

I SEMESTER EXAMINATION, 2022 – 23
Ist yr M.Tech. – Computer Science & Engineering
MACHINE LEARNING

Duration: 3:00 hrs**Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.

Q 1.	Answer any four parts of the following. a) List three computer applications for which machine learning approaches seem appropriate and three for which they seem inappropriate. b) Explain the CANDIDATE-ELIMINATION algorithm using version spaces. c) What is the difference between inductive and analytical learning? d) Write a note on Bayes Rule and its Applications. e) What are the four 4 types of machine learning algorithms? f) Write two applications of genetic algorithms in our day-to-day life.	5x4= 20
Q 2.	Answer any four parts of the following. a) Show the perceptron that calculates AND with 2-bit Binary Input. b) Write short notes on Heuristic space search. c) Give an example of how specific clustering methods can be integrated, for example, where one clustering algorithm is used as a preprocessing step for another. d) Explain Decision tree with example. e) Translate each of the following sentences into First Order Logic (FOL) <ul style="list-style-type: none"> Not all cars have carburetors Some numbers are not real f) Which are the four inputs EBL software takes?	5x4= 20
Q 3.	Answer any two parts of the following. a) In an exam you have to solve exactly one problem, which might be A, B, or C, with probabilities 30%, 20%, and 50%, respectively. During your preparation you have solved 9 of 10 problems of type A, 2 of 10 problems of type B, and 6 of 10 problems of type C. <ul style="list-style-type: none"> What is the probability that you will solve the problem of the exam? Given you have solved the problem, what is the probability that it was of type A? b) We have a bag of three biased coins a, b, and c with probabilities of coming up heads of 20%, 60%, and 80%, respectively. One coin is drawn randomly from the bag (with equal likelihood of drawing each of the three coins), and then the coin is flipped three times to generate the outcomes X1, X2, and X3. <ul style="list-style-type: none"> Draw the Bayesian network corresponding to this setup and define the necessary Conditional probability table (CPT) c) Consider the scenario stated in Q.3 b). Calculate which coin was most likely to have been drawn from the bag if the Observed flips come out heads twice and tails once.	10x2= 20
Q 4.	Answer any two parts of the following. a) Explain K-nearest neighbor learning algorithm with example. b) Explain locally weighted linear regression. c) How reinforcement learning problem differs from other function approximation tasks?	10x2= 20
Q 5.	Answer any two parts of the following. a) Explain FOCL with example. b) Describe Q-Learning. Define following terms with respect to Q-learning State, Action, Rewards, episodes, Q-values, Temporal difference c) Explain reinforcement learning. How it is different from supervised and unsupervised learning?	10x2= 20