

SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

QUESTION BANK



II SEMESTER CP3261 – INTERNET OF THINGS

Regulation – 2023

Academic Year 2024 – 2025 EVEN

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
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SUBJECT : CS3261-INTERNET OF THINGS

SEM / YEAR : II / I

UNIT I - ARCHITECTURES AND MODELS			
Introduction to IoT - IoT Architectures - Core IoT Functional Stack, Sensors and Actuators Layer, Communications Network Layer, Applications and Analytics Layer - IoT Data Management and Compute Stack, Fog Computing, Edge Computing, Cloud Computing - Sensors, Actuators, Smart Objects, Sensor networks			
PART-A (2 - MARKS)			
Q. No	QUESTIONS	Competence	BT Level
1.	What is the Internet of Things (IoT)	Remember	BTL-1
2.	List two examples of IoT applications.	Remember	BTL-1
3.	Give the key components of IoT architecture?	Understand	BTL-2
4.	Name any two layers of the IoT architecture.	Analyze	BTL-4
5.	Describe any two communication protocols used in IoT.	Understand	BTL-2
6.	What are smart objects in IoT?	Apply	BTL-3
7.	Define cloud computing in the context of IoT.	Understand	BTL-2
8.	State one key advantage of edge computing.	Analyze	BTL-4
9.	what is the role of sensors in IoT?	Remember	BTL-1
10.	Describe edge computing layer.	Understand	BTL-2
11.	Show two examples of sensors used in IoT applications.	Apply	BTL-3
12.	What is the significance of the applications and analytics layer in IoT?	Remember	BTL-1
13.	Define actuators with an example.	Remember	BTL-1
14.	Mention two examples of sensor networks used in IoT systems.	Apply	BTL-3
15.	Define fog computing in IoT.	Remember	BTL-1
16.	Define IoT data management?	Apply	BTL-3
17.	Explain connectivity layer	Evaluate	BTL-5
18.	Mention two applications of IoT analytics.	Remember	BTL-1
19.	Mention two examples of sensor networks used in IoT systems.	Remember	BTL-1

20.	Show the purpose of the communication network layer in IoT?		Apply	BTL-3
21.	Differentiate between sensors and actuators.		Understand	BTL-2
22.	Differentiate between fog computing and cloud computing.		Analyze	BTL-4
23.	Give one M-to-M IoT standard.		Understand	BTL-2
24.	Why is data processing important in IoT systems?		Evaluate	BTL-5
PART-B (16- MARKS)				
1	Explain the concept of the Internet of Things (IoT) and discuss its key characteristics, applications, and challenges.	(16)	Remember	BTL-1
2	Describe the IoT architecture in detail. Explain the roles and functions of its different layers.	(16)	Evaluate	BTL-5
3	Elaborate on the Core IoT Functional Stack.	(16)	Analyze	BTL-4
4	Discuss the role of the Sensors and Actuators Layer, Communications Network Layer, and Applications and Analytics Layer.	(16)	Remember	BTL-1
5	(i) Distinguish sensors and actuators.	(8)	Analyze	BTL-4
	(ii) Analyze about IoT. Explain its key features and benefits with examples.	(8)	Analyze	BTL-4
6	Discuss the IoT data management and compute stack.	(16)	Understand	BTL-2
7	Explain the significance of data management in IoT systems and the challenges associated with it.	(16)	Understand	BTL-2
8	Explain the Core IoT Functional Stack and the functions of its key layers.	(8)	Analyze	BTL-4
9	Compare fog computing, edge computing, and cloud computing with examples.	(16)	Analyze	BTL-4
10	Discuss the working principles of sensors and actuators in IoT.	(16)	Understand	BTL-2
11	Provide examples and discuss roles of sensors and actuators in smart applications.	(16)	Remember	BTL-1
12	Define smart objects in IoT. Discuss the importance of sensor networks and their applications in real-world IoT solutions.	(16)	Remember	BTL-1
13	Analyze the role of the communication network layer in IoT? Discuss key protocols used in this layer.	(16)	Analyze	BTL-4
14	Describe the layered architecture of IoT and explain the role of each layer.	(8)	Apply	BTL-3
	(ii) Compare fog computing and edge computing in IoT systems.	(8)	Apply	BTL-3
15	Discuss the importance of the applications and analytics layer in IoT. Provide examples of analytics-driven IoT applications.	(16)	Understand	BTL-2
16	Explain the role of the Applications and Analytics Layer in IoT.	(16)	Create	BTL-6
17	State and Discuss how data analytics enhances IoT applications with suitable case studies.	(16)	Apply	BTL-3
UNIT II CONNECTIVITY				
Communications Criteria - Access Technologies - IP as IoT Network Layer - Business case-Optimization - Profiles and compliances - Application Protocols - Transport Layer - ApplicationTransport Methods.				

PART – A				
Q. No	QUESTIONS	Competence		BT Level
1.	What are the key communication criteria for IoT networks?	Understanding		BTL-2
2.	Define MAC layer.	Remembering		BTL-1
3.	Differentiate latency and throughput.	Analyzing		BTL-4
4.	Why is IP considered suitable as the network layer in IoT?	Understanding		BTL-2
5.	Show how does access technology selection impact IoT device performance.	Remembering		BTL-3
6.	List two wireless access technologies used in IoT communication.	Remembering		BTL-1
7.	What is 6LoWPAN.	Remembering		BTL-1
8.	Define SCADA.	Understanding		BTL-2
9.	What advantages does IPv6 offer for IoT networks?	Remembering		BTL-1
10.	List application layer protocols.	Applying		BTL-3
11.	Assess why is a business case important for adopting IoT solutions?	Applying		BTL-5
12.	List key advantages of Internet protocol	Remembering		BTL-1
13.	Show how does IoT create business value for industries.	Remembering		BTL-3
14.	Point out two benefits of optimizing IoT networks.	Remembering		BTL-1
15.	Discover the difference between constraint node and constraint network.	Applying		BTL-3
16.	D Why is lightweight data transport important for IoT devices?	Understanding		BTL-2
17.	Analyze why does network optimization enhance IoT communication efficiency?	Analyzing		BTL-4
18.	Assess two commonly used application protocols in IoT.	Evaluating		BTL-5
19.	Write the role of compliance profiles in IoT systems.	Evaluating		BTL-5
20.	List the two examples of IoT compliance standards.	Remembering		BTL-1
21.	How does the transport layer ensure reliable data delivery?	Understanding		BTL-2
22.	Compare two methods used for transporting data in IoT applications.	Applying		BTL-3
23.	Generalize the function of the transport layer in IoT communication.	Creating		BTL-6
24.	State why is MQTT suitable for IoT applications.	Understanding		BTL-2
PART-B (16- MARKS)				
1.	Write and Discuss the key communication criteria for IoT networks and explain their importance in ensuring reliable and efficient communication.	16	Analyzing	BTL-4
2.	(i)Assess on Why is IP used as the network layer in IoT? (ii) Discuss the advantages of using IPv6 over IPv4 for IoT networks, with examples.	8 8	Evaluating	BTL-5

3.	Analyze in detail about the need for optimization in IOT.	16	Analyzing	BTL-4
4.	Explain various access technologies used in IoT communication, comparing their advantages, limitations, and applications.	16	Analyzing	BTL-4
5.	(i)Examine the importance of optimization in IoT networks. (ii) Discuss various techniques used to optimize communication and resource utilization in IoT systems.	8 8	Applying	BTL-3
6.	Explain in detail about the significance of building a business case for IoT adoption? Analyze how IoT can create value across different industries with suitable examples.	16	Remembering	BTL-3
7.	Explain SCADA in detail with diagram.	16	Creating	BTL-6
8.	Analyze and Discuss What are profiles and compliance standards in IoT communication systems? Discuss their role in ensuring security, interoperability, and regulatory adherence.	16	Analyzing	BTL-4
9.	Generalize on the different application transport methods used in IoT communication. Highlight their advantages, challenges, and use cases in real-world IoT applications.	16	Creating	BTL-6
10.	Explain CoAP communication in IOT infrastructure.	16	Evaluating	BTL-5
11.	Explain protocol stack for transporting serial DNP3 SCADA over IP.	16	Creating	BTL-6
12.	Assess in detail about the key application protocols used in IoT communication, including MQTT and CoAP, and compare their performance and use cases.	16	Evaluating	BTL-5
13.	Explain MQTT in detail.	16	Understanding	BTL-2
14.	Generalize on the concept of optimizing IP for IOT using adaptation layer.	16	Applying	BTL-3
15.	Analyze the challenges in designing IoT communication networks	16	Analyzing	BTL-4
16.	(i) List out the key advantages of internet Protocols. (ii) Differentiate constraint node and constraint network.	8 8	Applying	BTL-3
17.	State the comparison of an IOT protocol stack utilizing 6LoWPAN and IP protocol stack.	16	Evaluating	BTL-5

UNIT III SYSTEM DEVELOPMENT

Design Methodology - Case study - Basic blocks of IoT device - Raspberry Pi - Board, Interfaces, Linux, Setting up, Programming - Arduino - Other IoT Devices.

PART A

Q. No	QUESTIONS	Competence	BT Level
1.	Give the key steps in IoT design methodology.	Understanding	BTL-2
2.	List two popular Arduino boards used in IoT projects.	Remembering	BTL-1
3.	Show the various components in raspberry pi board.	Applying	BTL-3
4.	Point out various IOT design methodology.	Analyzing	BTL-4
5.	What makes Arduino suitable for IoT applications?	Analyzing	BTL-4
6.	What are the differences between Raspberry Pi and Arduino in IoT applications?	Understanding	BTL-4
7.	Define IOT level specification.	Remembering	BTL-1

8.	Why is requirement analysis important in IoT design?	Remembering	BTL-1	
9.	What is Give an example of a real-world IoT application and its purpose.	Understanding	BTL-2	
10.	Show the basic building block of IOT device.	Applying	BTL-3	
11.	Asses the role of microcontrollers in IoT devices.	Evaluating	BTL-5	
12.	Name two IoT devices other than Raspberry Pi and Arduino	Understanding	BTL-2	
13.	What challenges are commonly faced in implementing IoT solutions?	Understanding	BTL-2	
14.	What are the different types of linux in raspberry pi?	Analyzing	BTL-4	
15.	List the basic components of an IoT device.	Remembering	BTL-1	
16.	Define Raspberry pi	Remembering	BTL-1	
17.	List two interfaces available on Raspberry Pi for IoT applications	Applying	BTL-3	
18.	What is the role of sensors and actuators in IoT?	Analyzing	BTL-4	
19.	Why is Linux commonly used on Raspberry Pi for IoT projects?	Remembering	BTL-1	
20.	State Why GPIO important in Raspberry Pi projects?	Evaluating	BTL-5	
21.	List out the different types of Raspberry pi interfaces.	Remembering	BTL-1	
22.	What operating system is commonly used on Raspberry Pi for IoT development?	Evaluating	BTL-5	
23.	What are the differences between Raspberry Pi and Arduino in IoT applications?	Understanding	BTL-2	
24.	What is Raspberry Pi, why it is popular in IoT projects?	Creating	BTL-6	
	PART-B (16- MARKS)			
1.	Analyze and Discuss the step-by-step process of IoT system design, from conceptualization to deployment.	16	Analyzing	BTL-4
2.	Illustrate the strengths and limitations of using Raspberry Pi for IoT applications. Discuss its components, including the board, interfaces, and compatibility with Linux.	16	Applying	BTL-3
3.	Summarize on the basic building blocks of an IoT device. Explain the role of sensors, actuators, microcontrollers, communication interfaces, and power management in IoT systems.	16	Applying	BTL-3
4.	Write a python program for sending an e-mail on switch press.	16	Analyzing	BTL-4
5.	Explain the design methodology for creating an IoT system. Discuss each stage in detail with examples.	16	Analyzing	BTL-4
6.	(i)List and explain about different Raspberry Pi interfaces.	8	Analyzing	BTL-4
	(ii)Analyze and write python program for switching LED	8		
7.	Analyse about a detailed case study of an IoT application for weather monitoring system.	16	Creating	BTL-6
8.	What operating system is typically used in Raspberry Pi for IoT development? Describe the steps to set up the Raspberry Pi and program it for an IoT project.	16	Creating	BTL-6
9.	Compare Raspberry Pi with other IOT devices.	16	Evaluating	BTL-5

10.	Write a python program for interfacing an LED and switch with Raspberry Pi	16	Analyzing	BTL-4
11.	Analyze about the Linux on Raspberry pi and write various command of linux.	16	Analyzing	BTL-4
12.	Discuss the role of alternative IoT devices like ESP8266 and BeagleBone in the IoT ecosystem. How do they differ from Raspberry Pi and Arduino in terms of features and use cases?	16	Remembering	BTL-1
13.	Draw the block diagram of an IOT device and explain in detail.	16	Creating	BTL-6
14.	Explain GPIO and write python program for blinking LED.	16	Understanding	BTL-2
15.	Discuss the basic components of an IoT device, including sensors, actuators, microcontrollers, and communication interfaces.	16	Remembering	BTL-1
16.	Illustrat in detail about raspberry Pi Board	16	Evaluating	BTL-5
17.	Compare the programming approaches for Raspberry Pi and Arduino in IoT applications.	16	Understanding	BTL-2

UNIT IV DATA ANALYTICS AND IoT SECURITY

Data Analytics for IoT - **Big Data Analytics Tools and Technology - Edge Streaming Analytics-Network Analytics, Applications.** Security history, challenges, variations - Risk Analysis Structures - Application in Operational Environment.

PART-A

Questions		Competence	BT Level
1.	Define edge streaming analytics.	Remembering	BTL-1
2.	Define NoSQL database.	Understanding	BTL-2
3.	Assess the role of big data analytics in IoT.	Applying	BTL-3
4.	Differentiate Hadoop and YARN	Analyzing	BTL-4
5.	State two popular big data analytics tools for IoT applications.	Applying	BTL-3
6.	Mention one benefit of IoT analytics in operational environments.	Understanding	BTL-2
7.	Define Mapreduce.	Remembering	BTL-1
8.	How does network analytics in IoT involve.	Understanding	BTL-2
9.	Define ICCP.	Remembering	BTL-1
10.	Pointout two advantages of edge analytics over cloud-based analytics.	Understanding	BTL-2
11.	Assess about "three Vs" to categorize Big data.	Analyzing	BTL-4
12.	Differentiate Big Data and Edge Analytics.	Analyzing	BTL-4
13.	How is IoT analytics useful in predictive maintenance?	Analyzing	BTL-4
14.	Define DNP3.	Remembering	BTL-1
15.	Differentiate ICCP and OCP.	Analyzing	BTL-4
16.	What is a common security challenge in IoT data analytics?	Remembering	BTL-1
17.	What is FNF and list its advantages.	Remembering	BTL-1

18.	How does IoT data analytics applied in smart manufacturing?	Creating	BTL-6	
19.	Examine the purpose of risk analysis in IoT.	Evaluating	BTL-5	
20.	State the Mention two key components of risk analysis structures.	Understanding	BTL-2	
21.	Differentiate OCTAVE and FAIR.	Analyzing	BTL-4	
22.	List the network management services	Understanding	BTL-2	
23.	What do you mean by Network Security Monitoring (NSM).	Remembering	BTL-1	
24.	State two applications of data analytics in IoT.	Understanding	BTL-2	
	PART-B (16- MARKS)			
1.	Explain in Explain the role of big data analytics in IoT and discuss the tools and technologies used for analyzing IoT data.	16	Applying	BTL-3
2.	Define Hadoop and show thereationship between NameNodes and DtaNodes and how data blocks are distributed across cluster	16	Understanding	BTL-2
3.	Explain in detail about Apache kafka dataflow	16	Creating	BTL-6
4.	Define edge streaming analytics. Discuss its architecture, advantages, and how it differs from Bigdata.	16	Evaluating	BTL-5
5.	Show the Field area network traffic analytics performed on the aggregation router in a smart grid	16	Evaluating	BTL-5
6.	Describe the concept of network analytics in IoT. Explain its importance, tools, and use cases with examples.	16	Evaluate	BTL-5
7.	Explain Lambda architecture in detail.	16	Analyzing	BTL-4
8.	Draw and explain about the overview of Flexible Netflow.	16	Creating	BTL-6
9.	Explain briefly about Distributed analytics throughout the IOT system.	16	Evaluate	BTL-5
10.	Discuss major challenges and security variations faced in IoT analytics.	16	Understanding	BTL-2
11.	What are risk analysis structures in IoT? Explain their components and their role in mitigating IoT security risks.	16	Evaluate	BTL-5
12.	Illustrate OCTAVE Allegro steps and phases in the formal Risk Analysis structure.	16	Evaluate	BTL-5
13.	Explain the significance of big data analytics in IoT and mention key tools used for analytics.	16	Evaluate	BTL-5
14.	Define edge streaming analytics and explain its benefits compared to traditional analytics approaches.	16	Creating	BTL-6
15.	What is network analytics in IoT? Discuss its importance and applications.	16	Analyzing	BTL-4
16.	Apply the phased application of security in an operational Environment	16	Analyzing	BTL-4
17	Explain in detail about security between levels and zones in the process control Hierarchy model.	16	Creating	BTL-6
UNIT V IoT IN INDUSTRY				
Manufacturing- Architecture, Protocols – Utilities- Grid Blocks- Smart Cities, Architecture, Use cases - Transportation, Architecture, Use cases.				

PART-A				
Questions		Competence		BTL
1.	Define CPwE	Remembering		BTL-1
2.	List out the types of Industrial Automation control protocol	Understanding		BTL-2
3.	Compare on-premises Vs Cloud.	Analyzing		BTL-4
4.	Give the. What is the function of the application layer in smart cities?	Remembering		BTL-1
5.	Define PROFINET.	Remembering		BTL-1
6.	What is Resilient Ethernet protocol(RED)?	Remembering		BTL-1
7.	State List two protocols commonly used in smart grids.	Understanding		BTL-2
8.	Differentiate system control grid block and FAN.	Analyzing		BTL-4
9.	Draw a figure to show how electricity prices rise , while LED prices decrease and their unit sale rise.	Remembering		BTL-1
10.	List out the different types of Grid Block	Understanding		BTL-2
11.	Point out the different protocols used in different OSI layers in smart Transport.	Remembering		BTL-1
12.	State Media Redundancy Protocol(MRP).	Understanding		BTL-2
13.	Define FAN.	Remembering		BTL-1
14.	State any five tier of Grid block in 11-Tier Architecture.	Remembering		BTL-1
15.	Assess the benefits of PROFINET.in manufacturing.	Applying		BTL-3
16.	What are the three sub sector of Transportation.	Remembering		BTL-1
17.	What is DSRC in smart Transport.	Evaluate		BTL-5
18.	State the characteristics of MRP in manufacturing.	Understanding		BTL-2
19.	Assess the challenges in Transportation.	Applying		BTL-3
20.	State Name two technologies used in smart public transport systems.	Analyzing		BTL-4
21.	Define RTLS.	Remembering		BTL-1
22.	What are the technologies used for Transportation.	Understanding		BTL-2
23.	List out different zones in manufacturing plant.	Understanding		BTL-2
24.	Give benefits of gridblock to utility operator.	Evaluate		BTL-5
PART-B				
1.	Explain in detail about the architecture of connected Factory.	16	Analyzing	BTL-4
2.	Discuss in detail about High –level view of the CPwE Architecture .	16	Understanding	BTL-2
3.	Describe a usecase for smart Transport.	16	Understanding	BTL-2
4.	Analyze about the Resilient Ethernet Protocol in manufacturing.	16	Analyzing	BTL-4
5.	Write short notes on CPwE wireless network architecture.	16	Analyzing	BTL-4
6.	Explain PROFINET MRP operations in manufacturing unit.	16	Analyzing	BTL-4

7.	Briefly discuss about a Factory network based on Ethernet/IP.	16	Evaluate	BTL-5
8.	Explain smart bridge in smart Transport.	16	Applying	BTL-3
9.	Discuss briefly about the Grid block Reference Architecture with neat diagram.	16	Analyzing	BTL-4
10.	Examine system control Grid Block with example.	16	Evaluate	BTL-5
11.	Write short notes on Field Area Network(FAN) Grid Block.	16	Understanding	BTL-2
12.	Design and Elaborate on Key smart and connected cities reference architecture.	16	Evaluate	BTL-5
13.	Explain DSRC General communication Architecture in smart transport.	16	Evaluate	BTL-5
14.	Draw and Explain in detail about the Street light Architecture.	16	Evaluate	BTL-5
15.	Design a CPwE Resilient Network	16	Creating	BTL-6
16.	Draw and explain the 11-Tiered reference architecture.	16	Creating	BTL-6
17.	Design a Smart parking Architecture to develop a smart city.	16	Creating	BTL-6