

# CBCS SCHEME

18EC745

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**Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024**

## Machine Learning with Python

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define Well posed learning problem. Describe the following problems with respect to tasks, performance and experience :
  - i) A checkers learning problem
  - ii) A hand writer recognition learning problem.
  - iii) A robot driving learning problem. (10 Marks)
- b. Write Find – S algorithm with an example. (10 Marks)

**OR**

- 2 a. With the diagram, explain the final design of the Checkers Learning program. (10 Marks)
- b. Find the version space for the following set of training examples with respect to candidate elimination algorithm.

Ex	Sky	Air temp	Humidity	Wind	Water	Forecast	Enjoy sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cool	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

(10 Marks)

### Module-2

- 3 a. What is Decision tree and discuss the use of decision tree for classification problem. (10 Marks)
- b. Discuss the issues in Decision tree learning. (10 Marks)

**OR**

- 4 a. Build a decision tree for the following set of training examples :

Day	Outlook	Temperature	Humidity	Wind	Play tennis
D <sub>1</sub>	Sunny	Hot	High	Weak	No
D <sub>2</sub>	Sunny	Hot	High	Strong	No
D <sub>3</sub>	Overcast	Hot	High	Weak	Yes
D <sub>4</sub>	Rain	Mild	High	Weak	Yes
D <sub>5</sub>	Rain	Cool	Normal	Weak	Yes
D <sub>6</sub>	Rain	Cool	Normal	Strong	No
D <sub>7</sub>	Overcast	Cool	Normal	Strong	Yes
D <sub>8</sub>	Sunny	Mild	High	Weak	No
D <sub>9</sub>	Sunny	Cool	Normal	Weak	Yes
D <sub>10</sub>	Rain	Mild	Normal	Weak	Yes
D <sub>11</sub>	Sunny	Mild	Normal	Strong	Yes
D <sub>12</sub>	Overcast	Mild	High	Strong	Yes
D <sub>13</sub>	Overcast	Hot	Normal	Weak	Yes
D <sub>14</sub>	Rain	Mild	High	Strong	No

(10 Marks)

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.

- b. Write a Python program for decision tree learning. (10 Marks)

**Module-3**

- 5 a. Explain the concept of a perception with neat diagram. (10 Marks)  
b. How a single perception can be used to represent Boolean functions such as AND & OR? (10 Marks)

**OR**

- 6 a. What is Gradient descent search? Derive the equation for the same. (10 Marks)  
b. Derive equation for Back propagation algorithm. (10 Marks)

**Module-4**

- 7 a. What is the Brute – force MAP algorithm? Briefly explain. (10 Marks)  
b. Explain Maximum Likelihood hypothesis for predicting probabilities. (10 Marks)

**OR**

- 8 a. Explain Naïve Bayes classifier with an example. (10 Marks)  
b. Derive necessary equations of the K means algorithm with respect to EM algorithm. (10 Marks)

**Module-5**

- 9 a. What is the K-nearest neighbor learning? Explain briefly. (10 Marks)  
b. Explain briefly Locally weighted Linear regression. (10 Marks)

**OR**

- 10 a. Explain the following : (10 Marks)  
i) Estimating Hypothesis Accuracy ii) Binomial distribution.  
b. Discuss the Learning task and Q – learning in the context of reinforcement learning. (10 Marks)

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