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BAU703

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Applications of AI in Automotive Vehicles

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 Mechanical Systems Evolution and list the key issues in the context of Industry 4.0.	10	L1	CO1
	b.	Explain with the example how flexibility and interoperability influence the design of modern mechanical system.	10	L2	CO1
OR					
Q.2	a.	Define Central Limit Theorem and P-value.	10	L1	CO1
	b.	Compute the mean, variance and standard deviation for the following dataset representing tensile strength (in MPa) : 210, 215, 220, 230, 235. Interpret the results.	10	L3	CO1
Module – 2					
Q.3	a.	Discuss the difference between rational and non rational reasoning in AI.	10	L2	CO2
	b.	Illustrate the working of Hill Climbing and A* search algorithms using suitable examples of problem states and operators.	10	L4	CO2
OR					
Q.4	a.	Compare uninformed search and informed search strategies with suitable examples.	10	L2	CO2
	b.	Given the following heuristic values for nodes A-F, apply Best First Search to find goal node from node A. Assume edges and heuristic values as : A – B (2), A – C (4), B – D (3), C – E (1), D – F (goal, h = 0)	10	L4	CO2
Module – 3					
Q.5	a.	Explain A* algorithm and its advantages over Breadth – First Search.	10	L2	CO3
	b.	Construct a State-Space representation for the 8-puzzle problem and demonstrate how A* algorithm explores the states.	10	L3	CO3
OR					
Q.6	a.	Explain the terms propositional logic and predicate logic with example.	10	L2	CO3
	b.	Using Forward Chaining, show the inference process from the following rules : (i) If it rains → road is wet. (ii) If road is wet → accident occurs. (iii) It rains. Find the conclusion.	10	L3	CO3

Module – 4

Q.7	a.	Differentiate between Hierarchical Planning and Non-linear Planning.	10	L2	CO4
	b.	Analyze goal stack planning approach using suitable example problem in AI planning.	10	L3	CO4

OR

Q.8	a.	Explain the concept of learning from examples and explanation – based learning.	10	L2	CO4
	b.	Using the following dataset, classify the samples using Naïve Bayes classifier 3 features (A, B, C) with 2 classes (X, Y). Data : (A = 1, B = 0, C = 1 → X), (A = 0, B = 1, C = 0 → Y), (A = 1, B = 1, C = 1 → X). Compute posterior probabilities.	10	L4	CO4

Module – 5

Q.9	a.	Explain Supervised and Unsupervised Learning with suitable examples.	10	L2	CO5
	b.	Determine the performance of a Linear Regression Model using following data: $x = [2, 4, 6, 8, 10]$, $y = [3, 7, 11, 15, 19]$. Find regression coefficients and predict y when $x = 12$.	10	L4	CO5

OR

Q.10	a.	Explain the Convolution and Pooling operations in CNNs with neat sketches.	10	L3	CO5
	b.	Design K-means clustering example for the following data points: (2, 10), (2, 5), (8, 4), (5, 8), (7, 5), (6, 4). Assume $K = 2$ and initial centroids at (2, 10) and (5, 8). Perform one iteration and show the updated clusters.	10	L4	CO5
