RV College of Engineering®
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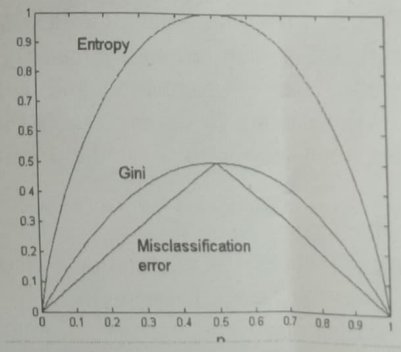
Academic year 2024-2025 (Odd Sem)

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Date	26 November 2024	Maximum Marks	(10+50) Marks
Course Code	IS3531A	Duration	(30+90) = 120 Min
Sem	V	CIE-1	
UG/PG	UG	Faculty: MEM/AS/VH/VG/JS/SHRS/ARA	

Artificial Intelligence and Machine Learning

(Common to CSE/ISE/CD/CY)

Sl. No.	Quiz Questions	M	L	CO
1	Justify whether the following sentence(s) hold true or false for Turing test in context AI. Marks are awarded for justification only. i. The Turing Test requires the machine to be able to convincingly simulate human intelligence to pass. ii. The Turing Test guarantees that a machine that passes it is intelligent.	02	L3	CO1
2	The _____ algorithm uses Entropy as a measure for constructing decision trees, while the _____ algorithm employs the Gini Index for splitting criteria.	02	L1	CO1
3	Draw observations from the graph below  	02	L3	CO1
4	List the key stopping criteria used in constructing a decision tree	02	L1	CO1
5	Differentiate Rationality and perfection in AI decision making with an example.	02	L2	CO1

Sl. No.	Test Questions	M	L	CO
1a	Analyze each of the following agent environments and determine whether they are fully or partially observable, deterministic or stochastic, static or dynamic, and discrete or continuous. Justify your classification with appropriate reasoning for each environment. i. autonomous Mars rover. ii. playing tic-tac-toe. iii. mathematician's theorem-proving assistant.	08	L3	CO1

1b	For the following examples, find the PEAS (Performance measure, Environment, Actuators, Sensors) framework and describe each component: 1. Washing Machine 2. Autonomous Drone 3. Smart Home Thermostat	06	L3	CO1
2a	Consider the data set given in **Figure (2a)**: Suppose we decide to construct a decision tree using binary splits and the Gini index impurity measure. Which feature and split point combinations would be the best to use as the root node assuming that we consider each of the input features to be unordered?	12	L3	CO2
2b	Discuss the approaches for splitting based on continuous attributes? Demonstrate the same using the dataset shown **Figure (2b)**.	06	L3	CO2
3a	Compare and contrast the types of intelligent agents—simple reflex, model-based reflex, goal-based, and utility-based—based on their rationality, memory use, ability to handle dynamic or partially observable environments, and computational complexity. Use examples like a robot vacuum or a virtual assistant to illustrate their differences and applications. Present your answer in a tabular format with the following columns:	10	L3	CO1
3b	With the help of examples describe the potential causes and solutions of model overfitting in decision trees.	08	L2	CO1

price	maintenance	capacity	airbag	profitable
low	low	2	no	yes
low	med	4	yes	no
low	low	4	no	yes
low	high	4	no	no
med	med	4	no	no
med	med	4	yes	yes
med	high	2	yes	no
med	high	5	no	yes
high	med	4	yes	yes
high	high	2	yes	no
high	high	5	yes	yes

Figure (2a)

Record	Age	Purchased (Yes/No)
1	22	No
2	25	Yes
3	28	Yes
4	35	No
5	40	Yes

Figure (2b)

Agent Type	Rationality	Memory Usage	Handling Dynamic/Partially Observable Environments	Computational Complexity	Example/Use Case

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BT-Blooms Taxonomy, CO-Course Outcomes

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	CO5	L1	L2	L3	L4	L5	L6
	Test	Max Marks	42	18				2	12	46			

Course Outcomes	
CO 1	Explain and apply AI and ML algorithms to address various requirements of real-world problems.
CO 2	Design and develop AI and ML solutions to benefit society, science, and industry.
CO 3	Use modern tools to create AI and ML solutions.
CO 4	Demonstrate effective communication through team presentations and reports to analyze the impact of AI and ML solutions on society and nature.
CO5	Conduct performance evaluation, modeling, and validation of AI and ML solutions benefiting lifelong learning.