



Department of Computer Science & Engineering

Class Test – I Session- July – Dec, 2023 Month-October

Sem- CSE 5thAI

Subject- Machine Learning

Code- C127571(022)

Time Allowed: 2 hrs Max Marks: 40

Note: Q.1 in part Part A & B is compulsory, attempt any two questions from Q 2 to Q4.

| Q.N. | Questions | Marks | Levels of Bloom's Taxonomy | COs | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|---|----------------|----------------------------|----------------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----|-------|-----|
| Part A | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q1 (a) | <p>Artificial Neural Network is based on which approach?</p> <p>a) Weak Artificial Intelligence approach b) Strong Artificial Intelligence approach c) Cognitive Artificial Intelligence approach d) Applied Artificial Intelligence approach</p> | [2] | Understand | CO1 | | | | | | | | | | | | | | | | | | | | | | | | |
| (b) | <p>Suppose we like to calculate $P(H E, F)$ and we have no conditional independence information. Which of the following sets of numbers are sufficient for the calculation-</p> <p>a) $P(E, F), P(H), P(E H), P(F H)$ b) $P(E, F), P(H), P(E, F H)$ c) $P(H), P(E H), P(F H)$ d) $P(E, F), P(E H), P(F H)$</p> | [2] | Understand ,Apply | CO2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Q2 (a) | <p>What do you mean by learning? Explain well defined problems in brief. Design the learning system for Checkers problem.</p> | [4] | Understand | CO2 | | | | | | | | | | | | | | | | | | | | | | | | |
| (b) | <p>After your yearly checkup, the doctor has bad news and good news. The bad news is that you tested positive for a serious disease, and that the test is 99% accurate (i.e., the probability of testing positive given that you have the disease is 0.99, as it is the probability of testing negative given that you do not have the disease). The good news is that this is a rare disease, striking only one in 10,000 people. Why is it good news that the disease is rare? What are the chances that you actually have the disease?</p> | [4] | Apply | CO2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Q3 (a) | <p>What is zero conditional probability? Imagine that you have given following set of training examples. Each feature can take up to three nominal values a, b and c.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>F₁</th><th>F₂</th><th>F₃</th><th>Class</th></tr> <tr> <td>a</td><td>c</td><td>a</td><td>+</td></tr> <tr> <td>c</td><td>a</td><td>c</td><td>+</td></tr> <tr> <td>a</td><td>a</td><td>c</td><td>-</td></tr> <tr> <td>b</td><td>c</td><td>a</td><td>-</td></tr> <tr> <td>c</td><td>c</td><td>b</td><td>-</td></tr> </table> <p>How would the Naive system classify the following test example- $F_1 = a, F_2 = c, F_3 = b$</p> | F ₁ | F ₂ | F ₃ | Class | a | c | a | + | c | a | c | + | a | a | c | - | b | c | a | - | c | c | b | - | [4] | Apply | CO3 |
| F ₁ | F ₂ | F ₃ | Class | | | | | | | | | | | | | | | | | | | | | | | | | |
| a | c | a | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| c | a | c | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| a | a | c | - | | | | | | | | | | | | | | | | | | | | | | | | | |
| b | c | a | - | | | | | | | | | | | | | | | | | | | | | | | | | |
| c | c | b | - | | | | | | | | | | | | | | | | | | | | | | | | | |
| (b) | <p>Derive an expression for linear regression? Find the equation for regression coefficient.</p> | [4] | Apply | CO3 | | | | | | | | | | | | | | | | | | | | | | | | |

Suppose we wish to include the continuous-valued attribute Temperature in describing the training example days in the learning task of following table. Incorporate these continuous value to make decision tree.

[8]

Apply

CO3

| F | F1 | F2 | F3 | F4 | F5 | F6 |
|-------------|----|----|-----|-----|-----|----|
| Temperature | 40 | 48 | 60 | 72 | 80 | 90 |
| Play Tennis | No | No | Yes | Yes | Yes | No |

Part B

Decision trees are appropriate for the problems where _____?

- a) Attributes are both numeric and nominal
- b) Target function takes on a discrete number of values
- c) Data may have errors
- d) All of the above

[2]

Understand

CO1

Regarding bias and variance, which of the following statements are true?

- a) Models which overfit have a high bias and underfit have a high variance
- b) Models which overfit have a high bias and underfit have a low variance
- c) Models which overfit have a low bias and underfit have a high variance
- d) Models which overfit have a low bias and underfit have a low variance

[2]

Understand

CO2

What is curse of dimensionality? Consider following sample. Apply PCA to reduce the dimension.

Q2

| F | F1 | F2 | F3 | F4 |
|----|----|----|----|----|
| X1 | 4 | 8 | 13 | 7 |
| X2 | 11 | 4 | 5 | 14 |

[8]

Apply

CO3

Consider following data and execute DBScan algorithm. Assume $\epsilon = 3.5$ and MinPts= 3. Find core, boundary and noise point.

Q3

| Feature | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 |
|---------|----|----|----|----|----|----|----|----|
| X | 5 | 8 | 3 | 4 | 3 | 6 | 6 | 5 |
| Y | 7 | 4 | 3 | 4 | 7 | 7 | 1 | 5 |

[8]

Apply

CO3

Use the k-means algorithm and Euclidean distance to cluster the following 8 examples into 3 clusters:

A1=(2,10), A2=(2,5), A3=(8,4), A4=(5,8), A5=(7,5), A6=(6,4), A7=(1,2), A8=(4,9).

Q4 Suppose that the initial seeds are A1, A4 and A7. Run the k-means algorithm for

1 epoch only. At the end of this epoch show:

- a) The new clusters (i.e. the examples belonging to each cluster)
- b) The centers of the new clusters
- c) How many iteration it need to get convergence?

[8]

Apply

CO3



Chhattisgarh Swami Vivekanand Technical University
University Teaching Department
Class Test-1 (July-December 2023)
B. Tech(H)-5th Semester
Branch: AI/DS

Subject Name: Cryptography and Network Security

Subject Code: C127573(022)

Max Marks: 40

Min Marks: 14

Times: 2 hrs

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

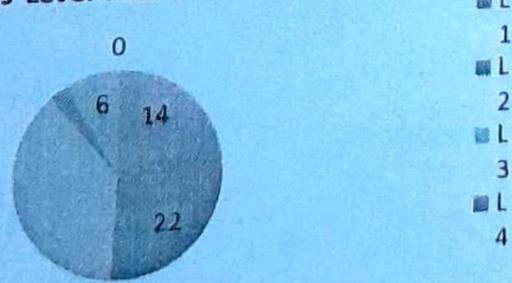
CO: 1 Compare various crystallographic techniques.

CO: 2 Examine different number theory and modular arithmetic techniques.

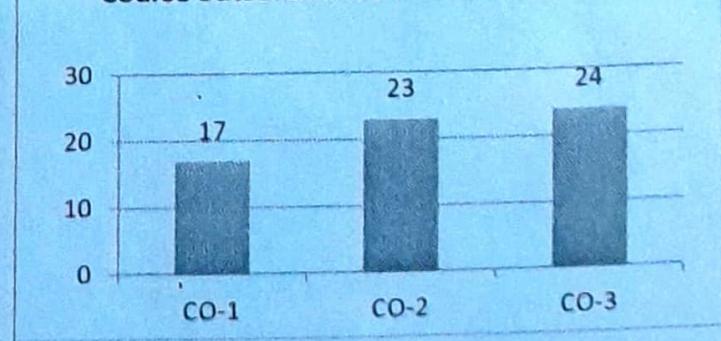
CO: 3 Examine Block Ciphers methods and Public Key Cryptography.

| Q.No. | Questions | Marks | BL | CO |
|---------------|---|-------|----|----|
| UNIT 1 | | | | |
| 1 | a Differentiate passive attack from active attack with example. | 2 | L1 | 1 |
| | b Convert the Given Text "CRYPTOGRAPHY" into cipher text using Rail fence Technique. | 6 | L2 | 1 |
| | c Convert "MEET ME" using Hill cipher with the key matrix Convert the cipher text back to plaintext - use the following matrix as keyword. [[17 17 5] [21 18 21] [2 2 19]] | 6 | L2 | 1 |
| | d Encrypt the following using play fair cipher using the keyword MONARCHY . " SWARAJ IS MY BIRTH RIGHT". Use X as blank space. | 6 | L2 | 1 |
| UNIT 2 | | | | |
| 2 | a State the Fermat's Theorem | 2 | L2 | 2 |
| | b Discuss Euler's Theorem with example. | 6 | L3 | 2 |
| | c Discuss the properties that are satisfied by Groups, Rings and Fields. | 6 | L3 | 2 |
| | d Explain different methods of modular arithmetic. | 6 | L2 | 2 |
| UNIT 3 | | | | |
| 3 | a Write down the purpose of S-Boxes in DES? | 2 | L1 | 3 |
| | b What is a meet-in-the-middle attack? | 5 | L2 | 3 |
| | c Explain DES with proper diagram and algorithm. | 5 | L2 | 3 |
| | d Explain triple DES in detail with example and diagram. | 5 | L2 | 3 |

Blooms Level Wise Marks Distribution



Course outcome Wise Marks Distribution





Chhattisgarh Swami Vivekanand Technical University

University Teaching Department

Class Test-1 (July-December 2023)

B.Tech(H)-5th Semester

Branch: Artificial Intelligence

Subject Name: Computational Complexity

Max Marks: 40

Min Marks: 14

Subject Code: C127532(022)

Times: 2 hrs

Note: All questions are compulsory

CO 1: Understand the basic concepts of polynomial-time algorithms, Class P, Class NP and NP- Completeness

CO 2: Calculate the Time complexity of different Dynamic programming, Greedy and Divide Conquer approaches algorithms.

CO 5: Apply Advanced Data Structures concepts in AVL Trees, Red and Black trees, Dictionaries and tries, Maps, Binomial Heaps, Fibonacci Heaps

| Q.No. | Questions | Marks | BL | CO |
|---------------|--|-------|----|----|
| UNIT 1 | | | | |
| 1 | a) The problems 3-SAT and 2-SAT are a) Both NP-complete b) Both in P c) NP-complete and in P, respectively d) Undecidable and NP-complete, respectively | 2 | L1 | 1 |
| | b) Demonstrate the Turing Reduction with an example. | 6 | L2 | 1 |
| | c) Distinguish between Deterministic and Non-Deterministic algorithm and write a non-deterministic algorithm to search an element from a given set of elements. | 6 | L2 | 1 |
| UNIT 2 | | | | |
| 2 | a) Huffman coding is an encoding algorithm used for a) lossless data compression b) broadband systems c) files greater than 1 Mbit d) lossy data compression | 2 | L2 | 2 |
| | b) Calculate the minimum no. of multiplication and placing of parenthesis for the given chain matrix multiplication. A1=2X4, A2=4X6, A3=6X7, A4=7X8 | 6 | L3 | 2 |
| | c) Illustrate Quick Sort algorithm and calculate its worst-case Time complexity | 6 | L4 | 2 |
| UNIT 3 | | | | |
| 3 | a) Create a AVL tree using the following elements: 21, 26, 30, 9, 4, 14, 28, 18 | 6 | L6 | 5 |
| | b) Illustrate the Red Black Tree property and using the following elements create a Red Black Tree. 8, 18, 5, 15, 17, 25, 40, 80 | 6 | L4 | 5 |



Subject- Machine Learning

Time Allowed: 2 hrs

SubjectCode- C127571(022)

Max Marks: 40

Note: - Question 1 is each 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) | Perceptron Classifier is? a) Un-supervised learning b) Supervised Learning c) Semi-supervised Learning d) Soft Margin Classifier | [2] | Understand | CO4 |
| (b) | Which algorithm is used for solving temporal probabilistic reasoning? a) Support Vector Machine b) Hidden markov model c) Independent Component Analysis d) Regression Analysis | [2] | Understand, Apply | CO5 |
| Q2 (a) | Derive an expression for maximum marginal hyper plane for support vector machine? | [4] | Apply | CO4 |
| (b) | What do you mean by kernel? Explain different types of kernel in support vector machine. | [4] | Apply | CO4 |
| Q3 (a) | What is perceptron in Artificial Neural Network? Explain its functionalities with suitable diagram. | [4] | Apply | CO4 |
| (b) | Implement perceptron for Ex-OR gate. Consider initial weights to be 1, learnin rate is 1.5 and threshold is 1. Assume any other parameter if necessary. | [4] | Apply | CO4 |
| Q4 (a) | What do you mean by linear inseparable problem? How can be resolved. | [4] | Apply | CO4 |
| (b) | Explain Multi Layer Perceptron? How weights are updated in output and hidden layer in MLP. | [4] | Apply | CO4 |

Part B

Spam classification is an example of following classifier model-

- a) Random Forest
- b) Probabilistic Condition
- c) Naïve Bayes
- d) All of the above

| | | | |
|-----------|-----|------------|-----|
| Q1 (a) | [2] | Understand | CO4 |
|-----------|-----|------------|-----|

A continuous loud noise is avoided by closing the door. This would be comes under following-

- a) Positive punishment
- b) Negative punishment
- c) Positive reinforcement
- d) Negative reinforcement

[2]

Understand

CO5

(b)

Q2
(a)

What is reinforcement learning? Explain its element in brief

[4]

Apply

CO5

(b)

What is Markov Process? Explain HMM in brief.

[4]

Apply

CO5

Consider following data sample given in table below. Classify following instance using Naïve Bayes Classifier-

- (i) $a = 1, b = 0, c = 1$
- (ii) $a = 1, b = 1, c = 0$
- (iii) $a = 1, b = 1, c = 1$
- (iv) $a = 0, b = 1, c = 0$

Q3

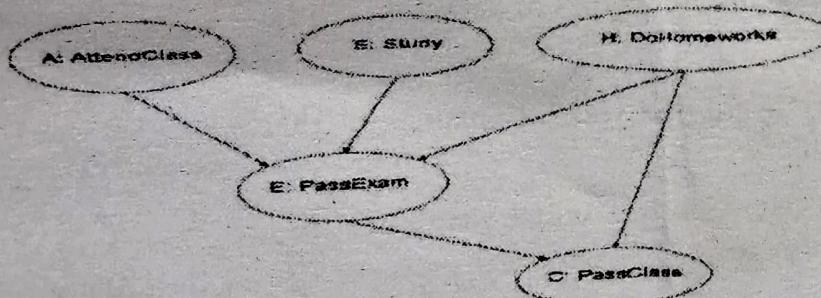
| Class | 1 | 1 | 0 | 0 | 1 | 0 |
|-------|---|---|---|---|---|---|
| a | 1 | 1 | 0 | 1 | 0 | 0 |
| b | 0 | 1 | 1 | 1 | 0 | 0 |
| c | 1 | 1 | 1 | 0 | 0 | 1 |

[8]

Apply

CO5

Consider following Bayesian Belief Network given below-



Use following CPT for above belief network-

$$P(A) = 0.5, P(S) = 0.7, P(H) = 0.9$$

Q4

| A | S | H | $P(E A, S, H)$ |
|---|---|---|----------------|
| 0 | 0 | 0 | 0.2 |
| 0 | 0 | 1 | 0.5 |
| 0 | 1 | 0 | 0.4 |
| 0 | 1 | 1 | 0.8 |
| 1 | 0 | 0 | 0.3 |
| 1 | 0 | 1 | 0.7 |
| 1 | 1 | 0 | 0.6 |
| 1 | 1 | 1 | 0.9 |

| E | H | $P(C E, H)$ |
|---|---|-------------|
| 0 | 0 | 0.1 |
| 0 | 1 | 0.4 |
| 1 | 0 | 0.3 |
| 1 | 1 | 0.9 |

[8]

Apply

CO4

- (i) Write down the joint probability for above bayesian network?

- (ii) Write the expression for the probability of passing class given you attend classes and study but not do homework?



Chhattisgarh Swami Vivekanand Technical University
University Teaching Department
Class Test-2 (July-December 2023)
B. Tech (H) – 5th Semester
Branch: AI

Subject Name: Cryptography and Network Security

Subject Code: C127573(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: 4 Understand Public Key Cryptography and RSA Algorithm.

CO: 5 Understand Hash Function and Different Techniques such as SHA, MD5, SHA3 etc.

CO: 6 Understand the Concept of Digital Signature and Message Authentication techniques like KERBORUS.

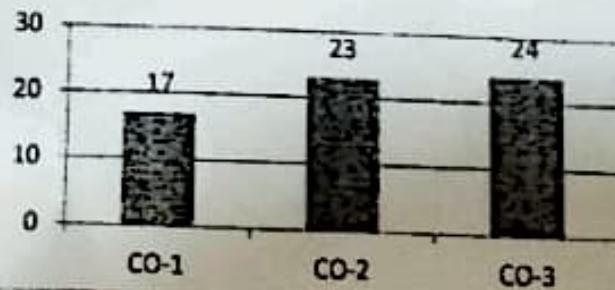
| Q. No. | Questions | Marks | BL | CO |
|---------------|---|--------------|-----------|-----------|
| UNIT 1 | | | | |
| 1 | a State and explain the principles of public key cryptography? | 2 | L1 | 4 |
| | b Explain Diffie Hellman key Exchange in detail with an example? | 6 | L2 | 4 |
| | c Explain RSA algorithm in detail with an example? | 6 | L2 | 4 |
| | d Explain the key management of public key encryption in detail. | 6 | L2 | 4 |
| UNIT 2 | | | | |
| 2 | a What you meant by hash function? | 2 | L2 | 5 |
| | b Describe SHA-1 algorithm in detail. Compare its performance with MD5 and RIPEMD-160 and discuss its advantages. | 6 | L3 | 5 |
| | c Discuss about the objectives of HMAC and its security features. | 6 | L3 | 5 |
| | d What is the role of compression function in hash function? What is the difference between weak and strong collision resistance? | 6 | L2 | 5 |
| UNIT 3 | | | | |
| 3 | a What 4 requirements were defined by Kerberos? | 2 | L1 | 6 |
| | b What is Kerberos? Explain how it provides authenticated service. | 5 | L2 | 6 |
| | c What are the properties a digital signature should have? What requirements should a digital signature scheme satisfy? | 5 | L3 | 6 |
| | d Describe about SSL/TLS Protocol. | 5 | L3 | 6 |

Blooms Level Wise Marks Distribution



■ L
1
■ L
2

Course outcome Wise Marks Distribution



Chhattisgarh Swami Vivekanand Technical University
 University Teaching Department
Class Test-2 (July-December 2023)
B.Tech(H)-5th Semester
Branch: Artificial Intelligence

Subject Name: Computational Complexity

C127532(022)

Max Marks: 40

Min Marks: 14

Subject Code:

Times: 2 hrs

Note: All questions are compulsory

CO 3: Analyze the Time Complexity of Randomized Algorithms and De-Randomization Advanced Algorithms.

CO 4: Compute the shortest path using Spanning Tree, Approximation algorithms and Polynomial Time Approximation Schemes.

| Q.No. | Questions | | Marks | BL | CO |
|---------------|---|--|-------|----|----|
| UNIT 1 | | | | | |
| a | Apply Ford-Fulkerson Algorithm and calculate Maximum Flow for the given graph. | | 8 | L3 | 4 |
| b | Apply Dijkstra algorithm to solve the given graph | | 8 | L3 | 4 |
| c | Distinguish between Randomized and De-Randomized algorithms and also write their applications related real world problem. | | 8 | L4 | 4 |
| UNIT 2 | | | | | |
| 2 | a | Demonstrate Probabilistic Primality Testing algorithm and using Miller Rabin Test check number 27 and 61 are prime or not. | 8 | L4 | 3 |
| | b | Illustrate Finger Printing algorithm with a suitable example. | 8 | L4 | 3 |