

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

BEC515A

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2026

Intelligent Systems and Machine Learning Algorithms

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Define Artificial Intelligence. Discuss the four approaches for AI.	8	L2	CO1
	b.	Consider the application of a vacuum cleaner with just two locations and discuss the concept of percept sequence, agent function, agent program and action.	8	L3	CO1
	c.	With the block diagram, explain the simple reflex agent.	4	L2	CO1
OR					
Q.2	a.	With example explain any four applications of AI.	4	L2	CO1
	b.	With an example, discuss the properties of task environments.	8	L2	CO1
	c.	Explain the Goal-Based problem solving agent.	8	L2	CO1
Module – 2					
Q.3	a.	Illustrate the properties and the algorithm for Bread-first search technique.	8	L2	CO2
	b.	Design the problem-solving agent with an example of 8-puzzle problem.	6	L3	CO2
	c.	List and explain the parameters in measuring problem-solving performance.	6	L2	CO2
OR					
Q.4	a.	Make use of the state space of the vacuum cleaner and define the components to solve this problem.	6	L3	CO2
	b.	With advantages and disadvantages, illustrate the iterative dept-first search algorithm.	8	L2	CO2
	c.	Explain the tree search and graph search algorithm with function.	6	L2	CO2

Module – 3

Q.5	a.	Apply Greedy best-first search to find the best path from Arad to Bucharest given in Fig. Q5 (a).	10	L4	CO3																												
Fig. Q5 (a) <table><tr><th colspan="2">hSLD to Bucharest</th></tr><tr><td>Arad</td><td>366</td></tr><tr><td>Bucharest</td><td>0</td></tr><tr><td>Craiova</td><td>160</td></tr><tr><td>Drobeta</td><td>242</td></tr><tr><td>Fagaras</td><td>176</td></tr><tr><td>Lugoj</td><td>244</td></tr><tr><td>Mehadia</td><td>241</td></tr><tr><td>Oradea</td><td>380</td></tr><tr><td>Pitesti</td><td>100</td></tr><tr><td>Rimnicu</td><td>193</td></tr><tr><td>Sibiu</td><td>253</td></tr><tr><td>Timisoara</td><td>389</td></tr><tr><td>Zerind</td><td>374</td></tr></table>			hSLD to Bucharest		Arad	366	Bucharest	0	Craiova	160	Drobeta	242	Fagaras	176	Lugoj	244	Mehadia	241	Oradea	380	Pitesti	100	Rimnicu	193	Sibiu	253	Timisoara	389	Zerind	374			
hSLD to Bucharest																																	
Arad	366																																
Bucharest	0																																
Craiova	160																																
Drobeta	242																																
Fagaras	176																																
Lugoj	244																																
Mehadia	241																																
Oradea	380																																
Pitesti	100																																
Rimnicu	193																																
Sibiu	253																																
Timisoara	389																																
Zerind	374																																
	b.	With a generic knowledge based agent describe the various components of knowledge base.	10	L2	CO3																												

OR

Q.6	a. With an example illustrate the operation of A* (A – star) algorithm.	10	L2	CO3
	b. Using the Wumpus world as a case study, explain how a knowledge-based agent applies logical reasoning to safely explore the environment.	10	L3	CO3

Module – 4

Q.7	a. Define machine learning and list any three application of machine learning.	4	L2	CO4
	b. What are the key design consideration and approaches in developing a machine learning program to optimize its performance in a world checkers tournament?	10	L3	CO4
	c. Explain supervised learning and unsupervised learning with example.	6	L2	CO4

OR

Q.8	a.	Explain any four main challenges in machine learning.	8	L2	CO4																																								
	b.	Illustrate Find-S algorithm, assume the learner is given the sequence of training example from Fig. Q8 (b) for the Enjoy Sport task. <table><tr><td>Example</td><td>Sky</td><td>Air Temp</td><td>Humidity</td><td>Wind</td><td>Water</td><td>Forecast</td><td>Enjoy Sport</td></tr><tr><td>1</td><td>Sunny</td><td>Warm</td><td>Normal</td><td>Strong</td><td>Warm</td><td>Same</td><td>Yes</td></tr><tr><td>2</td><td>Sunny</td><td>Warm</td><td>High</td><td>Strong</td><td>Warm</td><td>Same</td><td>Yes</td></tr><tr><td>3</td><td>Rainy</td><td>Cold</td><td>High</td><td>Strong</td><td>Warm</td><td>Change</td><td>No</td></tr><tr><td>4</td><td>Sunny</td><td>Warm</td><td>High</td><td>Strong</td><td>Cool</td><td>Change</td><td>Yes</td></tr></table> Fig. Q8 (b)	Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport	1	Sunny	Warm	Normal	Strong	Warm	Same	Yes	2	Sunny	Warm	High	Strong	Warm	Same	Yes	3	Rainy	Cold	High	Strong	Warm	Change	No	4	Sunny	Warm	High	Strong	Cool	Change	Yes	8	L3	CO4
Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport																																						
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes																																						
2	Sunny	Warm	High	Strong	Warm	Same	Yes																																						
3	Rainy	Cold	High	Strong	Warm	Change	No																																						
4	Sunny	Warm	High	Strong	Cool	Change	Yes																																						
	c.	Explain the concept of online learning.	4	L2	CO4																																								

Module – 5					
Q.9	a.	Explain following performance measures for regression problem : (i) Root of a sum of squares (RMSE) (ii) Mean Absolute Error (MAE)	6	L2	CO5
	b.	Elaborate on how a confusion matrix is structured and how it relates to the calculation of precision, recall and FI score.	8	L3	CO5
	c.	With an example, explain binary classifiers and multi-class classifiers.	6	L2	CO5
OR					
Q.10	a.	In what ways do min-max scaling and standardization serve as feature scaling and transformation technique and how do their application affect model performance.	8	L3	CO5
	b.	What is ROC curve and how it is used to assess the performance of binary classifier?	6	L2	CO5
	c.	With an example, explain multilabel classification.	6	L2	CO5
