QP Code: SN22BTECH588 | Reg. No | | | | | | | | | | | AR 21

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

B. Tech (Seventh Semester - Regular) Examinations, November – 2025

21BECPE47021– Machine Learning

(ECE)

Time: 3 hrs | Maximum: 70 Marks

Answer ALL questions

(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. How do classification and regression differ?	CO1	K1
b. What is Bayes' Theorem? Why do we use it?	CO2	K1
c. Differentiate between Random forest and Decision tree.	CO3	K1
d. Define reinforcement learning.	CO2	K3
e. What is K-fold Cross Validation?	CO4	K1

PART – B **(15 x 4 = 60 Marks)**

Answer ***all*** the questions	Marks	CO #	Blooms Level
2. a. What is the role of data in ML? Explain the different categories of data with example.	8	CO1	K1
b. Explain Machine Learning Process with suitable diagram.	7	CO1	K1
(OR)			
c. Minimize the quadratic function $J(\theta) = \frac{1}{2}(\theta - 5)^2$ using Gradient Descent Algorithm. Consider $\alpha = 0.1$. (Use 3 iterations)	15	CO2	K3
3.a. Build a linear regression model to predict Y based on X for the data given below. You can proceed up to 3 iterations. Use MSE as cost function.	15	CO1	K3

X	1	2	3	4	6
Y	2	3	4	5	7

(OR)

b. The cancer data set has 100 records, out of which certain classifier predicted 94 are cancer records and 6 are non-cancer records. But the model is predicting 90 out of 94 cancer records correctly. Four cancer records are not predicted correctly. Draw the confusion matrix of the classifier? Determine the key parameters of the classifier like Accuracy, Sensitivity, Specificity and F1-score.	8	CO3	K3
c. What is Overfitting and Underfitting in decision tree? What are its symptoms and mitigation strategies?	7	CO2	K2
4.a. For the given conditions in the table, determine whether the student with attribute **Confident=Yes**, **Sick=No** will Pass or Fail using Bayesian Classification.	15	CO3	K3

Confident	Studied	Sick	Result
Yes	No	No	Fail
Yes	No	Yes	Pass
No	Yes	Yes	Fail
No	Yes	No	Pass
Yes	Yes	Yes	Pass

(OR)

b.	What is SVM? Explain how it is superior to other ML classifiers.	8	CO3	K1
c.	Differentiate between Classification and clustering.	7	CO3	K2
5.a.	Transform the provided features to obtain the principal components using PCA.	8	CO3	K3

Features	E_1	E_2	E_3	E_4
X_1	2	3	4	5
X_2	4	6	8	10

b.	Draw the structure of a single neuron. Explain the working principle of it.	7	CO3	K1

(OR)

c.	Apply KNN classification to determine the class of the new data point with X_1=3 and X_2=4.	8	CO4	K3

ID	X_1	X_2	Class
1	1	2	A
2	2	3	A
3	3	3	B
4	6	5	B
5	7	8	B

d.	Consider a simple dataset with 8 data points in a 2D space: **X = {(1, 2), (2, 1), (3, 4), (5, 7), (3, 3), (4, 5), (6, 8), (7, 6)}** Determine the optimal number of clusters K for this dataset using the Elbow Method.	7	CO4	K3

--- End of Paper ---