by writing a simple program to perform the following task continuously on an Arduino UNO: Read a digital input from an external push button and print the state of the button as "Pressed" or "Not Pressed" to the serial Monitor. The push button is connected to digital pin Z, and is configured as active low. Apply the proper Arduino C setup and loop structure, and present suitable comments with each line of your program.	6	CO5	K3
(c)	**Identify** with an example, how data read from sensor and devices.	6	CO5	K3
	PART –B			
3(a)	**Develop** the extended concept of analytics in the new integrated world. How analytics will change the way we do business.	6	CO4	K3
(b)	**Identify** and explain Edge Streaming Analytics used in IoT devices for real time applications.	6	CO4	K3
	OR			
4(a)	Assume that you are recently appointed as an International IT Consultant and IoT Specialist in a Multi-national IT Company. As first project, you are assigned by the Managing Director and the smart city assigned to you is Bengaluru. a. **Design** and draw the technical architecture for the IoT ecosystem, that you propose to be implemented in Bengaluru.	6	CO4	K3

(b)	**Identify** some cases of where normal IT systems procedures in security can have a negative impact OT system?	6	CO4	K3

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K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

THIRD SESSIONAL 2022 – 23 EVEN SEMESTER

SET B

SCHEME AND SOLUTION

Degree	:	**B.E**	**Semester**	:	**IV**
Branch	:	**Computer Science and Engineering**	**Course Code**	:	**18CS81**
Course Title	:	**Internet of Things**	**Max Marks**	:	**10**

Q.NO.	POINTS	MARKS
1.a)	Sensor Technology Cloud Computing Artificial Intelligence (AI) and Machine Learning (ML) Edge Computing	1 Mark
	Explanation	5 Marks

b.	const int led1Pin = 2;
	const int led2Pin = 3;
	const int led3Pin = 4;
	const int led4Pin = 5;
	const int led5Pin = 6;
	
	void setup() {
	// Set the LED pins as OUTPUT
	pinMode(led1Pin, OUTPUT);
	pinMode(led2Pin, OUTPUT);
	pinMode(led3Pin, OUTPUT);
	pinMode(led4Pin, OUTPUT);
	pinMode(led5Pin, OUTPUT);
	}
	
	void loop() {
	// Turn on all LEDs
	digitalWrite(led1Pin, HIGH);
	digitalWrite(led2Pin, HIGH);
	digitalWrite(led3Pin, HIGH);
	digitalWrite(led4Pin, HIGH);
	digitalWrite(led5Pin, HIGH);
	
	// Delay for 5 seconds
	delay(5000);
		6 Marks

	// Turn off all LEDs
	digitalWrite(led1Pin, LOW);
	digitalWrite(led2Pin, LOW);
	digitalWrite(led3Pin, LOW);
	digitalWrite(led4Pin, LOW);
	digitalWrite(led5Pin, LOW);
	
	// Delay for 5 seconds
	delay(5000);
	}	

c.	• Connectivity • Data Security and Privacy • Interoperability and Standardization • Citizen Engagement and Participation	1 Mark
	Explanation of each challenge	5 Marks
2 a.	In the future, a smart city with integrated IoT and 5G technologies will provide a highly connected and data-rich environment that can be valuable for investigators and law enforcement agencies.	
	Advanced Surveillance Systems Predictive Analytics Intelligent Traffic Management Public Safety and Emergency Response	2 Marks
	Explanation	4 Marks

b.	const int buttonPin = 2;
	
	void setup() {
	// Set the button pin as INPUT
	pinMode(buttonPin, INPUT);
	
	// Start the serial communication
	Serial.begin(9600);
	}
	
	void loop() {
	// Read the state of the button
	int buttonState = digitalRead(buttonPin);
	
	// Check if the button is pressed or not
	if (buttonState == HIGH) {
	// Button is pressed
	Serial.println("Pressed");
		6 Marks

	} else {
	// Button is not pressed
	Serial.println("Not Pressed");
	}
	
	// Delay for a short period to debounce the button
	delay(100);
	}	

c.	Data reading from sensors and devices depends on the specific technology and communication protocol employed. • Analog Data Reading • Sensing • Signal Conditioning • ADC Conversion • Digital Processing Detail explanation of above	2 Marks 4 Marks
3.a	Analytics has the potential to revolutionize the way we do business across various industries. • Data-Driven Decision Making • Customer Understanding and Personalization • Operational Efficiency and Process Optimization • Risk Management and Fraud Detection • Innovation and Product Development	6 Marks
b.	• Reduced Latency • Bandwidth Optimization • Offline Operation • Real-Time Decision-Making • Privacy and Security Explanation of above	1 Mark 5 Marks
4.a	• IoT Devices and Sensors • Connectivity • Gateway • Cloud Infrastructure • Data Processing and Analytics Explanation of above 5 list	1 Mark 5 Marks

b.	1. Patching and Updates 2. Network Segmentation 3. Availability and Downtime 4. Vendor Management 5. Risk Assessment and Testing Explanation of above	1 Mark 5 Marks

Signature of Course in charge

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