

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-V Semester (CSE/IT)

COURSE CODE (CREDITS): 20B1WCI532 (2)

MAX. MARKS: 35

COURSE NAME: CLOUD COMPUTING: CONCEPTS, TECHNOLOGY & ARCHITECTURE

COURSE INSTRUCTORS: Mr. Aayush Sharma & Ms. Nitika Ratan

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	<p>A company uses cloud services with the following details for a month:</p> <p>Compute Instances: Total usage: 1,200 hours Cost per hour: \$0.15 Discount: 20% if usage exceeds 1,000 hours</p> <p>Storage: Total usage: 4 TB Cost: \$0.02/GB/month Free Tier: First 1 TB of storage is free</p> <p>Data Transfer: Outbound usage: 300 GB Cost per GB: \$0.08</p> <p>Database Service: Flat rate: \$200/month</p> <p>1) Calculate the total compute cost, including the discount if applicable. 2) Calculate the storage cost, considering the free tier. 3) Compute the data transfer cost for the month. 4) Determine the total monthly cost for all services combined. 5) If the company reduces compute usage by 30%, calculate the new compute cost and the adjusted total monthly cost. 6) Assuming similar usage for 12 months, calculate the annual cost savings due to the reserved instance discount on compute.</p>	[CO-2] [CO-3]	[6]
Q2	<p>A company uses a cloud provider offering the following Service Level Agreement (SLA):</p> <p>Uptime guarantee: 99.95% per month. Penalty clause: 10% refund of the monthly bill if downtime exceeds the SLA limit but is less than 2 hours. 20% refund if downtime exceeds 2 hours but is less than 5 hours. 50% refund if downtime exceeds 5 hours. The company has subscribed to the following services:</p>	[CO-2] [CO-3]	[6]

	<p>Compute Service: \$3,000/month Storage Service: \$1,500/month Data Transfer Service: \$500/month During one month:</p> <p>The total recorded downtime was 4 hours and 20 minutes. 1) Calculate the maximum allowed downtime for the SLA guarantee. 2) Determine if the SLA was breached and by how much. 3) Compute the penalty refund based on the actual downtime. 4) Calculate the adjusted monthly bill for the company. 5) Calculate the percentage of uptime achieved during the month. 6) Estimate the annual cost impact if the downtime remains the same for every month in a year.</p>		
Q3	<p>Explain the concept of cloud bursting architecture with a proper diagram. In what scenarios is cloud bursting advantageous, and what are the potential limitations associated with implementing it in a hybrid cloud environment? (Explain 4 points each for advantages and disadvantages)</p>	[CO-1] [CO-4]	[2+2+2]
Q4	<p>Explain the key differences between Cluster Computing and Grid Computing at least 2 differences each, and describe the NIST Cloud Architecture's role in modern virtualization. With examples and proper diagrams.</p>	[CO-1] [CO-4]	[2.5+2.5]
Q5	<p>A company's customer acquisition cost (CAC) is \$1,500 per customer, and it acquires 100 customers per month. The lifetime value (LTV) of each customer is \$10,000. The company's cloud provider charges a fixed subscription fee of \$50,000 annually, plus \$0.02 per GB for data transfer. The company transfers 1,000 TB of data annually. The company experiences 10% downtime annually, leading to a revenue loss of \$200,000. To reduce downtime, the company plans to invest in a redundant cloud system costing an additional \$100,000 per year, which will reduce downtime to 2% annually.</p> <p>Answer the following:</p> <ol style="list-style-type: none"> 1. Calculate the total annual cloud cost, including data transfer fees. 2. Compute the company's annual revenue loss per percentage of downtime. 3. Determine the new revenue loss if downtime is reduced to 2%. 4. Evaluate the net savings if the company invests in the redundant cloud system to reduce downtime. 5. Calculate the CAC-to-LTV ratio. 6. If the company's target CAC-to-LTV ratio is 0.15, determine how much it needs to reduce its CAC to meet this target. 	[CO-2] [CO-3]	
Q6	<p>A company is migrating to the cloud. The annual on-premises cost is \$150,000, and the cloud services cost \$12,000 per month. Migration costs are \$100,000, with expected annual savings of \$20,000. The company uses the following cloud services monthly: compute (\$3,000), storage (\$800), and bandwidth (\$400). It reserves 1,000 compute hours but only uses 700 hours. Additionally, the cloud processes 1,000,000 transactions monthly, costing \$5,000. The cloud provider guarantees 99.9% uptime but delivered 99.5%. The SLA penalty is \$2,000 for every 0.1% deviation.</p> <p>Answer the following:</p> <ol style="list-style-type: none"> 1. Calculate the total cost of ownership (TCO) in the first year after migration. 2. Determine the break-even time for the migration. 3. Compute the total monthly cloud usage cost. 4. Calculate the utilization rate (%) of compute hours. 5. Determine the cost per transaction. 6. Find the SLA penalty cost for the uptime deviation. 	[CO-2] [CO-3]	[6]