SRM VALLIAMMAI ENGINEERING COLLEGE

An Autonomous Institution
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF

ELECTRONICS AND INSTRUMENTATION ENGINEERING

QUESTION BANK

VI SEMESTER

EC3666 – IOT Concepts and Applications

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Department of Electronics and Instrumentation Engineering

SUBJECT: EC3666 IOT CONCEPTS AND APPLICATION

SEM / YEAR: VI / III

UNIT-I INTRODUCTION

Internet of Things (IoT) evolution – Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT Models – Simplified IoT Architecture and Core IoT Functional Stack – Fog, Edge and Cloud in IoT.

PART –A

Q.No	Questions	COs	BT Level	Competence
1	Define Internet of Things (IoT).	CO1	BTL1	Remember
2	What is meant by evolution of IoT?	CO1	BTL1	Understand
3	Who coined the term Internet of Things and in which year?	CO1	BTL1	Remember
4	List any two enabling technologies of IoT.	CO1	BTL1	Remember
5	State the role of sensors in IoT.	CO1	BTL1	Remember
6	Define IoT architecture.	CO1	BTL1	Remember
7	What is oneM2M architecture?	CO1	BTL2	Understand
8	Mention any two features of IoT World Forum (IoTWF) architecture.	CO1	BTL2	Understand
9	What is meant by simplified IoT architecture?	CO1	BTL2	Understand
10	Name the layers of simplified IoT architecture.	CO1	BTL1	Remember
11	Define core IoT functional stack.	CO1	BTL1	Remember
12	What is edge computing in IoT?	CO1	BTL2	Understand
13	Define fog computing.	CO1	BTL1	Remember
14	What is cloud computing in IoT?	CO1	BTL1	Remember
15	List any two advantages of edge computing.	CO1	BTL1	Remember
16	State one difference between fog computing and cloud computing.	CO1	BTL2	Understand
17	Why is IPv6 important for IoT?	CO1	BTL2	Understand
18	List any two alternative IoT architecture models.	CO1	BTL1	Remember
19	What is latency in IoT systems?	CO1	BTL1	Remember
20	Why is low latency important in IoT applications?	CO1	BTL2	Understand
21	What is the role of gateways in IoT architecture?	CO1	BTL2	Understand
22	List any two advantages of IoT architecture standardization.	CO1	BTL1	Remember
23	What is the purpose of the service layer in oneM2M architecture?	CO1	BTL2	Understand
24	Mention any two limitations of cloud-centric IoT systems.	CO1	BTL2	Understand

PART –B				
1	Illustrate the evolution of IoT highlighting the transition from Internet of People to Internet of Things.	CO1	BTL3	Apply
2	Demonstrate how enabling technologies contribute to the functioning of a real-time IoT system.	CO1	BTL3	Apply
3	Examine the role of enabling technologies in the successful deployment of IoT systems.	CO1	BTL3	Apply
4	Illustrate the data flow in an IoT application using the oneM2M architecture.	CO1	BTL3	Apply
5	Evaluate and analyze the oneM2M architecture with respect to interoperability and scalability.	CO1	BTL4	Analyze
6	Demonstrate the layered operation of an IoT system using the IoT World Forum (IoTWF) architecture.	CO1	BTL3	Apply
7	Examine the IoT World Forum reference model and discuss its significance in IoT deployment.	CO1	BTL3	Apply
8	Illustrate the use of alternative IoT architecture models for specific application scenarios.	CO1	BTL3	Apply
9	Compare and analyze alternative IoT models with standardized IoT architectures.	CO1	BTL4	Analyze
10	Demonstrate an end-to-end IoT system using the simplified IoT architecture.	CO1	BTL3	Apply
11	Examine the simplified IoT architecture and identify its limitations.	CO1	BTL3	Apply
12	Illustrate data processing in IoT systems using the core IoT functional stack.	CO1	BTL3	Apply
13	Analyze and interpret the core IoT functional stack in relation to system performance.	CO1	BTL4	Analyze
14	Demonstrate how edge computing reduces latency in real-time IoT applications.	CO1	BTL3	Apply
15	Examine the role of fog computing in supporting real-time IoT environments.	CO1	BTL3	Apply
16	Illustrate large-scale IoT data analytics using cloud computing concepts.	CO1	BTL3	Apply
17	Compare and analyze fog, edge, and cloud computing paradigms and their impact on IoT architecture.	CO1	BTL4	Analyze

UNIT-II COMPONENTS

Functional Blocks of an IoT Ecosystem – Actuators, Sensors and Smart Objects – Control Units - Communication modules - Bluetooth, Zigbee, Wi-Fi, GPS, GSM Module.

PART –A				
Q.No	**Questions**	**COs**	**BT Level**	**Competence**

1	Define an IoT ecosystem.	CO2	BTL1	Remember
2	What are the functional blocks of an IoT ecosystem?	CO2	BTL1	Remember
3	What is the role of sensors in IoT systems?	CO2	BTL2	Understand
4	Define actuators in IoT.	CO2	BTL1	Remember
5	What is meant by a smart object?	CO2	BTL2	Understand
6	List any two examples of smart objects.	CO2	BTL1	Remember
7	What is the function of a control unit in IoT?	CO2	BTL2	Understand
8	Name any two commonly used control units in IoT.	CO2	BTL1	Remember
9	What is the purpose of communication modules in IoT?	CO2	BTL2	Understand
10	What is Bluetooth communication?	CO2	BTL1	Remember
11	State one application of Bluetooth in IoT.	CO2	BTL2	Understand
12	What is Zigbee technology?	CO2	BTL1	Remember
13	Mention one feature of Zigbee communication.	CO2	BTL2	Understand
14	Define Wi-Fi in the context of IoT.	CO2	BTL1	Remember
15	List one advantage of Wi-Fi communication in IoT.	CO2	BTL2	Understand
16	What is the role of GPS module in IoT applications?	CO2	BTL2	Understand
17	What information does a GPS module provide?	CO2	BTL1	Remember
18	What is GSM module?	CO2	BTL1	Remember
19	Mention one application of GSM module in IoT.	CO2	BTL2	Understand
20	What is meant by machine-to-machine (M2M) communication?	CO2	BTL2	Understand
21	What is the difference between sensor and actuator?	CO2	BTL2	Understand
22	What is the role of gateways in an IoT ecosystem?	CO2	BTL2	Understand
23	List any two advantages of smart objects.	CO2	BTL1	Remember
24	What is meant by low-power communication in IoT?	CO2	BTL2	Understand

PART –B				
1	Illustrate the functional blocks of an IoT ecosystem using a suitable example.	CO2	BTL3	Apply
2	Demonstrate how sensors and actuators work together in an IoT automation system.	CO2	BTL3	Apply
3	Examine the characteristics and selection criteria of sensors used in IoT applications.	CO2	BTL4	Analyze
4	Differentiate various types of actuators used in IoT systems with examples.	CO2	BTL4	Analyze
5	Illustrate the concept of smart objects through a real-time IoT application.	CO2	BTL3	Apply
6	Analyze the architecture and operational features of smart objects in IoT.	CO2	BTL4	Analyze
7	Demonstrate the role of control units in processing sensor data in IoT systems.	CO2	BTL3	Apply
8	Compare and analyze microcontroller-based and microprocessor-based control units used in IoT.	CO2	BTL4	Analyze
9	Illustrate the use of Bluetooth communication in short-range IoT applications.	CO2	BTL3	Apply

10	Examine the advantages and limitations of Bluetooth communication for IoT.	CO2	BTL4	Analyze
11	Demonstrate how Zigbee communication supports low-power IoT networks.	CO2	BTL3	Apply
12	Differentiate Zigbee communication with other wireless technologies used in IoT.	CO2	BTL4	Analyze
13	Illustrate the role of Wi-Fi modules in cloud-connected IoT systems.	CO2	BTL3	Apply
14	Examine the suitability of Wi-Fi communication for high data rate IoT applications.	CO2	BTL3	Apply
15	Demonstrate the use of GPS and GSM modules in a real-time tracking IoT application.	CO2	BTL3	Apply
16	Analyze the working and constraints of GSM-based communication in IoT systems.	CO2	BTL4	Analyze
17	Interpret how sensors, control units, and communication modules integrate within an IoT ecosystem.	CO2	BTL3	Apply

UNIT-III PROTOCOLS AND TECHNOLOGIES

IoT Protocols - IPv6, 6LoWPAN, MQTT, CoAP - RFID, Wireless Sensor Networks, Big Data Analytics, Cloud Computing, Embedded Systems.

PART-A

Q.No	Questions	COs	BT Level	Competence
1	Define IoT protocol.	CO3	BTL1	Remember
2	What is IPv6?	CO3	BTL1	Remember
3	Why is IPv6 preferred over IPv4 in IoT?	CO3	BTL2	Understand
4	What is meant by 6LoWPAN?	CO3	BTL1	Remember
5	State the purpose of 6LoWPAN in IoT networks.	CO3	BTL2	Understand
6	Define MQTT protocol.	CO3	BTL1	Remember
7	What communication model is used in MQTT?	CO3	BTL1	Remember
8	State one advantage of MQTT protocol.	CO3	BTL2	Understand
9	What is CoAP protocol?	CO3	BTL1	Remember
10	Mention one feature of CoAP.	CO3	BTL2	Understand
11	What is RFID technology?	CO3	BTL1	Remember
12	List the main components of an RFID system.	CO3	BTL1	Remember
13	What is a Wireless Sensor Network (WSN)?	CO3	BTL1	Remember
14	State the function of sensor nodes in WSN.	CO3	BTL1	Remember
15	What is meant by Big Data in IoT?	CO3	BTL2	Understand
16	Why is data analytics important in IoT?	CO3	BTL2	Understand
17	Define cloud computing.	CO3	BTL1	Remember
18	Mention one role of cloud computing in IoT.	CO3	BTL2	Understand
19	What is an embedded system?	CO3	BTL1	Remember
20	State one characteristic of embedded systems.	CO3	BTL1	Remember
21	What is the role of protocols in IoT communication?	CO3	BTL2	Understand

22	What is meant by low-power communication in IoT?	CO3	BTL2	Understand
23	List any two applications of RFID in IoT.	CO3	BTL1	Remember
24	What is meant by scalability in IoT networks?	CO3	BTL2	Understand

PART – B				
1	Illustrate the role of IPv6 addressing in supporting large-scale IoT networks.	CO3	BTL3	Apply
2	Demonstrate how 6LoWPAN enables IPv6 communication in low-power IoT devices.	CO3	BTL3	Apply
3	Examine the features of IPv6 and analyze their suitability for IoT environments.	CO3	BTL3	Apply
4	Illustrate the working principle of MQTT protocol in an IoT communication scenario.	CO3	BTL3	Apply
5	Compare and analyze MQTT and CoAP protocols used in IoT applications.	CO3	BTL4	Analyze
6	Demonstrate the operation of CoAP protocol in constrained IoT networks.	CO3	BTL3	Apply
7	Examine the architecture of MQTT protocol and analyze its performance characteristics.	CO3	BTL3	Apply
8	Illustrate the use of RFID technology in an IoT-based identification system.	CO3	BTL3	Apply
9	Analyze the components and working of an RFID system in IoT applications.	CO3	BTL4	Analyze
10	Demonstrate the architecture and data flow of a Wireless Sensor Network (WSN).	CO3	BTL3	Apply
11	Examine the challenges associated with Wireless Sensor Networks in IoT systems.	CO3	BTL3	Apply
12	Illustrate how Big Data analytics is used to extract insights from IoT data.	CO3	BTL3	Apply
13	Analyze the role of Big Data analytics in enhancing IoT decision-making processes.	CO3	BTL4	Analyze
14	Demonstrate the integration of cloud computing with IoT applications.	CO3	BTL3	Apply
15	Examine the significance of cloud computing in large-scale IoT deployments.	CO3	BTL3	Apply
16	Illustrate the role of embedded systems in IoT device operation.	CO3	BTL3	Apply
17	Analyze how embedded systems support real-time processing in IoT applications.	CO3	BTL4	Analyze

UNIT-IV OPEN PLATFORMS AND PROGRAMMING

IoT deployment for Raspberry Pi/Arduino platform - Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud.

PART – A				
Q.No.	**Questions**	**COs**	**BT Level**	**Competence**
1	What is meant by an open platform in IoT?	CO4	BTL1	Remember

2	Name any two open platforms used in IoT.	CO4	BTL1	Remember
3	What is Arduino platform?	CO4	BTL1	Remember
4	What is Raspberry Pi?	CO4	BTL1	Remember
5	State one difference between Arduino and Raspberry Pi.	CO4	BTL2	Understand
6	What is meant by IoT deployment?	CO4	BTL2	Understand
7	What type of processor is used in Arduino?	CO4	BTL1	Remember
8	What operating system is used in Raspberry Pi?	CO4	BTL1	Remember
9	Define GPIO pins.	CO4	BTL1	Remember
10	What is the purpose of GPIO pins in IoT systems?	CO4	BTL2	Understand
11	What is meant by GPIO pin configuration?	CO4	BTL2	Understand
12	What is digital input in GPIO?	CO4	BTL1	Remember
13	What is digital output in GPIO?	CO4	BTL1	Remember
14	What is meant by interfacing in IoT?	CO4	BTL2	Understand
15	Name any two devices that can be interfaced with Arduino.	CO4	BTL1	Remember
16	What is meant by sending signals using GPIO pins?	CO4	BTL2	Understand
17	What is meant by receiving signals using GPIO pins?	CO4	BTL2	Understand
18	What is cloud connectivity in IoT?	CO4	BTL2	Understand
19	Name any two IoT cloud platforms.	CO4	BTL1	Remember
20	What is the role of API keys in IoT cloud platforms?	CO4	BTL2	Understand
21	What programming language is commonly used for Arduino?	CO4	BTL1	Remember
22	What programming language is commonly used for Raspberry Pi?	CO4	BTL1	Remember
23	What is meant by real-time data monitoring in IoT?	CO4	BTL2	Understand
24	State one advantage of using open platforms for IoT development.	CO4	BTL2	Understand

PART B				
1	Illustrate the architecture of an IoT deployment using Arduino platform.	CO4	BTL3	Apply
2	Demonstrate the architecture of an IoT system implemented using Raspberry Pi.	CO4	BTL3	Apply
3	Examine the differences between Arduino and Raspberry Pi architectures for IoT applications.	CO4	BTL4	Analyze
4	Illustrate the steps involved in deploying an IoT application using open platforms.	CO4	BTL3	Apply
5	Examine the role of programming in controlling IoT devices using Arduino/Raspberry Pi.	CO4	BTL4	Analyze
6	Demonstrate sensor and actuator interfacing using Arduino platform.	CO4	BTL3	Apply
7	Illustrate the interfacing of sensors and actuators with Raspberry Pi.	CO4	BTL3	Apply
8	Examine the configuration and functionality of GPIO pins in Arduino platform.	CO4	BTL3	Apply
9	Examine the configuration and usage of GPIO pins in Raspberry Pi.	CO4	BTL3	Apply
10	Demonstrate how digital signals are sent using GPIO pins in IoT systems.	CO4	BTL3	Apply
11	Demonstrate how digital signals are received using GPIO pins in IoT systems.	CO4	BTL3	Apply
12	Illustrate bidirectional data transfer using GPIO pins in an IoT application.	CO4	BTL3	Apply
13	Examine the signal flow and timing considerations in GPIO-based IoT systems.	CO4	BTL3	Apply
14	Illustrate the process of connecting Arduino/Raspberry Pi to a cloud platform.	CO4	BTL3	Apply
15	Examine the role of cloud platforms in data storage and visualization for IoT systems.	CO4	BTL3	Apply
16	Demonstrate an IoT application where sensor data is uploaded to the cloud in real time.	CO4	BTL3	Apply
17	Analyze the challenges involved in IoT deployment using open platforms and cloud connectivity.	CO4	BTL4	Analyze

UNIT-VAPPLICATIONS

Business models for the internet of things, Smart city, Smart mobility and transport, Industrial IoT, Smart health, Environment monitoring and surveillance – Home Automation – Smart Agriculture.

PART – A				
Q.No	**Questions**	**COs**	**BT Level**	**Competence**
1	Define Internet of Things business model.	CO5	BTL1	Remember
2	What is meant by smart city?	CO5	BTL1	Remember

3	List any two applications of IoT in smart cities.	CO5	BTL1	Remember
4	What is smart mobility?	CO5	BTL1	Remember
5	State the role of IoT in intelligent transportation systems.	CO5	BTL2	Understand
6	What is Industrial Internet of Things (IIoT)?	CO5	BTL1	Remember
7	Mention one application of IIoT.	CO5	BTL2	Understand
8	What is smart health?	CO5	BTL1	Remember
9	List any two smart healthcare devices.	CO5	BTL1	Remember
10	What is environmental monitoring in IoT?	CO5	BTL2	Understand
11	State the purpose of surveillance systems in IoT.	CO5	BTL2	Understand
12	What is home automation?	CO5	BTL1	Remember
13	List any two devices used in home automation systems.	CO5	BTL1	Remember
14	What is smart agriculture?	CO5	BTL1	Remember
15	Mention one application of IoT in agriculture.	CO5	BTL2	Understand
16	What is meant by real-time monitoring in IoT applications?	CO5	BTL2	Understand
17	Define predictive maintenance.	CO5	BTL1	Remember
18	What is the role of sensors in smart city applications?	CO5	BTL2	Understand
19	List any two advantages of smart mobility systems.	CO5	BTL1	Remember
20	What is meant by energy management in IoT applications?	CO5	BTL2	Understand
21	What is a wearable device in smart healthcare?	CO5	BTL1	Remember
22	State one benefit of IoT-based environmental monitoring.	CO5	BTL2	Understand
23	What is meant by automation in IoT applications?	CO5	BTL2	Understand
24	List any two challenges in implementing IoT applications.	CO5	BTL1	Remember
PART B				
1	Illustrate an IoT-based business model with a suitable real-time example.	CO5	BTL3	Apply
2	Demonstrate how IoT technologies are used in smart city applications.	CO5	BTL3	Apply
3	Examine the architecture of a smart city system enabled by IoT.	CO5	BTL3	Apply
4	Illustrate the role of IoT in smart mobility and intelligent transportation systems.	CO5	BTL3	Apply
5	Examine IoT-based smart mobility solutions for traffic management and safety.	CO5	BTL3	Apply
6	Demonstrate the working of an Industrial IoT (IIoT) system with suitable examples.	CO5	BTL3	Apply
7	Examine the architecture and components of an Industrial IoT system.	CO5	BTL3	Apply
8	Illustrate how IoT enables remote patient monitoring in smart healthcare.	CO5	BTL3	Apply
9	Examine the role of IoT technologies in improving healthcare services.	CO5	BTL3	Apply

10	Demonstrate an IoT-based environmental monitoring and surveillance system.	CO5	BTL3	Apply
11	Examine the importance of IoT in environmental monitoring and pollution control.	CO5	BTL3	Apply
12	Illustrate the design of a home automation system using IoT technologies.	CO5	BTL3	Apply
13	Examine the working principles of IoT-based home automation systems.	CO5	BTL3	Apply
14	Demonstrate how IoT supports smart agriculture applications such as irrigation and crop monitoring.	CO5	BTL3	Apply
15	Examine the use of sensors and analytics in smart agriculture systems.	CO5	BTL3	Apply
16	Illustrate energy management and automation using IoT applications.	CO5	BTL3	Apply
17	Analyze the integration of multiple IoT applications within a smart environment.	CO5	BTL4	Analyze