Subject Name: Cloud Computing　　　　　　　　　　**Subject Code: D127871(022)**
Max Marks: 40　　　　　　　**Min Marks: 14**　　　　　**Times: 2 hrs**

Note: All questions are compulsory

Roll No. 3000128221042

CO1: Explain the core principles, service models, and deployment models of cloud computing. **CO2:** Demonstrate the use of virtualization technologies and resource management techniques in cloud environments.
CO3: Design and manage cloud storage and networking solutions for real-world applications.

Q.No.	Questions	Marks	BL	CO
	UNIT I			
1	Apply the concept of cloud deployment models (Public, Private, Hybrid, and Community) to a real-world scenario. Suggest the most suitable model for a startup company handling sensitive financial data and justify your choice	8	3	CO1
	UNIT II			
2	Analyze the role of hypervisors in cloud virtualization. Compare Type 1 and Type 2 hypervisors, highlighting their advantages, disadvantages, and use cases	8	4	CO2
3	Evaluate the importance of elasticity and scalability in cloud resource management. How do these features contribute to cost-effectiveness and performance optimization? Provide examples	8	5	CO2
	UNIT III			
4	Illustrate Cloud-based Data Management system and its challenges in the real world	8	3	CO3
5	Analyze the role of software-defined networking (SDN) in Cloud computing	8	4	CO3

Subject Name: DataWarehouse   SubjectCode: D128871(022)

Max Marks: 40   Min Marks: 14   Times: 2 hrs

Note: All questions are compulsory. Part a is compulsory attempt any two from b,c,d.

Co1. To provide a comprehensive understanding of the concepts and architecture of data warehousing systems.

Co2. To explore the process of data extraction, transformation, and loading (ETL) and its application in building data warehouses.

ROLL No – 30001282 1042

Q.No.		Questions	Marks	BL	CO
		UNIT 1			
1	a	Explain role of data warehouse in Business intelligence.	2	L1	1
	b	Explain the architecture of data warehouse.	6	L2	1
	c	Differentiate OLTP and OLAP.	6	L2	1
	d	Write a short note on Data marts.	6	L2	1
		UNIT 2			
2	a	Explain data modeling.	2	L2	1
	b	Compare **star schema, snowflake schema, and fact constellation schema** with a suitable example.	6	L2	1
	c	Discuss the challenges and strategies for **handling Slowly Changing Dimensions (SCDs)**.	6	L3	1
	d	How do **fact and dimension tables** work together in a data warehouse? Explain with an example.	6	L3	1
		UNIT 3			
3	a	Write and explain the step wise ETL process	6	L3	2
	b	Explain source Identification.	6	L3	2
	c	Explain different types of immediate data extraction technique.	6	L3	2
	d	List down the advantages and disadvantages of different data Extraction techniques.	6	L3	2

Subject Name: Artificial Intelligence (AI) for Investments

Subject Code:

Max Marks: 40   Min Marks: 14   Times: 2 hrs

Note: All questions are compulsory

CO1: Develop a Strong Conceptual Foundation
CO2: Enhance Analytical and Quantitative Skills
CO3: Integrate Technology with Management Practices
CO4: Foster Strategic and Critical Thinking
CO5: Cultivate Leadership and Communication Competencies

ROLL No· 3000128821042

Q.No.		Questions	Marks	BL	CO
		UNIT 1			
1	a	Which of the following best describes the purpose of cash flow discounting? A. To adjust cash flows for inflation B. To convert future cash flows into present value C. To forecast future cash flows D. To determine the nominal growth rate In the context of asset pricing models, which model assumes that the market portfolio is efficient? A. Arbitrage Pricing Theory (APT) B. Capital Asset Pricing Model (CAPM) C. Black-Scholes Model D. Dividend Discount Model	4	2	1,2
	b	Discuss the integration of traditional financial analysis with emerging machine learning techniques in investment decision-making. In your answer, explain the roles of risk-return analysis, cash flow discounting, and asset pricing models, and how predictive models and data-driven insights can enhance these methods.	8	4	1,2,3,4
	c	A firm is evaluating a project expected to generate cash flows of $800 in Year 1, $1,000 in Year 2, and $1,200 in Year 3. If the cost of capital is 9%, calculate the Net Present Value (NPV) of the project. Show all your steps and clearly state any formulas used.	8	3	2
	d	Consider a stock with annual returns over the past five years of 7%, 10%, 4%, 8%, and 12%. a) Calculate the mean return, variance, and standard deviation of the stock's returns. b) Assuming a risk-free rate of 3% and a market return of 9%, with a covariance between the stock and market of 0.018 and a market variance of 0.02, compute the stock's beta. Provide all calculations and state your formulas.	8	4	1,2
		UNIT 2			
2	a	In an order-driven market, which of the following best characterizes the mechanism that matches buy and sell orders?	4	2,3	1,2,4

A. Quotation system
B. Limit order book
C. Dealer market
D. Over-the-counter system

Interest rate compounding is primarily used to:
A. Adjust nominal rates for inflation
B. Reflect the time value of money
C. Forecast future interest rates
D. Determine dividend payouts

Under the mean-variance framework, the portfolio risk is computed based on:
A. Individual asset risks only
B. Asset correlations and individual variances
C. Expected returns only
D. Risk-free rate adjustments

The efficient frontier represents:
A. The portfolio with the highest return regardless of risk
B. The set of portfolios that offer the maximum expected return for a given level of risk
C. The lowest risk portfolio available
D. The optimal allocation between risk-free and risky assets

b	Discuss the principles of portfolio optimization. In your answer, explain the concepts of the efficient frontier and minimum variance portfolio, and describe the role of risk-free lending/borrowing in enhancing portfolio construction.	8	5	1,2,4
c	Consider a portfolio consisting of two assets: **Asset A:** Expected return = 9%, Standard deviation = 10% **Asset B:** Expected return = 13%, Standard deviation = 18% The correlation between Asset A and Asset B is 0.5, and the investor allocates 50% to each asset. a) Calculate the expected return of the portfolio. b) Calculate the standard deviation (risk) of the portfolio. *Show all calculations and specify any formulas used.*	8	4	2
d	Assume a portfolio of three assets with the following expected returns and covariance matrix: **Expected Returns:** Asset 1: 8% Asset 2: 11% Asset 3: 14% **Covariance Matrix:**	8	4	2,4

	Asset 1	Asset 2	Asset 3
Asset 1	0.025	0.010	0.005
Asset 2	0.010	0.040	0.015
Asset 3	0.005	0.015	0.090

Assuming there is no risk-free asset and that the sum of portfolio weights equals 1, determine the weights of the minimum variance portfolio using the mean-variance framework. Outline your methodology, present the necessary equations, and show all steps of your calculations.

Subject Name: High Performance Scientific Computing

Max Marks: 40

Min Marks: 14

Subject Code:

Times: 2 hrs

Note: All questions are compulsory

Roll No - 300012821042

CO1: Understand HPC fundamentals and its necessity

CO2: Analyze processor performance and memory hierarchy

CO3: Apply parallel programming concepts and algorithms

CO4: Evaluate and optimize OpenMP programming techniques

CO5: Develop and implement MPI-based programs for distributed computing

Q.No.		Questions	Marks	BL	CO
		UNIT 1			
1	a	What is the primary purpose of high performance computing (HPC)? A. To run everyday office applications B. To solve large-scale, computationally intensive problems C. To provide cloud-based storage solutions D. To support basic desktop computing Which level of the memory hierarchy is typically the fastest? A. Hard Disk Drive (HDD) B. Random Access Memory (RAM) C. Cache memory D. Solid State Drive (SSD) Multi-core processors primarily enable: A. Single-threaded performance improvements B. Parallel processing of tasks C. Enhanced graphics rendering only D. Increased storage capacity A parallel algorithm is best described as one that: A. Executes tasks sequentially B. Divides a problem into sub-tasks that can be executed concurrently C. Uses recursion exclusively D. Operates on a single processor core	4	2	1,2,3
	b	Discuss the significance of parallel programming and parallel algorithms in high performance computing. In your answer, explain: • The need for HPC and its role in solving large-scale problems • Key concepts in parallel programming and the challenges involved • How parallel algorithms improve performance compared to sequential execution • The implications of multi-core and vector computing for scientific computing	8	5	1,3
	c	Using Amdahl's Law, calculate the theoretical maximum speedup of a program if 90% of the code is parallelizable and the remaining 10% is inherently sequential when run on 4 processors.	8	3	2

d	a) Develop a pseudocode for a parallel algorithm to compute the sum of an array using multiple processors. Explain how task division improves performance. b) Given an array of 10,000 numbers, estimate the reduction in execution time if the workload is evenly divided among 4 processors, assuming ideal scaling.	8	6	3	

UNIT 2

2	a	OpenMP is primarily used for: A. Distributed-memory parallel programming B. Shared-memory parallel programming C. Single-threaded application development D. Cloud-based data storage Which OpenMP directive is used to parallelize loops? A. #pragma omp parallel for B. #pragma omp single C. #pragma omp master D. #pragma omp critical A common challenge when programming with OpenMP is: A. Lack of support for multi-threading B. Data race conditions C. Inability to parallelize loops D. High communication overhead between processes MPI is best suited for: A. Shared-memory systems B. Distributed-memory systems C. Single-core processors D. Local desktop computing	4	2	4,5
	b	Explain the fundamental differences between OpenMP and MPI programming paradigms in high performance computing.	8	5	4,5
	c	a) Write a simple OpenMP code snippet (or pseudocode) that demonstrates parallelizing a loop to calculate the sum of an array. b) Explain how using OpenMP can reduce execution time compared to a sequential approach.	8	3	4
	d	An MPI-based matrix multiplication program is implemented on a distributed system with 4 processes. Suppose the computation time for matrix multiplication (excluding communication overhead) is 50 seconds. If each process experiences a sequential communication overhead of 8 seconds, compute the overall execution time of the MPI program assuming communication overheads add linearly to the computation time.	8	3	5