



Department of Software Engineering
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Student ID: Section: Department: Quiz:

Course Code: Course Title: Date:

Answer the following questions:

Time: 35 Minutes

Total Marks: 15

1.	You are configuring a Machine Learning training cluster that runs three types of batch jobs: NLP Models, Vision Models, and Audio Models. Let x, y, and z represent the number of active jobs for each category. The cluster must operate at exactly 100% utilization based on the following per-job resource requirements: • GPU Allocation: NLP jobs require 4 GPUs each, Vision jobs require 2 GPUs each, and Audio jobs require 1 GPU each. The total available GPUs are 20. • Memory Allocation: NLP jobs require 1 TB, Vision jobs require 3 TB, and Audio jobs require 2 TB. The total available memory is 17 TB. • Network I/O: NLP jobs consume 2 Gbps, Vision jobs consume 1 Gbps, and Audio jobs consume 3 Gbps. The total network capacity is 20 Gbps. a) Extract the data from the scenario to formulate the system of linear equations. (3 Marks) b) Solve the system to find the required number of active NLP, Vision, and Audio training jobs. (5 Marks)	8
2.	Given the matrix: $A = [4, 0, 1; -2, 1, 0; -2, 0, 1]$, a) Determine all the eigenvalues of matrix A. (3 Marks) b) Find the eigenvector corresponding to the <i>maximum</i> eigenvalue. (4 Marks)	7

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