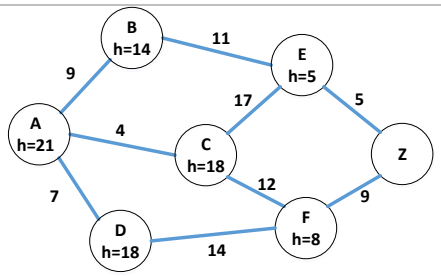
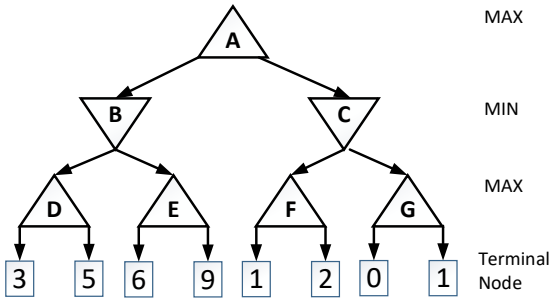
Vidyalankar Institute of Technology
Semester V – CMPN – End Semester Examination

Date: 10/11/2025	PCCE10T	Artificial Intelligence	Scheme: R-2023	40 Marks/ 1Hr & 45 Mints

All questions are compulsory.

<table>
<tr><td>1</td><td colspan="2">Solve any two (5 marks each)</td><td>CO</td></tr>
<tr><td></td><td>A</td><td>Design a PEAS description for a vacuum cleaner.</td><td>CO1</td></tr>
<tr><td></td><td>B</td><td>Compare supervised and unsupervised learning with examples. Discuss their importance in AI.</td><td>CO5</td></tr>
<tr><td></td><td>C</td><td>Consider a dataset with 10 examples where the features are Time (Morning, Afternoon, Evening) and Activity (Reading, Sports). The target variable is Satisfaction (Satisfied, Not Satisfied). The dataset is as follows:
<table>
<tr><th>Time</th><th>Activity</th><th>Satisfaction</th></tr>
<tr><td>Morning</td><td>Reading</td><td>Satisfied</td></tr>
<tr><td>Morning</td><td>Sports</td><td>Not Satisfied</td></tr>
<tr><td>Afternoon</td><td>Reading</td><td>Satisfied</td></tr>
<tr><td>Afternoon</td><td>Sports</td><td>Not Satisfied</td></tr>
<tr><td>Evening</td><td>Sports</td><td>Satisfied</td></tr>
<tr><td>Evening</td><td>Reading</td><td>Not Satisfied</td></tr>
<tr><td>Morning</td><td>Reading</td><td>Satisfied</td></tr>
<tr><td>Afternoon</td><td>Sports</td><td>Not Satisfied</td></tr>
<tr><td>Evening</td><td>Reading</td><td>Not Satisfied</td></tr>
<tr><td>Morning</td><td>Sports</td><td>Not Satisfied</td></tr>
</table>
Calculate the entropy of the entire dataset.</td><td>CO5</td></tr>
<tr><td>2</td><td colspan="2">Solve any one (10 marks each)</td><td></td></tr>
<tr><td></td><td>A</td><td>The graph includes the path costs between nodes and the heuristic values for each node.</td><td>CO2</td></tr>
</table>

		 a) Apply Greedy Best First search algorithm to find the shortest path from Start node A to Goal node Z. (In case of ties, use lexicographic ordering for breaking ties.) b) Show all steps and calculations, including the cost of each node visited. c) Draw search tree. Discuss performance parameters.	
	B	Consider the following game tree where the MAX and MIN players alternate levels.  a) Apply Alpha-Beta Pruning to show which branches can be pruned (Show all step calculations). Calculate the optimal move for the MAX player.	CO2
3	**Solve any one (10 marks each)**		
	A	The knowledge base (KB) contains the following facts: 1. All students attend school. 2. All teachers work at school. 3. If anyone attends a school, then they cannot be a teacher. 4. Alice is a student. a) Convert the facts into a suitable form for the resolution method (clausal form) b) Prove that "Alice cannot be a teacher" using resolution process. Explain each resolution step, including the clauses and unifications used.	CO3
	B	Convert following statement into CNF form. "Everyone who loves all animals is loved by someone"	CO3
4	**Solve any one (10 marks each)**		
	A	Explain Bayes rule and its applications. Elaborate semantics of belief network with the help of example.	CO4
	B	Explain the application of AI in Natural language processing.	CO6