**KUMARAGURU**
college of technology
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## B.E/B.TECH DEGREE EXAMINATIONS: NOV /DEC 2024

(Regulation 2018)

Sixth Semester

## INFORMATION SCIENCE AND ENGINEERING

U18ISI6204**:** Machine Learning Techniques

## COURSE OUTCOMES

**CO1:**   Understanding basic concepts and techniques of Machine Learning.

**CO2:**   Analyze the regression and classification techniques.

**CO3:**   Be able to create solutions to real world problems using Machine Learning.

**Time: Three Hours**                                                                                   **Maximum Marks: 100**

### Answer all the Questions:-
### PART A (10 x 2 = 20 Marks)
### (Answer not more than 40 words)

| | | | |
|---|---|---|---|
| 1. | Compare supervised and unsupervised learning. | CO1 | [K$_2$] |
| 2. | Define Confusion matrix | CO1 | [K$_1$] |
| 3. | How the error can be calculated in linear regression? | CO2 | [K$_1$] |
| 4. | Define gradient descent in the context of machine learning optimization. | CO2 | [K$_1$] |
| 5. | Specify how precision and recall are computed from a confusion matrix. | CO2 | [K$_2$] |
| 6. | What are support vectors? | CO2 | [K$_1$] |
| 7. | Differentiate Logistic regression and linear regression. | CO2 | [K$_2$] |
| 8. | Outline the terms over fitting and variance. | CO3 | [K$_2$] |
| 9. | In k-means or KNN, an euclidean distance can be used to calculate the distance between nearest neighbors. Why not manhattan distance ? | CO3 | [K$_3$] |
| 10. | Show the difference between feature selection and feature extraction | CO3 | [K$_2$] |

### Answer any FIVE Questions:-
### PART B (5 x 16 = 80 Marks)
### (Answer not more than 400 words)

| | | | | | |
|---|---|---|---|---|---|
| 11. | a) | Explain various types of machine learning algorithms. | 8 | CO1 | [K$_2$] |
| | b) | Describe a spam email classification model to distinguish between spam and non-spam emails. | 8 | CO1 | [K$_2$] |
| 12. | a) | Explain Single and multiple linear regression with an example | 8 | CO2 | [K$_2$] |
| | b) | Using historical data on monthly advertising expenditure and corresponding sales | 8 | CO2 | [K$_3$] |

figures, describe how you would build a single linear regression model to predict future sales based on advertising expenditure.

| | | | | | |
|---|---|---|---|---|---|
| 13. | a) | Explain the concept of Support Vector Machines (SVM) in machine learning. How does SVM classify data points by finding the optimal hyperplane. | 6 | CO2 | [K$_2$] |
| | b) | Consider the following dataset and create decision tree | 10 | CO2 | [K$_3$] |

| Outlook | Temperature | Humidity | Wind | Played football(yes/no) |
|---|---|---|---|---|
| Sunny | Hot | High | Weak | No |
| Sunny | Hot | High | Strong | No |
| Overcast | Hot | High | Weak | Yes |
| Rain | Mild | High | Weak | Yes |
| Rain | Cool | Normal | Weak | Yes |
| Rain | Cool | Normal | Strong | No |
| Overcast | Cool | Normal | Strong | Yes |
| Sunny | Mild | High | Weak | No |
| Sunny | Cool | Normal | Weak | Yes |
| Rain | Mild | Normal | Weak | Yes |
| Sunny | Mild | Normal | Strong | Yes |
| Overcast | Mild | High | Strong | Yes |
| Overcast | Hot | Normal | Weak | Yes |
| Rain | Mild | High | Strong | No |

| | | | | | |
|---|---|---|---|---|---|
| 14. | a) | Explain how the loss function is defined in logistic regression. | 8 | CO2 | [K$_2$] |
| | b) | Summarize the features of KNN algorithm | 8 | CO2 | [K$_2$] |
| | | | | | |
| 15. | a) | Explain One-vs-all multiclass classification | 8 | CO2 | [K$_2$] |
| | b) | Describe Regularization in machine learning. Explain L1 and L2 regularization | 8 | CO2 | [K$_2$] |
| | | | | | |
| 16. | a) | Consider a boy who has a volleyball tournament on the next day, but today he feels sick. It is unusual that there is only a 40% chance he would fall sick since he is a healthy boy. Now, Find the probability of the boy participating in the tournament. The boy is very much interested in volley ball, so there is a 90% probability that he would participate in tournaments and 20% that he will fall sick given that he participates in the tournament. | 8 | CO3 | [K$_3$] |
| | b) | How Matrix factorization works in PCA. Explain in detail? | 8 | CO3 | [K$_2$] |

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