QP Code: RA22BTECH414 | Reg. No | | | | | | | | | | | AR 21/22

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech(Sixth Semester - Regular) Examinations, April 2025

21BCSPC36003/22BCSPC36003 – Artificial Intelligence and Machine Learning

(CSE)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	You have a 12-liter jug and an 8-liter jug. Is it possible to measure exactly 4 litters? If so, how?	CO1	K1
b.	How does a model-based agent differ from a reflex agent?	CO2	K2
c.	What is the generate-and-test method, and in what situations is it effective?	CO3	K2
d.	What is production system? Explain it with an example. Discuss the Characteristics of a Production system?	CO4	K3
e.	What is the main difference between supervised and unsupervised learning, explain with example?	CO2	K2

PART – B **(15 x 4=60 Marks)**

Answer ***All*** the questions		Marks	CO #	Blooms Level
2. a.	Discuss the limitations, challenges, and ethical concerns associated with the development of AI?	7	CO1	K1
b.	BASE + BALL = GAMES Each letter represents a different digit. What is the value of each letter?	8	CO2	K2
	(OR)			
c.	Write the Production rules to solve 3 Missionaries and 3 Cannibals problem?	7	CO1	K2
d.	Write a short note on: a. Turing Test b. 8-Puzzle Problem	8	CO1	K2
3.a.	Write AO* algorithm and explain with suitable example.	8	CO2	K3
b.	Give the Algorithm for BFS and DFS and explain it in detail?	7	CO2	K2
	(OR)			
c.	Explain the following search strategies i) Best First Search ii) A* search	8	CO2	K3
d.	Explain the working principle of the Hill Climbing algorithm. Also, describe how local maxima, plateaus, and ridges affect the performance of Hill Climbing. Provide a graphical representation of each issue?	7	CO2	K4
4.a.	Given the following training data for a concept learning task, apply the Candidate Elimination Algorithm step-by-step to find the final Version Space:	8	CO3	K3

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	No
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	No

b. Given the confusion matrix for a 3-class classification problem (Classes A, B, C), Calculate: 7 CO3 K2

a) Precision and Recall for Class A

b) Macro-average F1 Score (average over A, B, and C)

Actual/Predicted	A	B	C
A	30	5	5
B	3	25	2
C	2	4	29

(OR)

c. A classifier predicts the following probabilities for 8 instances (1 = Positive class, 0 = Negative class): 7 CO3 K3

Instance	True Label	Predicted Probability
A	1	0.95
B	0	0.90
C	1	0.85
D	0	0.75
E	1	0.60
F	0	0.55
G	0	0.45
H	1	0.40

a) Sort the instances by predicted probability.

b) Use different thresholds to compute TPR and FPR for ROC points.

c) Plot the ROC Curve and estimate the AUC.

d. Write a short note with numerical example on: 8 CO3 K2

a. K-fold cross validation

b. Boot strapping

5.a. Fit a multiple linear regression model to the following data 8 CO4 K4

X_1	2	2	5
X_2	3	1	4
Y	1.5	3.8	2.5

b. Explain Random Forest algorithm with advantages and disadvantages. 7 CO4 K2

(OR)

c. Differentiate Bagging, Boosting and Stacking with Diagrammatic Explanation. 8 CO4 K2

d. Explain Multi-co-linearity and Variation Inflation Factor in details. 7 CO4 K3

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