Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S) Examinations April 2026 (2019 Scheme)

Course Code: MET426
Course Name: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Max. Marks: 100 **Duration: 3 Hours**

Use of Statistical tables is permitted

PART A

Answer all questions, each carries 3 marks. Marks

1 Differentiate between parametric and non-parametric estimation. (3)

2 The mean and standard deviation of a binomial distribution are 6 and 2 respectively. Determine the distribution. (3)

3 What is API? (3)

4 Explain the concept of Feed Forward Neural Networks (FNN). (3)

5 What are the different domains of AI? (3)

6 What is the importance of Python in machine learning and data science? (3)

7 What do you understand by KNN model? List some applications of KNN model. (3)

8 What do you understand by Underfitting? (3)

9 Define Data Science and its importance. (3)

10 What are the key applications of Machine Learning in Mechanical Engineering? (3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11 a) A random variable X has the following probability distribution: (8)

X	0	1	2	3	4	5	6	7	8
P(X)	a	3a	5a	7a	9a	11a	13a	15a	17a

Find (i) a (ii) P ($X \leq 2$) (iii) the mean of X.

b) If $f(x) = kx,\ 0 < x < 1$ is a PDF of a random variable, find the value of k and $P(X > 0.5)$ (6)

OR

12 a) A company produces bolts of different lengths (in mm): 10,12,14,16,18,20 (7)

(i) Find the mean and standard deviation of the bolt's lengths.

(ii) If a random sample of size 2 are drawn with replacement, find the mean and standard deviation of the sampling distribution of means.

b) An electrical firm manufactures light bulbs that have a life, before burn-out, that is normally distributed with mean equal to 800 hours and a standard deviation of 40 hours. Find (7)

(i) The probability that a bulb burns more than 834 hours, and

(ii) The probability that a bulb burns between 778 and 834 hours.

Module II

13 a) What are Convolutional Neural Networks (CNNs)? Explain the role of different layers in CNNs, including the Convolutional Layer, Pooling Layer, and Flatten Layer. How do they contribute to feature extraction. (14)

OR

14 a) What is the difference between Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL)? (6)

b) How is AI transforming industries like healthcare, finance, and automation? Provide real-world applications. (8)

Module III

15 a) Differentiate between classification and prediction problems in machine learning with suitable examples. (7)

b) Explain the working of the linear regression algorithm, its assumptions, and applications. (7)

OR

16 a) Write a Python program to enter 2 integers and perform all arithmetic operations on them. (8)

b) What are the different built-in data types available in Python? (6)

Module IV

17 a) A university wants to predict whether a student will pass or fail a course based on their study hours and attendance percentage. The following data is available: (14)

Student	Study Hours (per week)	Attendance (%)	Result
S1	5	60	Fail
S2	20	90	Pass
S3	15	85	pass

S4	10	70	Fail
S5	25	95	Pass

A new student (S6) has study hours = 12 and attendance = 75%.

Using KNN with K = 3, predict whether the new student will pass or fail. Use the Euclidean Distance formula.

OR

18 a) For an AI model developed to check if a painting is authentic or not, its confusion matrix is given below (0 means False and 1 means True). Evaluate the model as per its accuracy, precision, recall and f-measure. (14)

N = 192	**Predicted Values**	
Actual Values	**Predicted 0**	**Predicted 1**
Actual 0	118 (TN)	12 (FP)
Actual 1	47 (FN)	15 (TP)

Module V

19 a) Explain how Matplotlib is used for data visualization in Python. Provide examples of different types of plots. (7)

b) Explain the significance of NumPy and Pandas in data science, highlighting their key features. (7)

OR

20 a) Describe the typical workflow of a Data Science project. Explain each stage in detail. (14)

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