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CHENNAI

Reg. No

Final Assessment Test(FAT) - Apr/May 2025

Programme	**M.C.A.**	Semester	**Winter Semester 2024-25**
Course Code	**PMCA506L**	Faculty Name	**Prof. Priyaadharshini M**
Course Title	**Cloud Computing**	Slot	**E2+TE2**
		Class Nbr	**CH2024250501736**
Time	**3 hours**	Max. Marks	**100**

Instructions To Candidates

- Write only your registration number in the designated box on the question paper. Writing anything elsewhere on the question paper will be considered a violation.

Course Outcomes

CO1: To learn recent cloud computing paradigms and cloud infrastructures.
CO2: To emphasize on the understanding of virtualization and automation in a cloud environment.
CO3: To appreciate concepts of programming paradigms, security and storage in a cloud environment.

Answer all Questions (10 × 10 Marks)

01. A company called LearnTrack offers a cloud-based LMS for colleges and corporate clients. Each customer wants the system branded in their own name, with isolated student/faculty data and feature-based access control. The company struggles to balance resource efficiency, customizability, and data security across multiple clients.

a. Design a multi-tenant architecture for LearnTrack's LMS. (6)

b. Justify your answer between database-per-tenant, shared schema, or hybrid. (4)

[10] (CO1/K3)

02. A fintech startup is developing a fraud detection application that uses machine learning models. They want minimal infrastructure management, fast go-to-market, cost-effective, flexible websites, and database services with notification features during the experiment phase.

a. Identify and illustrate the suitable AWS Cloud services for this application development. (7)

b. Compare your solution with the traditional project development in terms of cost, high availability, and scalability. (3)

[10] (CO2/K4)

03. A national healthcare organization is digitizing its entire patient record system across public hospitals, private diagnostic labs, and insurance companies. They must ensure strict compliance with health data regulations like HIPAA, offer fast data access to authorized personnel, and scale the infrastructure during pandemic surges. Each stakeholder (government hospitals, private labs, and insurers) has different IT capabilities and privacy concerns. The CIO is evaluating cloud deployment models to implement this securely and efficiently.

a. Suggest and illustrate a deployment model for this multi-stakeholder healthcare system. (6)

b. Justify your solution that balances security, interoperability, compliance, and cost. (4)

[10] (CO2/K3)

04. An e-commerce giant experiences seasonal load surges and wants to dynamically migrate running VMs between data centers in different geographical locations for load balancing and compliance with regional data laws.

a. Develop a migration strategy for the data center. (5)

b. Analyze network latency and application downtime concerns, and justify your approach to mitigate risks during migration. (5)

[10] (CO3/K4)

05. A ride-sharing app experiences frequent bugs and deployment delays due to siloed development and operations teams. User retention is dropping, and the CTO wants to adopt a different development framework to improve product quality and deliver on time with the automation tools.

a. Design and illustrate a framework for this application development with the feedback loop. (5)
b. Compare your solution with the traditional framework such as the waterfall model and agile model. (5)

[10] (CO4/K3)

06. A global software development team is building an AI-based video editor. Developers use different operating systems, leading to environment conflicts and long onboarding times. The product must be consistent in all environments, from development to production.
a. Propose a containerized microservices architecture for the AI video editor. (6)
b. Illustrate how your solution improves efficiency compared to VM-based deployment ?. (4)

[10] (CO4/K5)

07. A video streaming company needs to manage hundreds of microservices for recommendation engines, media encoding, and regional streaming: Traffic spikes during global events cause crashes and buffering issues.
a. Design a Kubernetes architecture for a video streaming application. (6)
b. Illustrate the impact of Kubernetes orchestration on service reliability and cost. (4)

[10] (CO2/K6)

08. A digital media company hosts its entire backend on a public cloud. A recent audit revealed issues such as misconfigured storage buckets, outdated access tokens, and open ports. An internal investigation showed a lack of cloud governance policies.
a. Identify and illustrate the possible root causes of the vulnerabilities. (5)
b. Explain the effective solutions to safeguard your environment to be adopted by security experts. (5)

[10] (CO5/K2)

09. A multinational e-commerce platform running on a cloud environment recently experienced multiple cyberattacks, including brute force login attempts, SQL injections, and unauthorized access to APIs. The platform handles sensitive customer data (payments and addresses) and operates globally with multi-region deployments. The CTO wants to integrate an Intrusion Detection System (IDS) to proactively detect threats and minimize damage.
a. Design a cloud-compatible intrusion detection strategy using both host-based IDS (HIDS) and network-based IDS (NIDS). (6)
b. Design a defense-in-depth mechanism to safeguard the infrastructure. Illustrate your design. (4)

[10] (CO5/K5)

10. You are working for an e-commerce platform. Millions of customer reviews are collected daily. The company wants to identify products that consistently receive negative reviews (ratings of 1 or 2) and summarize the most common keywords in those reviews to identify possible product defects or dissatisfaction trends.

Format
product_id, user_id, rating (1–5), review_text
Sample input
P123,U234,2,"Battery drains quickly"
P123,U345,1,"Overheats and shuts down"
P456,U456,5,"Excellent camera quality"
P123,U567,2,"Terrible battery life"
P789,U678,1,"Stopped working after a week"

Using MapReduce, design a solution that performs the following:
a. Identify all products with an average rating less than 2.5. (2)
b. For these low-rated products, extract and count the most common keywords from review_text fields (ignoring stopwords like "and", "the", "a", etc.). (4)
c. Structure your response with a key-value pair format between the Map and Reduce stages and give the final output. (4)

[10] (CO4/K6)

BL-Bloom's Taxonomy Levels - (K1-Remembering,K2-Understanding,K3-Applying,K4-Analysing,K5-Evaluating,K6-Creating)