Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination Dec 2024

CB3EL01 Machine Learning

Programme: B.Tech. Branch/Specialisation: CSBS

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.

			Marks	BL	PO	CO	PSO
Q.1	i.	Regularization techniques are used for- (a) Error prevention (b) Error prediction (c) Over fitting prevention (d) Under fitting prevention	**1**	1	1	1	
	ii.	Imagine a Newly-Born starts to learn walking. It will try to find a suitable policy to learn walking after repeated falling and getting up. Specify what type of machine learning is best suited? (a) Regression (b) Means algorithm (c) Reinforcement learning (d) None of these	**1**	1	1	1	
	iii.	Classification in machine learning is- (a) Supervised and predictive (b) Unsupervised and predictive (c) Supervised and descriptive (d) UnSupervised and descriptive	**1**	2	2	2	
	iv.	The difference between the expected value of a statistic and the value of the parameter being estimated is called- (a) Standard error (b) Bias (c) Sampling error (d) Non-sampling error	**1**	2	2	2	

v.	which parameters can affect changes in weight vector of learning? (a) Learning parameters (b) Input vector (c) Learning signal (d) All of these	**1**	1	1	3		
vi.	Which is not a application area of supervised learning (a) Classification (b) Regression (c) Clustering (d) Prediction	**1**	1	1	3		
vii.	Which of the following is TRUE about CRF (Conditional Random Field) and HMM (Hidden Markov Model)? (a) CRF is generative model and HMM is discriminative model (b) Both CRF and HMM are generative model (c) CRF is discriminative model and HMM is generative model (d) Both CRF and HMM are discriminative model	**1**	1	8	4		
viii.	P[St+1 | St] = P[St +1 | S1,....., St], in this condition, What is the meaning of St? (a) State factor (b) Discount factor (c) Q value (d) Markov state	**1**	1	2	4		
ix.	Clustering in machine learning is- (a) Supervised and predictive (b) Unsupervised and predictive (c) Supervised and descriptive (d) UnSupervised and descriptive	**1**	2	2	5		
x.	Consider a undirected graph G with vertices {A, B, C, D, E}. In graph G, every edge has distinct weight. Edge CD is edge with minimum weight and edge AB is edge with maximum weight. Then, which of the following is false? (a) Every minimum spanning tree of G must contain CD (b) If AB is in a minimum spanning tree, then its removal must disconnect G (c) No minimum spanning tree contains AB (d) G has a unique minimum spanning tree	**1**	1	3	5		
Q.2	i. What is machine learning?	**2**	1	1	2		

	ii. Define the terms underfitting and overfitting.	**3**	1	1	2		
	iii. Explain bias and variance in machine learning.	**5**	2	1	2		
OR	iv. Enlist various applications of machine learning.	**5**	1	1	2		
Q.3	i. Define feature engineering.	**2**	3	2	3		
	ii. Explain discriminant functions and decision surfaces.	**8**	3	2	3		
OR	iii. Explain various classification algorithms.	**8**	3	2	3		
Q.4	i. What is bagging and boosting in machine learning classification?	**3**	1	2	4		
	ii. Write various selection methods for selection of k parameter in k Nearest neighbor classification algorithm.	**7**	1	3	4		
OR	iii. With suitable example, explain decision tree algorithm.	**7**	1	1	4		
Q.5	i. Define the steps for extracting a part of recognition from speech under analysis.	**4**	3	2	5		
	ii. Write various applications of sequence classification.	**6**	1	1	5		
OR	iii. Explain Hidden Markov model.	**6**	3	3	5		
Q.6	Attempt any two:						
	i. Explain expectation-maximization algorithm.	**5**	3	3	6		
	ii. Explain various outlier detection methods.	**5**	3	3	6		
	iii. Explain K nearest neighbors clustering algorithm.	**5**	3	3	6		

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Marking Scheme
CB3EL01 Machine Learning

Q.1	i)	c) Over fitting prevention	**1**
	ii)	c). reinforcement learning	**1**
	iii)	a). Supervised and Predictive	**1**
	iv)	b) Bias	**1**
	v)	d) all the mentioned	**1**
	vi)	c) Clustering	**1**
	vii)	c) CRF is discriminative model and HMM is generative model	**1**
	viii)	d). Markov state	**1**
	ix)	d). Unsupervised and Descriptive	**1**
	x)	c) No minimum spanning tree contains AB	**1**

Q.2	i.	What is Machine Learning?	3 Marks	**3**
	ii.	Define Underfitting and Overfitting	3 Marks	**3**
	iii.	Explain bias and variance in Machine Learning	5 Marks	**5**
OR	iv.	Enlist various applications of Machine Learning	5 Marks	**5**

Q.3	i.	Define Feature engineering	2 Marks	**2**
	ii.	Explain discriminant functions and decision surfaces.		**8**
		discriminant functions	4 Marks	
		decision surfaces	4 Marks	
OR	iii.	Explain various classification algorithms		**8**
		2 algorithms x 4 Marks		

Q.4	i.	What is bagging and boosting in Machine Learning classification?		**4**
		Bagging	2 Marks	
		Boosting	2 Marks	
	ii.	Write various selection methods for selection of k parameter in k Nearest neighbour classification algorithm.		**7**
		Elbow method	4 Marks	
		Root Mean Square method	3 Marks	
OR	iii.	suitable example,	3 Marks	**7**
		explain Decision Tree Algorithm.	4 Marks	

Q.5	i.	Define the steps for extracting a part of recognition from speech under analysis.	4 Marks	**4**
	ii.	Write various applications of sequence classification	6 Marks	**6**
OR	iii.	Explain Hidden Markov Model.	6 Marks	**6**

Q.6				
	i.	Expectation-Maximization (EM) algorithm	5 Marks	**5**
	ii.	Explain various outlier detection methods. at least 2 x	2.5 marks	**5**
	iii.	Explain K nearest neighbours clustering algorithm	5 Marks	**5**

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