Total No. of Questions : 8]

SEAT No. :

PA-1534

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T.E. (Mechanical Engineering)

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

(2019 Pattern) (Semester - II) (302049)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data wherever necessary.***

Q1) a) Explain following terms: **[6]**

i) Accuracy

ii) Precision

iii) Recall

iv) F-1 Score

b) Explain the procedure to find out the optimum value of K in K-means clustering? **[5]**

c) What is over-fitting in decision tree? Explain the techniques to avoid over-fitting. **[6]**

OR

Q2) a) Explain the steps in KNN algorithm. **[6]**

b) What is SVM? How does it work? **[5]**

c) Explain the evaluation parameters for regression model. **[6]**

P.T.O.

Q3) a) Explain the steps involved in development of ML model. **[7]**

b) Quality Engineer wants to solve a two-class classification problem for predicting whether a product is defective. The actual number of products containing no defect are 950 (Truly predicted positives = 900), the actual number defective products are 150 (Truly predicted negatives = 130). So, calculate accuracy, precision, recall and f1 score. **[4]**

c) Explain hyperparameter tuining in decision tree. Why is it required? **[7]**

OR

Q4) a) What are the different cross validation techniques? Explain K-fold cross validation with neat sketch. **[7]**

b) A sugar factory produces 3 sizes of sugar from three different nets. Daily 1000 tons of sugar produced from net-1, 3000 tons produced from net-2 and 2000 tons produced from net-3. The last year season experience shows that 1.5% of the total sugar produced from net 1 is waste sugar. The corresponding fractions of waste sugars for the remaining nets are 2.5% and 2% respectively. A certain amount of sugar is taken as a sample at random and is found to be waste sugar. Find out the probability that it is produced from : **[4]**

i) Net 1

ii) Net 2

iii) Net 3

c) What are the different classification algorithms? Explain logistic regression with neat sketch. **[7]**

Q5) a) Explain the concept of Reinforcement learning with suitable example. Define following terms in Reinforcement learning: **[8]**

i) Agent

ii) State

iii) Environment

iv) Reward

b) Define Markov property. Explain why Markov property is most applicable in solving Reinforcement learning problems. **[6]**

c) The transfer function of neuron on one layer of a neural network is assumed to be of sigmoid form. Evaluate the output of neuron corresponding to input x = 0.62. How is the nature of sigmoid function? (Justify the answer with plot). **[4]**

OR

Q6) a) Explain Convolution Neural Network (CNN) using neat flow diagram. Explain padding and striding in CNN. **[8]**

b) Explain Q-learning algorithm with flow diagram. **[6]**

c) A neuron with 4 inputs has the weights 1, 2, 3, 4 and bias 0. The activation function is linear, say the function f(x) = 2x. If the inputs are 4, 8, 5, 6 compute the output. Draw a diagram representing the neuron. **[4]**

Q7) a) How deep learning can be used for image classification? **[6]**

b) Explain human-machine interaction with suitable examples. **[5]**

c) Explain in detail various applications of AI in mechanical engineering. **[6]**

OR

Q8) a) How ML can be used in predictive maintenance? **[6]**

b) Explain use of AI in fault detection. **[5]**

c) Explain applications of AI in healthcare sector. **[6]**