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Name: .....

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**EIGHTH SEMESTER B.TECH. DEGREE EXAMINATION(R), MAY 2024****Mechanical Engineering****(2020 SCHEME)****Course Code : 20MET424****Course Name : Artificial Intelligence and Machine Learning****Max. Marks : 100****Duration:3 Hours****Scientific calculator and statistical table is allowed in the examination hall.****PART A***(Answer all questions. Each question carries 3 marks)*

1. What are the key components of probability theory that contribute to a foundational understanding in the fields of Artificial Intelligence (AI) and Machine Learning (ML)?
2. Mother, father and daughter line up at random in a queue. Find the  $P(A|B)$  for  $A$ =Daughter on one end and  $B$ =Father in Middle.
3. What function does backpropagation serve in the training process of neural networks?
4. What is the Turing Test, and what is its primary purpose in evaluating artificial intelligence?
5. What sets machine learning apart from traditional programming, and what factors drive its adoption?
6. List the similarities and differences between prediction and classification tasks in the context of machine learning?
7. What is the need for the web scrapped data?
8. Explain the notion of a confusion matrix within the context of evaluating machine learning models, and elaborate on its importance in understanding the effectiveness of classification algorithms.
9. How can you create an identity matrix of size  $3 \times 3$  using numpy?
10. List the steps involved in data science workflow.

**PART B***(Answer one full question from each module, each question carries 14 marks)***MODULE I**

11. Suppose the waist measurements  $W$  of 800 girls are normally distributed with mean 66 cms and 14 standard deviation 5 cms. Find the number  $N$  of girls with waists,
  - i) between 65 and 70cm.
  - ii) greater than or equal to 72cms.

**OR**

12. A service provider claims that individual customers pay on an average 400 rs. per month with standard deviation of 25 rs. A random sample of 50 customers bills during a given month is taken with a mean of 250 and standard deviation of 15. What to say with respect to the claim made by the service provider?

**MODULE II**

13. i) Calculate the net input for the network shown as in the given figure with bias included in the 8 network.  
 ii) Critically assess the advantages and limitations of different activation functions (e.g., ReLU) used in 6 Artificial Neural Networks (ANNs)

**OR**

14. Discuss the architecture and key components of Convolutional Neural Networks (CNNs), outlining 14 their significance in image recognition tasks. Additionally, explain the process of feature extraction through convolutional layers and how pooling layers aid in dimensionality reduction and feature retention. Finally, highlight the role of fully connected layers in CNNs and their importance in making final predictions.

**MODULE III**

15. Develop a python program to check whether the entered string is palindrome or not. 14

**OR**

16. Calculate the regression coefficient and obtain the lines of regression for the following data: 14

<b>X</b>	1	2	3	4	5	6	7
<b>Y</b>	9	8	10	12	11	13	14

**MODULE IV**

17. How would you outline the sequential phases of Natural Language Processing (NLP), encompassing 14 tasks such as text preprocessing, feature extraction, semantic analysis, and beyond?

**OR**

18. Using the Hamming distance metric and a 3-nearest neighbors (3NN) classifier with majority voting, 14 illustrate how the classification of { pepper: false, ginger: true, chilly: true} would be determined based on your burger preferences for the week (burgers A to E).

	<b>Pepper</b>	<b>Ginger</b>	<b>Chilly</b>	<b>Liked</b>
A	True	True	True	False
B	True	False	False	True
C	False	True	True	False
D	False	True	False	True
E	True	False	False	True

**MODULE V**

19. Examine the utilization of machine learning in autonomous vehicles, exploring its multifaceted 14 applications and operational intricacies.

**OR**

20. Investigate the deployment of machine learning in predictive maintenance, delving into its diverse 14 applications.

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