

Total No. of Questions: 6

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Enrollment No.....



Faculty of Engineering
End Sem Examination May-2024

ME3EL27 Machine Learning in Manufacturing

Programme: B.Tech.

Branch/Specialisation: ME

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. Which of the following is not a sample application of machine learning? **1**
- (a) Image recognition (b) Fraud detection
(c) Weather forecasting (d) Sorting algorithms
- ii. Which method involves searching through the version space to find the most suitable hypothesis? **1**
- (a) Candidate elimination (b) Decision trees
(c) Gradient descent (d) K-Means clustering
- iii. What is the primary purpose of backpropagation in neural networks? **1**
- (a) To propagate input signals through the network
(b) To adjust the weights of connections based on prediction errors
(c) To initialize the network with random weights
(d) To determine the optimal learning rate
- iv. Which of the following is NOT a characteristic of genetic algorithms? **1**
- (a) Population-based optimization
(b) Crossover and mutation operations
(c) Gradient descent optimization
(d) Selection of individuals based on fitness
- v. Nearest neighbour algorithms are primarily used for: **1**
- (a) Classification tasks (b) Regression tasks
(c) Clustering tasks (d) Feature selection

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vi.	Decision trees are used for:	1
	(a) Classifying data points into categories	
	(b) Predicting continuous numerical values	
	(c) Clustering similar data points together	
	(d) Dimensionality reduction	
vii.	What is the primary goal of inductive logic programming?	1
	(a) To develop algorithms for symbolic reasoning	
	(b) To learn logic programs from examples and background knowledge	
	(c) To optimize decision boundaries in high-dimensional spaces	
	(d) To train neural networks using logic-based representations	
viii.	What is one limitation of ILP compared to decision tree induction?	1
	(a) ILP cannot handle symbolic data	
	(b) ILP is more prone to overfitting	
	(c) ILP is less interpretable	
	(d) ILP requires more computational resources	
ix.	Reinforcement learning is a type of machine learning where:	1
	(a) The model learns by observing examples in the form of input-output pairs	
	(b) The model learns by interacting with an environment and receiving feedback in the form of rewards	
	(c) The model learns by inferring rules from logical expressions	
	(d) The model learns by optimizing a loss function through gradient descent	
x.	What is the primary goal of hierarchical clustering methods?	1
	(a) To identify dense regions of data points	
	(b) To assign each data point to a predefined number of clusters	
	(c) To construct a hierarchy of clusters that can be visualized as a dendrogram	
	(d) To optimize a clustering criterion such as silhouette score	
Q.2	i. What is machine learning?	3
	ii. Explain the terms: Conjunctive Normal Form (CNF), Disjunctive Normal Form (DNF), and decision lists.	7
OR	iii. Describe the candidate elimination method in machine learning. Explain how the algorithm works step-by-step, including the initialization of the version space.	7

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Q.3	i.	What are genetic algorithms? How are they utilized in machine learning?	3
	ii.	Explain feed forward neural network using example. List the application areas where it is used.	7
OR	iii.	Discuss the backpropagation algorithm in neural networks. How does it work? What is its role in training multilayer networks?	7
Q.4	i.	Discuss the significance of statistical learning in machine learning.	3
	ii.	Describe the nearest neighbour algorithm in machine learning. What are its advantages and limitations?	7
OR	iii.	Explain learning belief networks in detail with the help of example.	7
Q.5	i.	Discuss the advantages and disadvantages of using inductive logic programming over decision tree induction.	4
	ii.	Explain the key characteristics and capabilities of Inductive Logic Programming (ILP).	6
OR	iii.	Describe the notation commonly used in inductive logic programming, including predicate logic symbols and terms.	6
Q.6	i.	Define unsupervised learning and discuss its importance in machine learning.	3
	ii.	Describe hierarchical clustering methods. What are the benefits of hierarchical clustering?	7
OR	iii.	Define reinforcement learning and explain its fundamental principles. How does reinforcement learning differ from supervised and unsupervised learning?	7

Marking Scheme

Machine Learning in Manufacturing (T) - ME3EL27 (T)

- Q.1
- i) D) Sorting Algorithms **1**
 - ii) A) Candidate Elimination **1**
 - iii) B) To adjust the weights of connections based on prediction errors **1**
 - iv) C) Gradient descent optimization **1**
 - v) A) Classification tasks **1**
 - vi) A) Classifying data points into categories **1**
 - vii) B) To learn logic programs from examples and background knowledge **1**
 - viii) C) ILP is less interpretable **1**
 - ix) B) The model learns by interacting with an environment and receiving feedback in the form of rewards **1**
 - x) C) To construct a hierarchy of clusters that can be visualized as a dendrogram **1**
- Q.2
- i. Explaining machine learning..... **3Marks**
 - ii. Explain the terms: Conjunctive Normal Form (CNF), **2.5Marks**
Disjunctive Normal Form (DNF), **2.5Marks**
and decision lists. **2 Marks**
- OR
- iii. Describing the candidate elimination method in machine learning. **4 Marks**
Explain how the algorithm works step-by-step, including the initialization of the version space..... **3Marks**
- Q.3
- i. Explaining genetic algorithms, **2 Marks**
and how are they utilized in machine learning? **1 Marks**
 - ii. Explaining feed forward Neural Network using example. **5 Marks**
List the application areas where it is used. **2 Marks**
- OR
- iii. Discuss the backpropagation algorithm in neural networks. **3 Marks**
How does it work **2 Marks**
what is its role in training multilayer networks? **2 Marks**
- Q.4
- i. Discuss the significance of statistical learning in machine learning. **3 Marks**
 - ii. Describe the nearest neighbour algorithm in machine learning. **4 Marks**
what are its advantages and limitations? **3 Marks**

- OR
- iii. Explain learning belief networks in detail with the help of example..... **7 Marks**
- Q.5
- i. Write the key characteristics and capabilities of Inductive Logic Programming (ILP) **3 Marks**
 - ii. Discuss the advantages..... **3.5 Marks**
and disadvantages of using inductive logic programming over decision tree induction..... **3.5 Marks**
- OR
- iii. Describe the notation commonly used in inductive logic programming..... **3 Marks**
, Explaining predicate logic symbols..... **2 Marks**
Explaining terms. **2 Marks**
- Q.6
- i. Define unsupervised learning **2 Marks**
discuss its importance in machine learning..... **1 Marks**
 - ii. Describe hierarchical clustering methods. **5 Marks**
what are the benefits of hierarchical clustering? **2 Marks**
- OR
- iii. Define reinforcement learning **3 Marks**
and explaining its fundamental principles. **2 Marks**
How does reinforcement learning differ from supervised and unsupervised learning? **2 Marks**
