SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

VI SEMESTER

CS3661 CLOUD COMPUTING AND IoT

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UNIT I - CLOUD ENABLING TECHNOLOGIES AND VIRTUALIZATION

Evolution of Distributed computing: Scalable computing over the Internet - Technologies for network based systems - Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU -Memory - I/O Devices

PART – A

Q.No	Question	BTL Level	Competence
1	Define distributed computing.	BTL-1	Remembering
2	What is scalable computing over the Internet?	BTL-2	Understanding
3	List any two advantages of distributed systems.	BTL-1	Remembering
4	What are network-based systems?	BTL-2	Understanding
5	Define virtualization.	BTL-1	Remembering
6	List the different types of virtualization.	BTL-1	Remembering
7	Differentiate between full virtualization and para-virtualization.	BTL-2	Understanding
8	What is a hypervisor? Give an example.	BTL-1	Remembering
9	Define Type-1 and Type-2 hypervisors.	BTL-2	Understanding
10	What is system-level virtualization?	BTL-1	Remembering
11	What do you mean by implementation levels of virtualization?	BTL-2	Understanding
12	Define virtual machine monitor (VMM).	BTL-1	Remembering
13	What is CPU virtualization?	BTL-1	Remembering
14	Explain memory virtualization in brief.	BTL-2	Understanding
15	What is I/O virtualization?	BTL-1	Remembering
16	List any two virtualization tools or platforms.	BTL-1	Remembering
17	What is containerization?	BTL-2	Understanding
18	Define shadow paging.	BTL-1	Remembering
19	What is device emulation?	BTL-2	Understanding
20	What are virtual I/O devices?	BTL-1	Remembering

21	Define para-virtualized drivers.	BTL-2	Understanding
22	What is VM migration?	BTL-1	Remembering
23	List any two benefits of virtualization.	BTL-2	Understanding
24	What is the role of virtualization in cloud computing?	BTL-2	Understanding

PART - B				
Q.No	16-Mark Question	Marks	BTL Level	Competence
1	Illustrate how distributed computing has evolved to support large-scale cloud systems with suitable examples.	16	BTL-3	Apply
2	Demonstrate with a diagram the architecture of scalable computing over the Internet. Explain each component.	16	BTL-3	Apply
3	Apply network-based technologies to propose a model for resource sharing in distributed cloud environments.	16	BTL-3	Apply
4	Analyze the differences between cluster computing, grid computing, and cloud computing.	16	BTL-4	Analyze
5	Compare various technologies used in network-based systems and analyze their applicability in cloud environments.	16	BTL-4	Analyze
6	Analyze the importance of virtualization in enhancing resource utilization in cloud infrastructures.	16	BTL-4	Analyze
7 (i)	Evaluate the performance of full virtualization vs. para-virtualization based on overhead, compatibility, and security.	8	BTL-5	Evaluate
7(ii)	Critically evaluate the strengths and limitations of Type-1 and Type-2 hypervisors.	8	BTL-5	Evaluate
8	Examine and justify the selection of an appropriate virtualization tool (VMware, Xen, KVM, Hyper-V) for a data center.	16	BTL-5	Evaluate
9 (i)	Create a virtualization framework that includes CPU, memory, and I/O virtualization for a cloud-based application.	8	BTL-6	Create
9(ii)	Design a virtual machine setup for a multi-tenant cloud platform using suitable virtualization structures.	8	BTL-6	Create
10	Propose an optimized VM migration strategy to reduce downtime in cloud environments.	16	BTL-6	Create
11	Apply CPU virtualization techniques to run multiple OS instances effectively on a single physical machine.	16	BTL-3	Apply
12	Analyze various memory virtualization mechanisms and their impact on cloud system performance.	16	BTL-4	Analyze
13	Evaluate I/O virtualization techniques and determine the most efficient one for high-performance cloud servers.	16	BTL-5	Evaluate

	PART - B			
Q.No	16-Mark Question	Marks	BTL Level	Competence
14	Design a secure virtualized network architecture for distributed cloud applications.	16	BTL-6	Create
15	Apply the concept of implementation levels of virtualization to configure a virtualized environment for education or research institutions.	16	BTL-3	Apply
16	Analyze virtualization structures and mechanisms used in cloud computing platforms.	16	BTL-4	Analyze
17	Evaluate how virtualization contributes to cost reduction and scalability in cloud service delivery models.	16	BTL-5	Evaluate

UNIT - II: CLOUD ARCHITECTURE AND RESOURCE MANAGEMENT

Layered Cloud Architecture Design - NIST Cloud Computing Reference Architecture - Public, Private and Hybrid Clouds - IaaS - PaaS - SaaS - Cloud Storage - Storage-as- a-Service -Inter Cloud Resource Management - Resource Provisioning -Method

	PART – A		
Q.No	Question	BTL Level	Competence
1	Define cloud computing architecture.	BTL 1	Remembering
2	What is meant by layered cloud architecture?	BTL 1	Remembering
3	List the major layers in a cloud architecture.	BTL 1	Remembering
4	What is the role of the service layer in cloud architecture?	BTL 2	Understanding
5	Define NIST Cloud Computing Reference Architecture.	BTL 1	Remembering
6	Name the key actors defined by NIST cloud architecture.	BTL 1	Remembering
7	What is a public cloud?	BTL 1	Remembering
8	Mention any two advantages of private cloud.	BTL 2	Understanding
9	What is a hybrid cloud?	BTL 1	Remembering
10	Define Infrastructure as a Service (IaaS).	BTL 1	Remembering
11	Give two examples of IaaS providers.	BTL 1	Remembering
12	What is Platform as a Service (PaaS)?	BTL 1	Remembering
13	Define Software as a Service (SaaS).	BTL 1	Remembering
14	Differentiate IaaS and PaaS (any one point).	BTL 2	Understanding

15	What is cloud storage?	BTL 1	Remembering
16	Define Storage-as-a-Service.	BTL 1	Remembering
17	List any two features of cloud storage.	BTL 2	Understanding
18	What is inter-cloud resource management?	BTL 2	Understanding
19	Define resource provisioning in cloud computing.	BTL 1	Remembering
20	What is dynamic resource provisioning?	BTL 2	Understanding
21	Mention any two challenges in cloud resource management.	BTL 2	Understanding
22	What is on-demand resource provisioning?	BTL 2	Understanding
23	What is meant by elasticity in cloud computing?	BTL 2	Understanding
24	State the objective of cloud resource management.	BTL 2	Understanding

PART - B

Q.No	Question	Marks	BTL Level	Competence
1	Explain the layered cloud architecture design with a neat diagram and suitable example.	16	BTL 3	Applying
2(i)	Explain the NIST Cloud Computing Reference Architecture.	8	BTL 3	Applying
2(ii)	Illustrate the role of each actor.	8	BTL 3	Applying
3	Apply the concept of layered cloud architecture to design a basic cloud service framework.	16	BTL 3	Applying
4(i)	Analyze the layered cloud architecture with suitable diagram.	8	BTL 4	Analyzing
4(ii)	Explain how it supports scalability and fault tolerance.	8	BTL 4	Analyzing
5	Analyze the NIST Cloud Reference Architecture with respect to interoperability and portability.	16	BTL 4	Analyzing
6	Compare and analyze public, private, and hybrid cloud deployment models for enterprise applications.	16	BTL 4	Analyzing
7 (i)	Explain IaaS, PaaS, and SaaS models and	8	BTL 3	Applying
7 (ii)	Apply the models to suitable real-world use cases.	8	BTL 3	Applying
8	Analyze the responsibilities of cloud service providers and consumers in IaaS, PaaS, and SaaS models.	16	BTL 4	Analyzing
9	Evaluate the advantages and limitations of public cloud deployment for large-scale systems.	16	BTL 5	Evaluating

PART - B

Q.No	Question	Marks	BTL Level	Competence
10(i)	Evaluate the effectiveness of cloud storage and Storage-as-a-Service in data-intensive applications.	8	BTL 5	Evaluating
10(ii)	Explain Storage-as-a-Service solutions for backup and disaster recovery.	8	BTL 5	Evaluating
11	Analyze cloud storage architecture and its impact on data availability and reliability.	16	BTL 4	Analyzing
12	Analyze the challenges involved in inter-cloud resource management.	16	BTL 4	Analyzing
13	Evaluate different resource provisioning methods used in cloud computing environments.	16	BTL 5	Evaluating
14	Evaluate static and dynamic resource provisioning techniques with respect to cost and performance.	16	BTL 5	Evaluating
15 (i)	Design a hybrid cloud architecture for an enterprise application.	8	BTL 6	Creating
15(ii)	Justify the chosen deployment model.	8	BTL 6	Creating
16	Propose an efficient inter-cloud resource management and provisioning strategy for a high-availability cloud system.	16	BTL 6	Creating
17	Create a cloud-based storage solution using Storage-as-a-Service for a multimedia or big-data application.	16	BTL 6	Creating

UNIT - III: SECURITY IN CLOUD AND CASE STUDIES		
Security Overview - Cloud Security Challenges - Software-as-a-Service Security - Security Governance - Virtual Machine Security - IAM - Security Standards. Cloud :Hadoop - MapReduce - Virtual Box -- Google App Engine- Open Stack, AWS		
PART – A		
Q.No	Question	BTL Level	Competence

Q.No	Question	BTL Level	Competence
1	Define cloud security.	BTL 1	Remembering
2	What is meant by shared responsibility model in cloud security?	BTL 2	Understanding
3	List any two cloud security challenges.	BTL 1	Remembering
4	What is Software-as-a-Service (SaaS) security?	BTL 1	Remembering
5	State two security concerns in SaaS environments.	BTL 1	Remembering
6	Explain the role of security governance in cloud computing.	BTL 2	Understanding
7	What is virtual machine security?	BTL 1	Remembering
8	List any two threats to virtual machines.	BTL 1	Remembering

9	What is Identity and Access Management (IAM)?	BTL 1	Remembering
10	State the purpose of IAM in cloud security.	BTL 2	Understanding
11	What are cloud security standards?	BTL 1	Remembering
12	Give two examples of cloud security standards.	BTL 1	Remembering
13	Explain the need for security standards in cloud computing.	BTL 2	Understanding
14	What is Hadoop security?	BTL 1	Remembering
15	Mention any two security features of Hadoop.	BTL 1	Remembering
16	What is MapReduce?	BTL 1	Remembering
17	State the role of security in MapReduce frameworks.	BTL 2	Understanding
18	What is VirtualBox?	BTL 1	Remembering
19	List any two security features of VirtualBox.	BTL 1	Remembering
20	What is Google App Engine?	BTL 1	Remembering
21	State one security feature of Google App Engine.	BTL 2	Understanding
22	What is OpenStack?	BTL 1	Remembering
23	What is AWS?	BTL 1	Remembering
24	State the importance of security services in AWS.	BTL 2	Understanding

PART - B

Q.No	Question	Marks	BTL Level	Competence
1(i)	Explain the cloud security architecture with diagram.	8	BTL 3	Applying
1(ii)	Apply the security architecture to a typical cloud service environment and explain in detail.	8	BTL 3	Applying
2 (i)	Explain major cloud security challenges and illustrate it in detail them with real-world examples.	8	BTL 3	Applying
2 (ii)	Apply the challenges to real world examples.	8	BTL 3	Applying
3	Apply security mechanisms used in Software-as-a-Service (SaaS) environments.	16	BTL 3	Applying
4(i)	Analyze the security threats specific to cloud computing environments.	8	BTL 4	Analyzing
4(ii)	Analyze cloud security challenges related to data privacy, multi-tenancy, and compliance.	8	BTL 4	Analyzing
5	Analyze the role of security governance in managing cloud security risks.	16	BTL 4	Analyzing

PART - B

Q.No	Question	Marks	BTL Level	Competence
6	Analyze virtual machine security issues in multi-tenant cloud environments.	16	BTL 4	Analyzing
7	Analyze the importance of Identity and Access Management (IAM) in cloud security.	16	BTL 4	Analyzing
8	Evaluate different security standards used in cloud computing environments.	16	BTL 5	Evaluating
9 (i)	Evaluate the effectiveness of IAM mechanisms in preventing unauthorized access.	8	BTL 5	Evaluating
9(ii)	Explain IAM solutions in large-scale cloud platforms.	8	BTL 5	Evaluating
10	Evaluate security challenges and solutions in SaaS-based applications.	16	BTL 5	Evaluating
11	Analyze the security architecture of Hadoop and MapReduce frameworks.	16	BTL 4	Analyzing
12	Evaluate the security features provided by VirtualBox for virtualized environments.	16	BTL 5	Evaluating
13	Analyze the security model of Google App Engine.	16	BTL 4	Analyzing
14	Evaluate the security services offered by OpenStack cloud platform.	16	BTL 5	Evaluating
15	Evaluate AWS security mechanisms with respect to data protection and access control.	16	BTL 5	Evaluating
16	Design a secure cloud architecture incorporating IAM, VM security, and security standards.	16	BTL 6	Creating
17	Propose a comprehensive cloud security framework for an enterprise using AWS or OpenStack.	16	BTL 6	Creating

UNIT - IV: INTERNET OF THINGS (IoT) AND COMPONENTS		
Evolution of Internet of Things - Enabling Technologies - IoT Architectures: one M2M, IoT World Forum (IoTWF) - Simplified IoT Architecture and Core IoT Functional Stack - Fog, Edge and Cloud in IoT.Functional Blocks of an IoT Ecosystem - Sensors, Actuators, and Smart Objects		
PART – A		
Q.No	Question	BTL Level	Competence

Q.No	Question	BTL Level	Competence
1	Define Internet of Things (IoT).	BTL 1	Remembering
2	State the evolution of IoT.	BTL 2	Understanding
3	List any two enabling technologies of IoT.	BTL 1	Remembering
4	What is Machine-to-Machine (M2M) communication?	BTL 1	Remembering

5	Explain the role of M2M in IoT systems.	BTL 2	Understanding
6	What is IoT World Forum (IoTWF) architecture?	BTL 1	Remembering
7	List the layers of IoT World Forum architecture.	BTL 1	Remembering
8	What is meant by simplified IoT architecture?	BTL 1	Remembering
9	Explain the need for simplified IoT architecture.	BTL 2	Understanding
10	What is the Core IoT Functional Stack?	BTL 1	Remembering
11	List the components of Core IoT Functional Stack.	BTL 1	Remembering
12	Explain the role of the application layer in IoT.	BTL 2	Understanding
13	What is Fog computing in IoT?	BTL 1	Remembering
14	Differentiate Edge and Cloud computing in IoT (any one point).	BTL 2	Understanding
15	What is Edge computing?	BTL 1	Remembering
16	State the importance of Fog computing in IoT systems.	BTL 2	Understanding
17	What are functional blocks of an IoT ecosystem?	BTL 1	Remembering
18	List any two functional blocks of an IoT ecosystem.	BTL 1	Remembering
19	What is a sensor?	BTL 1	Remembering
20	What is an actuator?	BTL 1	Remembering
21	Explain the role of sensors in IoT.	BTL 2	Understanding
22	Explain the role of actuators in IoT systems.	BTL 2	Understanding
23	What are smart objects?	BTL 1	Remembering
24	State the importance of smart objects in IoT applications.	BTL 2	Understanding

PART - B

Q.No	Question	Marks	BTL Level	Competence
1	Explain the evolution of Internet of Things and apply it to modern applications.	16	BTL 3	Applying
2(i)	Explain enabling technologies of IoT.	8	BTL 3	Applying
2(ii)	Illustrate the components and their role in IoT systems.	8	BTL 3	Applying
3	Explain M2M architecture and apply it to a real-time IoT scenario.	16	BTL 3	Applying

PART - B

Q.No	Question	Marks	BTL Level	Competence
4	Analyze the IoT World Forum (IoTWF) architecture and its functional layers.	16	BTL 4	Analyzing
5	Analyze the simplified IoT architecture and compare it with IoTWF architecture.	16	BTL 4	Analyzing
6	Analyze the Core IoT Functional Stack and its role in end-to-end IoT solutions.	16	BTL 4	Analyzing
7	Explain Fog, Edge, and Cloud computing and apply them in an IoT use case.	8	BTL 3	Applying
8	Analyze the advantages of Fog and Edge computing over Cloud in IoT systems.	8	BTL 4	Analyzing
9	Evaluate the suitability of Fog, Edge, and Cloud computing for latency-sensitive IoT applications.	16	BTL 5	Evaluating
10	Analyze the functional blocks of an IoT ecosystem with a neat diagram.	8	BTL 4	Analyzing
11	Evaluate the role of sensors and actuators in smart IoT environments.	8	BTL 5	Evaluating
12	Analyze the characteristics and challenges of smart objects in IoT systems.	16	BTL 4	Analyzing
13	Evaluate different IoT architectures for large-scale industrial IoT applications.	16	BTL 5	Evaluating
14	Design a simplified IoT architecture for a smart home application.	16	BTL 6	Creating
15	Design an IoT ecosystem showing sensors, actuators, smart objects, and cloud integration.	16	BTL 6	Creating
16	Propose an IoT architecture incorporating Fog, Edge, and Cloud for a smart city application.	16	BTL 6	Creating
17	Create an end-to-end IoT system design for a healthcare or agriculture monitoring application.	16	BTL 6	Creating

UNIT - V: PROTOCOLS, TECHNOLOGIES AND APPLICATIONS		
IoT deployment for Raspberry Pi /Arduino platform-Architecture -Programming - Interfacing - Accessing GPIO Pins - Sending and Receiving Signals Using GPIO Pins - Connecting to the Cloud IoT Protocols - IPv6, 6LoWPAN, MQTT, CoAP - RFID, IoT Applications		
PART – A		
Q.No	Question	BTL Level	Competence
1	What is Raspberry Pi?	BTL 1	Remembering
2	What is Arduino?	BTL 1	Remembering
3	State the difference between Raspberry Pi and Arduino.	BTL 2	Understanding

4	What is IoT deployment architecture?	BTL 1	Remembering
5	List the main components of an IoT deployment architecture.	BTL 1	Remembering
6	What is meant by programming in IoT platforms?	BTL 1	Remembering
7	What are GPIO pins?	BTL 1	Remembering
8	State the purpose of GPIO pins in IoT devices.	BTL 2	Understanding
9	What is interfacing in IoT systems?	BTL 1	Remembering
10	Give two examples of devices interfaced with Raspberry Pi/Arduino.	BTL 1	Remembering
11	What is meant by sending signals using GPIO pins?	BTL 2	Understanding
12	What is meant by receiving signals using GPIO pins?	BTL 2	Understanding
13	What is cloud connectivity in IoT?	BTL 1	Remembering
14	State the importance of cloud in IoT applications.	BTL 2	Understanding
15	What is IPv6?	BTL 1	Remembering
16	What is 6LoWPAN?	BTL 1	Remembering
17	What is MQTT protocol?	BTL 1	Remembering
18	What is CoAP?	BTL 1	Remembering
19	State one difference between MQTT and CoAP.	BTL 2	Understanding
20	What is RFID?	BTL 1	Remembering
21	List the components of an RFID system.	BTL 1	Remembering
22	State the role of RFID in IoT.	BTL 2	Understanding
23	What are IoT applications?	BTL 1	Remembering
24	Mention any two real-world IoT applications.	BTL 1	Remembering

PART - B

Q.No	Question	Marks	BTL Level	Competence
1(i)	Explain the IoT deployment architecture using Raspberry Pi with a neat diagram.	8	BTL 3	Applying
1(ii)	Apply Raspberry Pi architecture to develop a basic IoT monitoring system.	8	BTL 3	Applying
2	Explain programming aspects of Arduino and apply them to a simple IoT use case.	16	BTL 3	Applying

PART - B

Q.No	Question	Marks	BTL Level	Competence
3	Explain interfacing techniques for sensors and actuators with Raspberry Pi/Arduino.	16	BTL 3	Applying
4	Apply GPIO pin configuration to send and receive signals in an IoT system.	16	BTL 3	Applying
5	Analyze the architecture of an IoT system deployed using Raspberry Pi.	16	BTL 4	Analyzing
6	Analyze the challenges involved in IoT device programming and interfacing.	16	BTL 4	Analyzing
7	Analyze the role of cloud connectivity in IoT deployments.	16	BTL 4	Analyzing
8	Explain IPv6 and 6LoWPAN protocols and analyze their suitability for IoT networks.	16	BTL 4	Analyzing
9(i)	Compare and analyze MQTT and CoAP protocols for IoT communication.	8	BTL 4	Analyzing
9(ii)	Explain MQTT and CoAP protocols with respect to latency, reliability, and scalability.	8	BTL 4	Analyzing
10	Evaluate the suitability of different IoT communication protocols for resource-constrained devices.	16	BTL 5	Evaluating
11(i)	Evaluate the role of RFID technology in IoT-based identification and tracking systems.	8	BTL 5	Evaluating
11(ii)	Design an IoT application using RFID integrated with cloud services for inventory management.	8	BTL 5	Evaluating
12	Evaluate the impact of protocol selection on performance and scalability of IoT applications.	16	BTL 5	Evaluating
13(i)	Analyze various IoT applications in smart home with suitable illustration	8	BTL 4	Analyzing
13 (ii)	Analyze various IoT applications in healthcare industry with examples.	8	BTL 4	Analyzing
14	Design an IoT system using Raspberry Pi or Arduino to monitor environmental parameters.	16	BTL 6	Creating
15	Design an IoT architecture incorporating cloud connectivity and MQTT/CoAP protocol.	16	BTL 6	Creating
16	Propose an IoT-based RFID system for asset tracking and management.	16	BTL 6	Creating
17	Create an end-to-end IoT solution for a smart application using suitable hardware, protocols, and cloud services.	16	BTL 6	Creating