CBCS SCHEME

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18CS71

Seventh Semester B.E. Degree Examination, June/July 2025
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.

Module-1

1 a. Define Artificial Intelligence .Classify the task domains of Artificial Intelligence. **(06 Marks)**

b. Explain the water-jug problem using suitable production rules. **(08 Marks)**

c. Explain mean-end analysis with an example. **(06 Marks)**

OR

2 a. Discuss in brief any four problem characteristics. **(06 Marks)**

b. Write and explain with an algorithm

i) Steepest ascent hill climbing with an example.

ii) Best-Fit search with an example. **(10 Marks)**

c. Explain production system components and characteristics. **(04 Marks)**

Module-2

3 a. Discuss briefly any two approaches of knowledge representation. **(10 Marks)**

b. Consider the following predicates:

i) Man (Marcus)

ii) Pompenian (Marcus)

iii) Born (Marcus, 40)

iv) $\forall_x$: man (x) $\rightarrow$ mortal (x)

v) $\forall_x$: Pompenian (x) $\rightarrow$ died (x, 79)

vi) Erupted (volcano, 79)

vii) $\forall x\ \forall t_1\ \forall t_2$: mortal (x) $\wedge$ born (x, t_1) $\wedge$gt ($t_2 - t_1$, 150) $\rightarrow$ dead (x, t_2)

viii) Now = 1991

ix) $\forall x\ \forall t$: [alive (x, t) $\rightarrow \neg$ dead (x, t)]$\wedge$

[$\neg$ dead (x, t) $\rightarrow$ alive (x, t)]

x) $\forall x\ \forall t_1\ \forall t_2$: died (x, t_1) $\wedge$ gt (t_2, t_1) $\rightarrow$ dead (x, t_2)

Prove that $\neg$ alive (Marcus, now) using resolution. **(10 Marks)**

OR

4 a. Explain issues in knowledge representation. **(04 Marks)**

b. Explain Find-S algorithm with an example. **(06 Marks)**

c. Explain candidate elimination algorithm with an example. **(10 Marks)**

Module-3

5 a. Explain the measures of selecting best attribute in construction of decision tree with an example. **(04 Marks)**

b. Write and explain ID3 algorithm with suitable example. **(10 Marks)**

c. Explain appropriate problems for decision tree learning. **(06 Marks)**

OR

6 a. Write and explain back propagation algorithm. **(08 Marks)**
b. Explain perceptron with an example. **(06 Marks)**
c. Explain perceptron training rule. **(06 Marks)**

Module-4

7 a. Define Bayes theorem. Explain maximum likelihood hypothesis for predicting probabilities. **(06 Marks)**
b. Explain minimum description length principle. **(04 Marks)**
c. Write and explain naïve bayes algorithm for classifying text. **(10 Marks)**

OR

8 a. Explain map learning algorithm. **(06 Marks)**
b. Explain EM algorithm. **(06 Marks)**
c. Classify (sunny, cool, high, strong) using the following table, use Naive Bayes classifier.

Day	Outlook	Temp	Humidity	Wind	Play tennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	Yes
D3	Overcast	Mild	Normal	Strong	No
D4	Rain	Cool	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	No

(08 Marks)

Module-5

9 a. Explain K-nearest neighbor algorithm. **(08 Marks)**
b. Write a note on Q-learning. **(06 Marks)**
c. Discuss locally weighted regression. **(06 Marks)**

OR

10 a. Explain reinforced learning with an example. **(08 Marks)**
b. Explain case based reasoning. **(06 Marks)**
c. Explain radial basis functions. **(06 Marks)**

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