Subject- Pattern Recognition and Machine Learning   **SubjectCode- C128571(02)**

Time Allowed:2 hrs   Max Marks: 40

Note: – Note: Q1 in both part is compulsory, attempt any two questions from Q2 to Q4 in each part.

Q.N.	Questions	Marks	Levels of Bloom's Taxonomy	COs
	Part A			
Q1 (a)	A Perceptron Model is- a) Backtracking algorithm b) Backpropagation algorithm c) Feed-forward neural network d) Feed Forward-backward algorithm	[2]	Understand	CO3
(b)	Linear Discriminant Analysis require which of the following data- a) Labelled data b) Unlabelled c) Labelled and Unlabelled data d) None of these	[2]	Understand	CO3
Q2	What do you mean by discriminant function? Explain linear classification for multiple classes.	[8]	Apply	CO3
Q3	Explain fisher discriminants function? Why it is preffered from other discriminants function.	[8]	Apply	CO3
Q4	Explain Perceptron model in Artificial Neural Network. Implement Ex-OR gate using multi layer perceptron model. Consider initial weights are 1, threshold is 1 and learning rate is 1.5.	[8]	Apply	CO3
	Part B			
Q1(a)	The effectiveness of an SVM depends upon: (a) Selection of Kernel trick (b) Kernel Parameters (c) Soft Margin Parameter C (d) All of the above	[2]	Understand	CO5
(b)	Suppose you are using RBF (radial basis factor) kernel in SVM with a high Gamma value. What does this signify? a) The model would consider even far away points from the hyperplane for modeling b) The model would consider only the points close to the hyperplane for modeling c) The model would not be affected by the distance of points from the hyperplane for modeling d) None of the above	[2]	Understand	CO5

Q2 (a)	Derive an expression for maximum marginal hyper plane for support vector machine?	[4]	Apply	CO5
(b)	What do you mean by kernel? Explain RBF and Polynomial kernel in support vector machine.	[4]	Apply	CO5
Q3	What is soft margine and hard margin in SVM? Mention advantage and disadvantages of SVM.	[8]	Apply	CO5
Q4	Consider following data point and find hyper plane using Support Vector Machine- Positive labeled: (3, 1), (3, -1), (6, 1), (6, -1) Negative Labelled: (1, 0), (0, 1), (0, -1), (-1, 0) Classify following data point after finding hyper plane- (i) (2, 0) (ii) (4, 1)	[8]	Apply	CO5

Subject Name: Intelligent Data Analysis　　　　　　　　**Subject Code: C128572(022)**

Max Marks: 40　　　　　　**Min Marks:14**　　　　　**Times: 2 hrs**

Note: Part A is compulsory, attempt any two questions from B, C, and D.

Co3. *Evaluating and interpreting the results of data mining and analysis, assessing algorithm effectiveness, and identifying anomalies and their limitations.*

Co4. *Creating data analysis solutions, including decision trees, neural network models, association rules, clustering solutions, and anomaly detection models.*

Co5. *Critically assessing the performance and quality of data mining techniques, models, and reflecting on ethical considerations in data analysis.*
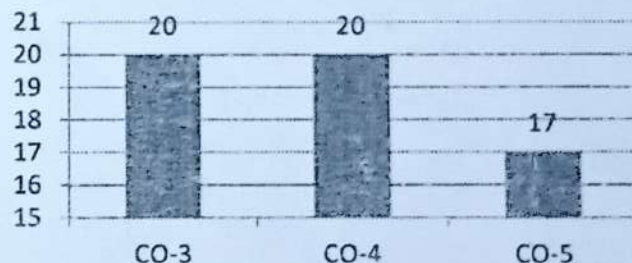
Q. No.		Questions	Marks	BL	CO
		UNIT 3			
	a	For each of the following questions, provide an example of an association rule from the market basket domain that satisfies the following conditions. Also, describe whether such rules are subjectively interesting. (a) A rule that has high support and high confidence. (b) A rule that has reasonably high support but low confidence. (c) A rule that has low support and low confidence. (d) A rule that has low support and high confidence.	2	L3	3
	b	Discuss the Frequent item set generation and also explain antimonotone property.	6	L3	3
	c	Elaborate maximal and closed frequent itemset. Also list the difference between them.	6	L3	3
1	d	Consider the data set shown <table><tr><td>Customer ID</td><td>Transaction ID</td><td>Items Bought</td></tr><tr><td>1</td><td>0001</td><td>{a, d, e}</td></tr><tr><td>1</td><td>0024</td><td>{a, b, c, e}</td></tr><tr><td>2</td><td>0012</td><td>{a, b, d, e}</td></tr><tr><td>2</td><td>0031</td><td>{a, c, d, e}</td></tr><tr><td>3</td><td>0015</td><td>{b, c, e}</td></tr><tr><td>3</td><td>0022</td><td>{b, d, e}</td></tr><tr><td>4</td><td>0029</td><td>{c, d}</td></tr><tr><td>4</td><td>0040</td><td>{a, b, c}</td></tr><tr><td>5</td><td>0033</td><td>{a, d, e}</td></tr><tr><td>5</td><td>0038</td><td>{a, b, c}</td></tr></table> a. Compute the support for itemset {e}, {b, d}, and {b, d, e} by treating each transaction ID as a market basket. b. Use the results in part (a) to compute the confidence for the association rules {b, d} $\longrightarrow$ {e} and {e} $\longrightarrow$ {b, d}. Is confidence a symmetric measure? c. Repeat part (a) by treating each customer ID as a market basket. Each item should be treated as a binary variable (1 if an item appears in at least one transaction bought by the customer, and 0 otherwise.)	6	L3	3

	d.	Use the results in part (c) to compute the confidence for the association rules {b, d} ⟶ {e} and {e} ⟶ {b, d}.			
		UNIT 4			
2	a	Explain different types of clusters	2	L3	4
	b	Explain Agglomerative Hierarchical Clustering. List the issues related with Hierarchical Clustering	6	L3	4
	c	Explain DBSCAN algorithm.	6	L3	4
	d	Explain cluster evaluation using cohesion and separation.	6	L4	4
		UNIT 5			
3	a	What are Characteristics of Anomaly Detection Methods.	2	L5	5
	b	Elaborate vast area of applications of anomaly detection.	5	L5	5
	c	What is the proximity base approach for anomaly detection	5	L4	5
	d	Explain reconstruction-based approach for anomaly detection	5	L4	5

Blooms Level Wise Marks Distribution

0

L1

L2

Course outcome Wise Marks Distribution

CO-3   CO-4   CO-5

Chhattisgarh Swami Vivekanad Technical University, Bhilai

University Teaching Department

B. Tech Honors – V Semester (CT-2)

Branch – Data Science

Subject: CRYPTOGRAPHY AND NETWORK SECURITY   Subject Code – C128573(022)

Date: Time: 16/12/2023   Time: 11:00 am -1:00 pm   Max Marks: 40

Note: Question 1 in each unit is compulsory and carries 4 marks. Attempt any two from question 2,3, and 4 which carries 8 marks each.

PART-A

1. Explain the properties of collision-resistant hash function briefly.   (CO3)
2. Explain the SHA algorithm for MAC generation with a proper diagram.   (CO4)
3. Describe the CMAC and HMAC with a diagram.   (CO3)
4. Write the importance and processing steps of Random Oracle Model.   (CO4)

PART-B

1. Explain SignCryption briefly.   (CO4)

2. Explain the SSL/TLS architecture in detail.   (CO5)

3. Write processing steps/algorithm of DSA (Digital Signature Algorithm).   (CO5)

4. Explain Kerberos with key components.   (CO5)

Chhattisgarh Swami Vivekanand Technical University

University Teaching Department

Class Test – II (*July-December 2023*)

B. Tech (H) – 5th Semester

Branch: Data Science

Subject Name: Natural Language Processing　　　　　　　　　Subject Code: C128574(022)

Max Marks: 40　　　　　　　Min Marks:14　　　　　　　Times: 2 hrs

Note: Part A is compulsory, attempt any two questions from B, C, and D.

CO: 3 Extract information from text automatically using concept and Methods from NLP including stemming, n-gram, POS Tagging and Parsing

CO: 4 Analyze the text content to provide prediction related to specific domain using language model.

CO: 5 Develop Natural language Processing based Application.

Q.No.		Questions	Marks	BL	CO
		UNIT 3			
1	A	What is Parsing.	2	L1	1
	B	Explain Scope Ambiguity and attachment Ambiguity.	5	L2	1
	C	Explain Different types of Types of Tree Banks.	5	L2	1
	D	Write the parsing Algorithms.	5	L2	1
		UNIT 4			
2	A	What do you mean by Dialogue.	2	L2	1
	B	Explain IR Model with suitable diagram.	6	L3	1
	C	Explain the Named Entity Resolution.	6	L3	1
	D	Explain Types of Anaphora.	6	L2	1
		UNIT 5			
3	A	Define Text Entailment.	2	L1	2
	B	Explain the Sentiment Analysis with suitable example.	6	L2	1
	C	Explain the Application of Question Answering based system.	6	L2	1
	D	Describe shallow parser.	6	L2	2

Subject Name: Computational Complexity **Subject Code: C127532 (022)**

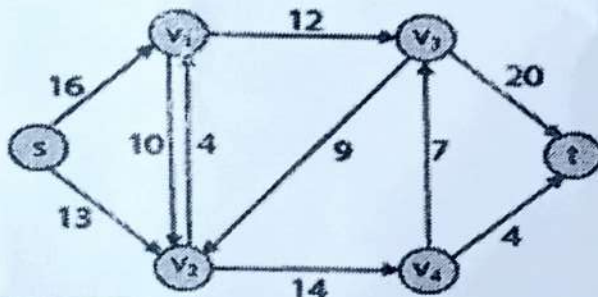**Max Marks: 40** **Min Marks: 14** **Times: 2 hrs**

Note: Part A is compulsory, attempt any two questions from B, C, and D.

CO: 1 Apply and understand the concept of randomized algorithm, pattern matching & Testing.
CO: 2 Apply and understand Graph, approximation & randomized algorithms.
CO: 3 Create and Construct advanced data structures trees and heaps concept.

Q.No.		Questions	Marks	BL	CO
		UNIT 3			
1	a	Define graph problem.	2	L1	3
	b	Explain Finger printing with algorithm and application.	6	L2	3
	c	Explain Pattern matching in term of all kind of algorithms.	6	L2	3
	d	Explain De-Randomization advanced algorithm.	6	L2	3
		UNIT 4			
2	a	Define Flow Network.	2	L1	4
	b	Explain Approximation algorithms with suitable example.	6	L3	4
	c	Explain Randomized algorithms with suitable example.	6	L3	4
	d	Each Directed Edge is labeled with capacity. Use the Ford-Fulkerson algorithm to find the maximum flow and also write algorithm.	6	L5	4
		UNIT 5			
3	a	Define disjoint sets.	2	L1	5
	b	Construct a B-Tree of order 3 by inserting a number from 1 to 10.	5	L6	5
	c	Define AVL tree, Construct AVL-Tree by inserting a number from 1 to 8.	5	L6	5
	d	Create a red-black tree by inserting following sequence of number 8, 18, 5, 15, 17, 25, 40 & 80.	5	L6	5

Blooms Level Wise Marks Distribution

- L1
- L2

Course outcome Wise Marks Distribution

	CO-1	CO-2	CO-3
Value	17	23	24