22589

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3 Hours / 70 Marks   Seat No.

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1.   Attempt any <u>FIVE</u> of the following: **10**

a) Define Rationality w.r.t. environment.

b) List the contents of searching through a state space.

c) List different stages of predictive modeling.

d) Define sensitivity, specificity w.r.t. evaluation metrics.

e) Classify unsupervised learning.

f) Define dynamism w.r.t. environment.

g) List significance of confusion matrix w.r.t. machine learning.

Marks

2. **Attempt any THREE of the following:** **12**

   a) Define the following properties of environment

     i)   Single agent / multiple agent

     ii)   Accessible / inaccessible

     iii) Episodic / Non-episodic

     iv) Deterministic / Non-deterministic.

   b) List various search strategies to evaluate their problem solving performance.

   c) Explain k-fold cross validation w.r.t. Machine learning.

   d) List any 4 key points of Decision tree classification algorithm.

3. **Attempt any THREE of the following:** **12**

   a) Define initial state, action, plan and path cost w.r.t state space search.

   b) Write basic search algorithm.

   c) Explain Univariate analysis data exploration.

   d) Explain unsupervised type of machine learning.

4. **Attempt any THREE of the following:** **12**

   a) Solve the state space problem i.e., place 8 queens on a chessboard so that no two queens are in the same row, column or diagonal.

   b) Explain the process of splitting training and testing dataset.

   c) Explain the process of model building in machine learning.

   d) List any four key points of linear regression algorithm.

   e) Explain the process of missing value treatment in data exploration.

Marks

5. Attempt any <u>TWO</u> of the following: **12**

  a) Explain how to evaluate performance of a model using evaluation metrics.

  b) Differentiate random forest and decision tree algorithms. (any six points)

  c) Compare clustering and classification. (any six points)

6. Attempt any <u>TWO</u> of the following: **12**

  a) Explain the significance of hyper parameter tuning w.r.t. machine learning.

  b) Explain K-nearest neighbors supervised classification algorithm.

  c) Explain the following applications of AI and ML in robotics

    i) AI enhanced navigation and motion control

    ii) AI enabled manipulation and grasping

    iii) Natural language processing.

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