Module 1

Introduction and Concept Learning

1	Define Machine Learning. Enlist 4 successful applications of machine learning.	4 Marks
2	Explain the steps in design of a learning system to play checkers, with the goal of entering in the world checkers tournament.	6 Marks
3	What is Machine Learning? Discuss the various applications and issues of Machine Learning.	6 Marks
4	What is the role of a function approximation algorithm? How does the learner system estimate training values and adjust weights while learning?	6 Marks
5	Explain concept learning with a training example. Explain general-to -specific ordering of hypothesis for the training example.	8 Marks
6	Describe find-S algorithm. Explain it working for the EnjoySport dataset given below: **Example Sky AirTemp Humidity Wind Water Forecast EnjoySport** 1 Sunny Warm Normal Strong Warm Same Yes 2 Sunny Warm High Strong Warm Same Yes 3 Rainy Cold High Strong Warm Change No 4 Sunny Warm High Strong Cool Change Yes	8 Marks
7	Explain Version-Space and list-then-Eliminate algorithm.	8 Marks
8	Describe find-S algorithm. Explain it working for the dataset given below: **Size Color Shape Label** Big red circle No Small red triangle No Small red circle Yes Big blue circle No Small blue circle Yes	8 Marks
9	Explain candidate elimination algorithm with an illustrative example.	8 Marks
10	Provide a hand trace of the candidate-elimination algorithm learning from the below given training examples and hypothesis language. In particular, show how the specific and general boundaries of the version space after it has processed the first two training examples.	8 Marks

	Training Examples 1 + < < *male brown tall US* > < *female black short US* > > 2 + < < *male brown short French* > < *female black short US* > > 3 - < < *female brown tall German* > < *female black short Indian* > > 4 + < < *male brown tall Irish* > < *female brown short Irish* > >	
11	How many distinct hypothesis from the above given hypothesis space are consistent with the following single positive training example: + << *male black short Portuguese* > < *female blonde tall Indian* >>	6 Marks
12	Explain advantages and drawbacks of find-S and candidate elimination algorithm.	4 Marks
13	Explain the inductive bias of candidate-elimination algorithm.	8 Marks
14	Explain candidate elimination algorithm, and illustrate the working of the algorithm for the dataset given below: **Size Color Shape Label** Big red circle No Small red triangle No Small red circle Yes Big blue circle No Small blue circle Yes	8 Marks
15	Consider the following set of training examples to train a robot janitor to predict whether or not an office contains a recycling bin. STATUS FLOOR DEPT. OFFICE SIZE RECYCLING BIN? 1. faculty four cs medium yes 2. faculty four ee medium yes 3. student four cs small no 4. faculty five cs medium yes a) What is the size of the set of instances for this example? b) What is the size of the hypothesis space? c) Give a sequence of S and G boundary sets computed by the Candidate-Elimination algorithm.	
16	Describe find-S algorithm. Explain it working for the dataset given below: **outlook temperature humidity wind answer** sunny hot high weak no sunny hot high strong no overcast hot high weak yes rain mild high weak yes rain cool normal weak yes rain cool normal strong no overcast cool normal strong yes	8 Marks

	sunny mild high weak no sunny cool normal weak yes rain mild normal weak yes sunny mild normal strong yes overcast mild high strong yes overcast hot normal weak yes rain mild high strong no	
17	Describe Candidate-Elimination algorithm. Explain it working for the dataset given below: **outlook temperature humidity wind answer** sunny hot high weak no sunny hot high strong no overcast hot high weak yes rain mild high weak yes rain cool normal weak yes rain cool normal strong no overcast cool normal strong yes sunny mild high weak no sunny cool normal weak yes rain mild normal weak yes sunny mild normal strong yes overcast mild high strong yes overcast hot normal weak yes rain mild high strong no	8 Marks
18	Differentiate between Find-S and Candidate-Elimination Algorithm.	8 Marks
19	Consider the following set of training examples to train a robot janitor to predict whether or not the person enjoys sport on a particular day. **Example Sky AirTemp Humidity Wind Water Forecast EnjoySport** 1 Sunny Warm Normal Strong Warm Same Yes 3 Sunny Warm High Strong Warm Same Yes 3 Rainy Cold High Strong Warm Change No 4 Sunny Warm High Strong Cool Change Yes a) What is the size of the set of instances for this example? b) What is the size of the hypothesis space? c) Give a sequence of S and G boundary sets computed by the Candidate-Elimination algorithm.	8 Marks
20	Enlist the advantages and drawbacks of Find-S,List-then-Eliminate, Candidate Elimination Algorithm.	6 Marks
21	What are the important objectives of machine learning ?	4 Marks
22	What are the basic design issues and approaches to machine learning?	4 Marks

23	What do you mean by Well-posed learning problems?	6 Marks
24	Explain the important features that are required to well define a learning problem.	6 Marks
25	Explain inductive biased hypothesis space and unbiased learner.	6 Marks