

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER M.TECH DEGREE EXAMINATION (R), DECEMBER 2023**COMPUTER SCIENCE AND SYSTEMS ENGINEERING****(2021 Scheme)****Course Code: 21SE105-D****Course Name: Foundations of Machine Learning Techniques****Max. Marks: 60****Duration: 3 Hours****PART A****(Answer all questions. Each question carries 3 marks)**

1. In a bolt factory, three machines M_1 , M_2 , and M_3 manufacture 2000, 2500, and 4000 bolts respectively every day. Out of these, 3%, 4%, and 2.5% are defective bolts. One bolt is drawn very randomly from a day's production and is found to be defective. What is the probability that it was produced by machine M_2 ?
2. What are decision trees? Explain in detail.
3. Give short note on clustering.
4. Write about manifold learning.
5. What are the difficulties in applying Gradient Descent?
6. Write short note on optimization.
7. Demonstrate back propagation algorithm.
8. Write down any 3 activation functions and its explanation.

PART B**(Answer one full question from each module, each question carries 6 marks)****MODULE I**

9. How multiclass classification problem can be dealt with logistic regression? Explain. (6)

OR

10. Consider the following dataset and predict that if a fruit has following properties, then which type of fruit it is using Naïve bayes classifier. (6)
 $X = \{\text{Yellow, Sweet, Long}\}$

Fruit	Yellow	Sweet	Long	Total
Mango	350	450	0	650
Banana	400	300	350	400
Others	50	100	50	150
Total	800	850	400	1200

MODULE II

11. Why KNN is known as instance-based classifier? Explain KNN algorithm in detail and the effect of selecting 'K' in KNN. Why usually odd value is chosen for K? Explain with neat diagrams. (6)

OR

12. a) What are entropy and Information gain? How an attribute is selected as a node for splitting? (3)
b) Write short notes on feed-forward neural network (3)

MODULE III

13. Compute the principal component of the given data using PCA algorithm. (6)

X1	X2
2	1
3	5
4	3
5	6
6	7
7	8

OR

14. Give details on Expectation Maximization in Gaussian Mixture Models. (6)

MODULE IV

15. What is a kernel function? Write about any 3 kernel functions. How can we obtain speeding up of kernel methods? (6)

OR

16. How dimensionality reduction can be obtained for non linear data? Explain Kernel PCA and Kernel LDA. (6)

MODULE V

17. Write the principle of Stochastic gradient decent algorithm? How does the learning rate affect the performance of gradient descent algorithm? (6)

OR

18. What is second order methods? Explain in detail Newton's method. (6)

MODULE VI

19. Describe about CNN architecture with the help of neat diagram (6)

OR

20. Explain in detail about RNN. How the problem of long term dependencies of RNN is tackled? (6)
