



B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Fifth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EEE0019: Machine Learning

COURSE OUTCOMES

CO1: Understand the practical aspects of data science and its evolution, applications.

CO2: Understand the concept of various Machine Learning Algorithms

CO3: Code basic programs in Python language that pertains to the use of machine learning algorithms

CO4: Applying machine learning techniques for solving various applications with the standard ML Libraries.

CO5: Able to understand the deep learning techniques and develop a basic DNN using Tensor flow.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match the list I with list II

CO1 [K₁]

List I	List II
A. Machine Learning	i. A function that measures the error between predicted outcomes and actual results
B. Supervised Learning	ii. A subset of AI where machines improve from experience without explicit programming
C. Regularization	iii. A technique used to prevent overfitting in ML models by penalizing large coefficients
D. Cost Function	iv. Model training using labeled datasets to predict outcomes

- | | A | B | C | D |
|----|-----|----|-----|----|
| a) | ii | i | iii | iv |
| b) | iii | iv | ii | i |
| c) | ii | iv | iii | i |
| d) | iii | i | ii | iv |

2. The high variance in a model causes_____

CO1 [K₂]

- | | |
|-------------------------------------|---|
| a) Good generalization to new data | b) Underfitting of the model |
| c) Overfitting to the training data | d) Low training error and low testing error |

- a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A
- c) A is true but R is false d) A is false but R is true
10. A convolutional layer has a filter size of 3x3 and receives an input image of size 32x32 with a depth of 3. If the stride is set to 1 and padding is set to 'valid', what will be the size of the output feature map? CO5 [K₂]
- a) 30 x 30 x 1 b) 30 x 30 x 2
- c) 30 x 30 x 3 d) 30 x 30 x 4

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. What is the bias-variance tradeoff in machine learning? CO1 [K₁]
12. How does high bias affect the performance of a model? CO1 [K₂]
13. What is the role of the centroid in K-means clustering? CO2 [K₁]
14. Compare soft margin and hard margin in support vector machines. CO2 [K₂]
15. Define a function in Python and describe its components. CO3 [K₁]
16. Distinguish between a list and tuple in Python. CO3 [K₂]
17. What is the syntax for creating a simple line plot using Matplotlib? CO4 [K₁]
18. How do you create a scatter plot in Seaborn? CO4 [K₂]
19. What are the basic steps to build a simple DNN using TensorFlow? CO5 [K₁]
20. In a CNN, if you have 64 filters of size 7x7 applied to a 256x256 input image with a stride of 1 and padding of 0, what will be the size of the output feature map? CO5 [K₂]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 350 words)

21. a) Describe how data is processed and used in machine learning models. 7 CO1 [K₂]
- b) Discuss the evolution of AI from its inception to the present day. 7 CO1 [K₂]
22. a) The value of temperature and their corresponding values of generated power are given below. Estimate the value of power when temperature is 30 degree Celsius. 7 CO2 [K₃]
- | | | | | | | | | |
|-------------|-----|-----|-----|------|------|-----|-----|-----|
| Temperature | 27 | 28 | 29 | 28.5 | 29.2 | 32 | 29 | 30 |
| Power | 280 | 300 | 301 | 300 | 289 | 285 | 287 | 289 |
- b) How does random forest combine the outputs of multiple decision trees? 7 CO2 [K₂]

- | | | | | | |
|-----|----|---|---|-----|-------------------|
| 23. | a) | Write a Python program that takes a list of numbers as input and returns a new list containing only the even numbers. Use functions and list operations in your program. | 7 | CO3 | [K ₃] |
| | b) | Discuss the different data types available in Python with an example. | 7 | CO3 | [K ₂] |
| 24. | a) | Explain the key operations of NumPy arrays, including array creation, indexing, and reshaping. Write the program for each operation. | 7 | CO4 | [K ₃] |
| | b) | Explain how to manipulate and analyze data using key operations of filtering, grouping, and merging data frames. | 7 | CO4 | [K ₂] |
| 25. | a) | Explain the significance of data preprocessing in the context of neural network training using TensorFlow. | 7 | CO5 | [K ₂] |
| | b) | Design a CNN model capable of performing multiple tasks related to wind energy, such as wind speed estimation and anomaly detection from the sensor data. Discuss how multi-task learning could enhance performance and efficiency. | 7 | CO5 | [K ₃] |
| 26. | a) | Consider five points {x ₁ ,x ₂ ,x ₃ ,x ₄ ,x ₅ } with the following coordinates as two dimensional sample for clustering:
x ₁ =(0.5,1.75) , x ₂ =(1,2), x ₃ =(1.75,0.25), x ₄ =(4,1), x ₅ =(6,3)
illustrate the K-means algorithm on the above dataset for number of clusters is two. Assume necessary data for algorithm. | 7 | CO2 | [K ₃] |
| | b) | Develop the DNN model to predict energy consumption in electrical systems based on historical data and environmental factors. Assume necessary feature and data for algorithm. | 7 | CO5 | [K ₂] |
