CBCS SCHEME

USN | | | | | | | | | | |

18IC62

Sixth Semester B.E. Degree Examination, June/July 2023
Artificial Intelligence and Machine Learning

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

VTU EXAMS JUNE-JULY-2023

Module-1

1 a. Define artificial intelligence and explain production system characteristics. **(10 Marks)**

b. State and explain algorithms for best first search technique and depth first search technique. List down the advantages and disadvantages of both. **(10 Marks)**

OR

2 a. Elaborate the steps of simulated annealing. **(10 Marks)**

b. Write AO* algorithm. Explain with an example. **(10 Marks)**

Module-2

3 a. Consider the following set of well-formed formulas in predicate logic:

i) Man (Marcus)
ii) Pompeian (Marcus)
iii) $\forall x$: Pompeian (x) $\rightarrow$ Roman (x)
iv) ruler (Caesar)
v) $\forall x$: Roman (x) $\rightarrow$ loyal to (x, Caesar) V hate (x, Caesar)
vi) $\forall x$: $\rightarrow y$: loyal to (x, y)
vii) $\forall x$: $\forall y$: man(x) A ruler (y) Atryassisnate (x, y) $\rightarrow$ loyal to (x, y)
viii) tryassisnate (Marcus, Caesor).

Convert these into clause form and prove that hate (marcus, Caesar) using resolution proof. **(10 Marks)**

b. Explain the approaches of knowledge representation. **(10 Marks)**

OR

4 a. How to implement Find-S algorithm in Artificial-Intelligence and Machine-Learning?

Example	Sky	Air Temperature	Humidity	Wind	Water	Forecast	Enjoy sport
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

(10 Marks)

b. Define inductive bias. With a neat diagram, explain how to model inductive systems by equivalent deductive systems. **(10 Marks)**

Module-3

5 a. What is decision tree? Write its representation with an example. **(05 Marks)**

b. Summarize the main issues for decision tree learning method. Explain with graphical representation. **(10 Marks)**

c. Bring out the appropriate problems in decision tree learning. **(05 Marks)**

OR

6 a. Write the differences between standard-gradient descent and stochastic gradient descent. **(05 Marks)**

b. What is perceptron? How to represent power of perception and discuss about perceptron training rule. **(10 Marks)**

c. Discuss about the remarks on the propagation algorithm. **(05 Marks)**

Module-4

7 a. Illustrate Bayes theorem and maximum posterior hypothesis. **(06 Marks)**

b. Outline Brute force MAP Learning Algorithm. **(07 Marks)**

c. Explain about EM-Algorithm with an example. **(07 Marks)**

OR

8 a. Explain Bayesian belief networks with the following terms:

i) Conditional independence

ii) BBN representation with an example

iii) Derivation of ascent training Bayesian networks. **(12 Marks)**

b. Discuss about minimum description length algorithm. **(08 Marks)**

Module-5

9 a. Suppose hypothesis h commits r = 10 errors over a sample of n = 65 independently drawn examples.

i) What is the varience and standard deviation for number of true error rate error D(h)?

ii) What is the 90% confidence interval (two-sided) for the true error rate?

iii) What is the 95% one-sided interval (i.e what is the upper bound U such that error D(h) ≤ 5U with 95% confidence)?

iv) What is the 90% one-sided interval?

α	0.100	0.050	0.025	0.001
$1 - \alpha$	0.900	0.950	0.975	0.999
$Z_1 - \alpha$	1.28	1.64	1.96	3.09

(10 Marks)

b. What is Reinforcement learning and explain reinforcement learning problem with neat diagram. **(10 Marks)**

OR

10 a. Explain the Q function and Q learning algorithm assuming deterministic rewards and actions with an example. **(10 Marks)**

b. Explain locally weighter linear regression. **(05 Marks)**

c. Explain K-nearest neighbor algorithm for approximating a discrete-valued target function. **(05 Marks)**

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VTU EXAMS QUESTION PAPERS - JULY - 2023