

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



B. Tech (Fifth Semester - Regular) Examinations, November – 2024

22BCMPC35001 – Advanced Machine Learning

(CSE (AIML))

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. Explain the concept of the learning rate in machine learning. Why is it important? | CO2 | K2 |
| b. Describe the role of activation functions in neural networks. Name two commonly used activation functions. | CO3 | K2 |
| c. Define Reinforcement Learning and describe its two main types. How does it differ from Supervised Learning? | CO4 | K2 |
| d. In the regression model ($Y = a + bx$) where $x' = 2.50$, $y' = 5.50$ and $a = 1.50$ (x' and y' denote mean of variables ' x ', ' y ' and ' a ' is a constant), what is the values of parameter ' b ' of the model. | CO5 | K3 |
| e. Explain F-Measure and exemplify the need. | CO4 | K4 |

PART – B

(15 x 4 = 60 Marks)

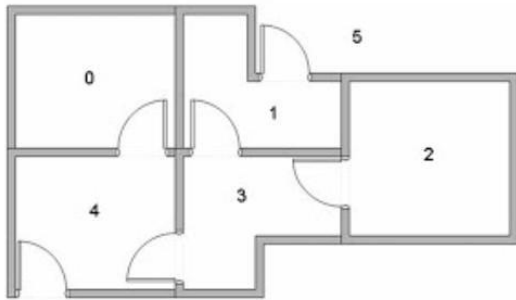
Answer **ALL** the questions

- | | Marks | CO # | Blooms Level |
|--|-------|------|--------------|
| 2. a. Differentiate between the learning rate and activation function in neural networks, explaining their roles and effects on model training. Additionally, for a bivariate dataset with the following statistics: $\bar{x} = 1.0$, $\bar{y} = 2.0$, $s_x = 3.0$, $s_y = 9.0$ and $r = 0.8$ (where r is the correlation coefficient), determine the regression line of y on x . Show all necessary steps and calculations to derive the regression equation. | 8 | CO5 | K3 |
| b. Compare between Lasso and Ridge Regression. | 7 | CO1 | K4 |
| (OR) | | | |
| c. Compare and contrast linear regression and logistic regression. Discuss their purposes, the types of problems they address, and the nature of their output. Additionally, Given a logistic regression model with the following coefficients: intercept = -3 & Coefficient = 1.2. For feature values (X): [1, 2, 3, 4, 5], calculate the predicted probabilities for each value of X . Show all necessary steps and calculations. Interpret the predicted probabilities in the context of binary classification. | 8 | CO3 | K3 |
| d. Differentiate between bagging, boosting & Stacking. | 7 | CO2 | K2 |
| 3.a. What is Reinforcement Learning? Provide applications, along with the advantages and disadvantages, supported by examples and visualizations. | 8 | CO4 | K3 |
| b. Differentiate between R-Squared and Adjusted R-Squared? Find the R-Squared value for following information, where intercept is 2.2 & coefficient value is 0.6. | 7 | CO2 | K3 |

X	1	2	3	4	5
Y	2	4	5	4	5

(OR)

- c. Explain the pros and cons of using ensemble learning methods in machine learning. Provide an example of a situation where ensemble learning might be particularly beneficial. 8 CO5 K4
- d. Define cross-validation and its types with applications. Explain the main types with visualizations for each type to illustrate the process. 7 CO2 K2
- 4.a. Write advantages and disadvantages of the Reinforcement Learning. Suppose we have 5 rooms in a building connected by doors as shown in figure below. we will number each room 0 through 4 the outside of the building can be thought of as one big room (5) notice that door 1 and 4 lead into the building from room 5(outside). The door not connected directly goal have zero reward whereas the door which directly connected have 100 rewards. Suppose learning rate=0.8. 8 CO5 K4



- b. Explain the DBScan Clustering algorithm and its pros & cons. 7 CO2 K2

(OR)

- c. Find linear regression of the data of week (1,2,3,4) and product sales (1,3,4,8) (in thousands). Use linear regression in matrix form predict the 5th week sales. 8 CO3 K3
- d. Calculating the Gini Index for past trend 7 CO4 K4

<i>Past Trend</i>	<i>Open Interest</i>	<i>Trading Volume</i>	<i>Return</i>
Positive	Low	High	Up
Negative	High	Low	Down
Positive	Low	High	Up
Positive	High	High	Up
Negative	Low	High	Down
Positive	Low	Low	Down
Negative	High	High	Down
Negative	Low	High	Down
Positive	Low	Low	Down
Positive	High	High	Up

- 5.a. What is Adaboost Learning? How do the first two decision stumps in the AdaBoost algorithm—CGPA ≥ 9 and Interactiveness = Yes—contribute to the classification of the job offer? What decisions do they make based on these attributes? 8 CO5 K3

CGPA	Interacti -veness	Practical Knowledge	Commun -ication Skill	Job Profile
≥ 9	Yes	Good	Good	Yes
< 9	No	Good	Mod.	Yes
≥ 9	No	Avg.	Mod.	No
< 9	No	Avg.	Good	No
≥ 9	Yes	Good	Mod.	Yes
≥ 9	Yes	Good	Mod.	Yes

- b. What are the roles of the last two decision stumps in the AdaBoost process— Practical Knowledge = Good and Communication Skill = Good—in determining the final classification for the job offer? How do these attributes influence the outcome?

7 CO5 K3

(OR)

- c. What is a Support Vector Machine (SVM), what are the different kernel functions available, and what is the mathematical intuition behind them with visualization?

8 CO4 K4

- d. Calculate different performance based on following data:

Target = [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]

7 CO4 K3

predicted = [1.0, 0.9, 0.8, 0.7, 0.6, 0.5, 0.4, 0.3, 0.2, 0.1, 0.0]

--- End of Paper ---