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Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: CDV3409 **Course Name:** AI-Enabled Cloud Cost Optimization

Semester: Fifth Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2
Marks	46	44

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Write the basic cloud spend equation. Distinguish 'usage reduction' from 'rate reduction' with one example of each.	2	CO1	BT2
2	A 2,000 GB dataset is stored in S3 Standard at $0.023 per GB-month. Calculate the monthly saving if it is moved to S3 Glacier Deep Archive at $0.00099 per GB-month (ignore retrieval and request charges).	2	CO1	BT3
3	State the interruption (eviction) notice period given by AWS Spot Instances and by Azure Spot VMs.	2	CO1	BT1
4	A billing dataset has a categorical column 'region' with the values us-east-1, eu-west-1 and ap-south-1. Show the one-hot encoding of the value eu-west-1 and state how many new columns are created.	2	CO2	BT3
5	An hourly billing export contains 25,000 duplicate rows, each with an average cost of $0.40, because the pipeline ingested incremental files without check-pointing. The reported monthly total is $58,000. Calculate the cost inflation caused by the duplicates and the corrected total.	2	CO2	BT3

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	**(A)** Explain how Spot Instances work. Compare AWS Spot Instances, Azure Spot VMs and Google Cloud Spot/Preemptible VMs with respect to discount range and interruption notice, and list two workloads suitable and one workload unsuitable for Spot capacity. **[5 Marks]** **(B)** A 1-year Partial Upfront reserved instance costs $1,752 upfront plus $73 per month for 12 months. The same instance costs $0.40 per hour On-Demand. (i) Calculate the total commitment cost. (ii) Calculate the effective hourly rate for a full year of 8,760 hours. (iii) Calculate the annual saving compared with running On-Demand 24×7. (iv) If the instance would run for only 60% of the hours, is the commitment still beneficial? Justify with calculation. **[5 Marks]**	10	CO1	BT3

7	**(A)** Explain the five-step workflow for estimating cloud cost with the AWS or Azure Pricing Calculator. Why do actual bills usually differ from calculator estimates? **[5 Marks]** **(B)** Estimate the monthly cost (730 hours) of a 3-tier web application in Region-1: 4 application servers at $0.192 per hour, 2 database servers at $0.384 per hour, 500 GB of block storage at $0.10 per GB-month and 5 TB (5,000 GB) of internet egress at $0.09 per GB (ignore free-tier allowances). Then calculate the monthly cost if Region-2 prices every item 40% higher, and the difference between the two regions. **[5 Marks]**	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
8	**(A)** Explain the components of cloud data-transfer (bandwidth) costing – ingress, internet egress, cross-AZ and cross-region traffic – and state two techniques to reduce these charges. **[5 Marks]** **(B)** In one month an application in a single AWS region sends 12,000 GB to the internet, receives 5,000 GB from the internet, and exchanges 4,000 GB in each direction between services placed in different Availability Zones. Internet egress is charged at $0.09 per GB for the first 10,000 GB and $0.085 per GB for the next volume; inbound traffic is free; cross-AZ traffic is charged at $0.01 per GB for each direction. Calculate the total data-transfer cost and identify the dominant cost component. **[5 Marks]**	10	CO1	BT3
9	**(A)** List the six principles of FinOps and state the primary motivation of the Engineering, Finance and Executive personas. **[6 Marks]** **(B)** A company's cloud bill rose from $200,000 in the first quarter to $260,000 in the second quarter, while its active customers grew from 40,000 to 65,000. Calculate the cost per customer in both quarters, the percentage change in total spend and in cost per customer, and state which FinOps principle the result illustrates. **[4 Marks]**	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	**(A)** Explain the main categories of columns in an AWS Cost and Usage Report (CUR). How are custom cost allocation tags exposed in the CUR, and how do the AWS CUR, GCP BigQuery export and Azure billing export differ in destination and tag structure? **[5 Marks]** **(B)** In a month the total unblended spend is $80,000, of which $18,000 carries no application tag. The tagged spend is: App-A $31,000, App-B $21,700 and App-C $9,300. (i) Calculate the tagging coverage (%). (ii) Distribute the untagged spend in proportion to the tagged spend and calculate the fully loaded cost of each application. **[5 Marks]**	10	CO2	BT3
11	**(A)** Differentiate showback and chargeback models with respect to definition, financial accountability, implementation effort and incentive. When should an organization adopt each? **[5 Marks]** **(B)** A shared support and networking cost of $18,000 must be allocated among three teams whose direct spends are Web $30,000, Mobile $18,000 and Data $12,000. Calculate each team's share under (i) an even split, (ii) a fixed ratio of 40 : 40 : 20 (Web : Mobile : Data) and (iii) the proportional model. Which team gains most from the even split? **[5 Marks]**	10	CO2	BT4

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**

12	**(A)** Compare AWS Cost Explorer and Azure Cost Management + Billing with respect to tooling philosophy, scope hierarchy, BI integration and historical data. State two limitations that both share in multi-cloud environments. **[5 Marks]** **(B)** A team has a monthly budget of $30,000 (30-day month) with alerts at 50%, 80% and 100% of actual spend and a forecast alert at 100%. After 10 days the actual spend is $11,400. Assuming a constant daily run-rate, calculate (i) the daily run-rate, (ii) the forecast month-end spend and whether the forecast alert triggers, and (iii) the day on which the 80% actual-spend alert will fire. **[5 Marks]**	10	CO2	BT3
13	**(A)** A unified cost dashboard is built in Grafana using a billing layer and a performance layer. Explain the architecture and the idea of 'telemetry fusion'. Then explain what each of the following queries returns. **[5 Marks]** max_over_time(node_cpu_utilization_percent{environment="Development"}[24h]) < 10 SELECT tag_cost_center, ROUND(SUM(unblended_cost), 2) AS total_spend, 35000.00 AS weekly_budget_target FROM billing WHERE usage_start_date >= CURRENT_DATE - INTERVAL 7 DAY GROUP BY tag_cost_center ORDER BY total_spend DESC; **(B)** The daily budget target for every team is $5,000. Last week's (7-day) spend was: Alpha $38,500, Beta $31,200 and Gamma $34,900. Calculate the weekly target line and the variance (in $ and %) of each team, and identify which team is above the target line. **[5 Marks]**	10	CO2	BT4