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# T.E.(Mechanical) <br> ARTIFICIAL INTELLIGENCE \& MACHINE LEARNING (2019 Pattern) (Semester - II) (302049) 

Time: $\mathbf{2 1}^{1 / 2}$ Hours]
[Max. Marks: 70
Instructions to the candidates:

1) Neat diagrammust bedrawn wherever necessary.
2) Figures to right side indicate full marks.
3) Use of calcylator is allowed.
4) Assumie suitable data wherever necessary.

Q1) a) Explainfollowing terms:
[6]
i) Accuracy.
ii) $)$ Precision.
iii) Recall.
iv) F-1 Score.
b) Explain the procedure to find ont the optimum value of K in K -means clustering?
c) Explain the following tems
i) Entropy.
ii) Information gain

Q2) a) Explain the steps in KNN algorithm.
b) What is SVM? How does it work?
c) Explain the evalyation parameters for regression model

Q3) a) Explain the steps involved in development of ML model.
b) Quality Engineer wants to solve a two-class classification problem for predicting whether a product is defective, The actuaf number of products containing no defect are 950 (Truly predicted poSitives = 900), the actual number defective products are 150 (Truly preficted negatives = 130). So, calculate accuracy, precision, recall and fi score.
c) Explain hyperparameter tuning parameters in decision tree.

Q4) a) What are the different cross validationtechniques? Explain K-fold cross validation with neat sketch.
b) A sugar factory produces 3 sizesof sugar from three different nets. Daily 1000 tons of sugar produced from net-1, 3000 tons produced from net2 and 2000 tons produced frrom net-3. The last year season experience shows that $1.5 \%$ of the tôtall 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 feund to be waste sugar. Find out the probability that it is produced from.
i)

iii) Net 3
c) What are the different classification algorithms? Explain logistic regression with neat sketch.
Q5) a) Explain the concept of Reinfoncement learning with suitable example.Define following termsin Reinforcement learning.
i) Agent
ii) State
iii) Environment
iv) Reward
b) Define Markov property. Explain why Markov property is most appliçable in solving Reinforcement learning problems.
c) The transfer function of neuron on one layer of a neural nêtwork is assumed to be of sigmoid from. Evaluate the outputof neuron corresponding to input $x=0.62$.How is the nature of sigmoid function? (Justify the answer with plot).

Q6) a) Explain Convolution Neural Networm(CNN) using neat flow diagram. Explain padding and striding in CNN.
b) Explain Q-learning algorithm wiof flow diagram.
c) A neuron with 4 inputs has the weights $1,2,3,4$ and bias 0 . The activation function is linear, say the function $f(x)=2 x$. If the inputs are $4,8,5,6$ compute the ouput. Draw a diagram representing the neuron.

Q7) a) How deeplearning can be used for Tuning of control algorithm? [6]
b) Explain Aí based fault detection.
c) Explain in detail various applications of AI in mechanicatengineering.[6] OR

Q8) a) HowAIML can be used in Dynamic system reduction?
b) Explain HMI with suitable examples.
c) Explain applications of AI in process optimization.

