Printed Page:-		e:- Subject Code:- BCSAI0301					
		Roll. No:					
N		A INSTITUTE OF ENGINEERING AND TECHNOLOGY, CREATER NODA					
1	NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGT, GREATER NOIDA (An Autonomous Institute Affiliated to AKTU Lucknow)						
		B.Tech					
		SEM: III - THEORY EXAMINATION (2024- 2025)					
		Subject: Artificial Intelligence and Machine Learning					
Time	e: 3 H	Iours Max. Marks: 100					
Genera	al Ins	tructions:					
IMP: V	/erify	that you have received the question paper with the correct course, code, branch etc. stion paper comprises of three Sections $-A = B + C$. It consists of Multiple Choice					
1. 1ms Ouesti	ons (MCO's) & Subjective type questions.					
2. Max	cimun	n marks for each question are indicated on right -hand side of each question.					
3. Illus	strate	your answers with neat sketches wherever necessary.					
4. Assı	ıme s	uitable data if necessary.					
5. Pref	ferab	ly, write the answers in sequential order.					
6. No s	sheet	should be left blank. Any written material after a blank sheet will not be					
evalua	iea/c	пескеа.					
SECTION-A							
I. Atte	empt a	all parts:-					
1-a.	N	Thich of the following best defines an intelligent agent? (CO1,K1)					
	(a)	A device that only acts on pre-defined instructions					
	(b)	A system that perceives its environment and takes actions to maximize its success					
	(c)	A program that collects and stores user data					
	(d)	A system that reacts randomly to the environment					
1-b.	W (C	What is the primary limitation of the Greedy Best-First Search algorithm?1CO1,K1)					
	(a)	It is memory-intensive					
	(b)	It is not complete					
	(c)	It may not find an optimal solution					
	(d)	Both b and c					
1-c.	Ic ei	lentify the learning method where an agent interacts with its 1 nvironment.(CO2,K1)					
	(a)	Supervised Learning					
	(b)	Reinforcement Learning					
	(c)	Unsupervised Learning					
	(d)	Clustering					
1-d.	D	Pistinguish between discrete and continuous features.(CO2,K1) 1					

Both are categorical features (a)

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	(b)	Both are numerical features		
	(c)	Discrete has specific values, continuous varies		
	(d)	Continuous is categorical		
1-e.		multivariate regression, target prediction involves (CO3,K1)	1	
	(a)	A single target and multiple features		
	(b)	Multiple targets and one feature		
	(c)	Multiple targets and multiple features		
	(d)	A single target and one feature		
1-f.	ID3 algorithm splits nodes based on (CO3,K1)		1	
	(a)	Gini index		
	(b)	Information gain		
	(c)	Variance reduction		
	(d)	Root mean square error		
1-g.	U	nsupervised learning methods are typically used for: (CO4,K1)	1	
	(a)	Clustering		
	(b)	Regression		
	(c)	Classification		
	(d)	Prediction		
1-h.	D	IANA algorithm starts clustering with: (CO4,K1)	1	
	(a)	A single large cluster		
	(b)	Individual data points		
	(c)	Predefined groups		
	(d)	Random assignments		
1-i.	W	Which of the following is not a supervised machine learning algorithm? (CO5,K1)		
	(a)	Decision tree		
	(b)	SVM for classification problems		
	(c)	Naïve Bayes		
	(d)	K-means		
1-j.	Id	entify the parametric machine learning algorithm. (CO5,K1)	1	
	(a)	CNN (Convolutional neural network)		
	(b)	KNN (K-Nearest Neighbours)		
	(c)	Naïve Bayes		
	(d)	SVM (Support vector machines)		
2. Att	empt a	all parts:-		
2.a.	L	ist two characteristics of a rational agent.(CO1,K2)	2	
2.b.	D	Define machine learning. (CO2,K1)		
2.c.	W	That is the primary goal of linear regression? (CO3,K1)	2	

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2.d.	Mention any two real-world applications of clustering.(CO4,K2)		
2.e.	Define what is the objective of a reinforcement learning agent? (CO5,K2)	2	
<u>SECTIO</u>	<u>N-B</u>	30	
3. Answe	er any <u>five</u> of the following:-		
3-a.	Describe the components of an Intelligent Agent with an example for each. (CO1,K2)		
3-b.	Compare the performance of Breadth-First Search (BFS) and Depth-First Search (DFS) in terms of completeness, optimality, and time complexity. (CO1,K3)		
3-с.	Explain the main purpose of machine learning in predictive modeling. (CO2,K2)		
3-d.	Discuss the working of Principal Component Analysis in reducing dimensionality. (CO2,K3)		
3.e.	Explain the four possible combination of bias and variance with diagram. (CO3,K3)		
3.f.	Discuss the various types of unsupervised machine learning models with real world applications. (CO4,K3)		
3.g.	Define reinforcement learning with four real life applications. Explain its key characteristics. (CO5,K3)	6	
SECTIO	<u>N-C</u>	50	
4. Answe	er any <u>one</u> of the following:-		
4-a.	Discuss the role and components of an Intelligent Agent with examples. Compare goal-based agents and utility-based agents in real-world applications. (CO1,K4)		
4-b.	Analyze the role of machine learning and reasoning in advancing AI, providing examples of their integration in real-world systems. (CO1,K3)		
5. Answe	er any <u>one</u> of the following:-		
5-a.	Discuss the steps to build a machine learning model, starting from data collection 10 to evaluation.(CO2,K4)		
5-b.	Describe the differences between various types of machine learning algorithms, 10 providing examples for each type.(CO2,K4)		
6. Answe	er any <u>one</u> of the following:-		
6-a.	Explain linear regression in brief. Apply linear regression of given below dataset and predict value for X=5. (CO3,K4)	10	
	X Y		
	4 6		
	7 5		
	<u> </u>		
6-b.	Describe the working of the K-Nearest Neighbors (KNN) algorithm. Apply KNN on given dataset for K=3 and classify label good or bad for X1=3 and X2=7.	10	

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(CO3,K4)

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X1	X2	Classify
7	7	Bad
7	4	Bad
3	4	Good
1	4	Good
3	7	?

7. Answer any one of the following:-

- 7-a. Explain the significance of the parameters eps (ε), minimum points, core points 10 and noise points in DBSCAN. How do they influence the clustering results? (CO4,K3)
- 7-b. Explain K-Means clustering in brief. Apply K-means clustering for K=2 on given 10 dataset {2,3,4,10,11,12,20,25,30}. (CO4, K4)
- 8. Answer any one of the following:-
- 8-a. State and prove Bayes' theorem and explain each term used in Bayes theorem. 10 (CO5,K3)
- 8-b. Explain the various components of reinforcement learning in detail. Discuss the significance of Q factor. (CO5, K4)