

Roll No.

TCS-403

B. TECH. (CSE) (FOURTH SEMESTER) MID SEMESTER EXAMINATION, April, 2023

MICROPROCESSORS

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) Draw the format of 8085 flag register. What will be value of accumulator and flags after execution of ADI 75 if value of $A = (76)_8$? (CO1/CO3)

OR

- (b) Write a program in 8085 which adds sum of digits of an eight bit number which is stored in a memory location 2050 if result is even store the result at memory location 3050H else store result at PORT F6.

(CO1/CO3)

2. (a) Explain the difference between the following : (CO2/CO3)
 - (i) PUSH B & POP B
 - (ii) LXI H 2060 & LHLD 2060

P. T. O.

(2)

OR

- (b) Consider the following program :

(CO2/CO3)

XRA A

LXI H 000D

LOOP : DCX H

JNZ LOOP

How much time this loop will be executed ? Also determine addressing mode of each instruction used in this program.

3. (a) Categories different types of signals of 8085 with two examples each.

(CO1/CO2)

OR

- (b) Draw the timing diagram for instruction STAX B.

4. (a) Write down any *four* instructions in 8085 which are used to reset accumulator. Also determine T states of each instruction. (CO1/CO2)

OR

- (b) What is the need of memory interfacing ? Differentiate between memory mapped I/O and I/O mapped I/O. (CO1/CO2)

5. (a) Explain RIM and SIM instruction in 8085.

(CO2/CO3)

OR

- (b) Write a program in 8085 which determine subtraction of two 8-bit decimal numbers. Assume that numbers are stored at starting location 2020 and store the result at 3020. (CO2/CO3)

Roll No.

TCS-402

B. TECH. (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023

(All Branches)

FINITE AUTOMATA AND FORMAL LANGUAGE

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) Construct a DFA over the alphabet $\Sigma = \{0,1\}$ such that it accepts all the strings ending with either 001 or 010 and test it for various possible inputs. (CO1)

OR

- (b) Construct a DFA over the alphabet $\Sigma = \{a,b\}$ equivalent to the given regular expression : (CO1)

$$ba + (a + bb)a^*b$$

2. (a) State and prove Kleene's Theorem. (CO1)

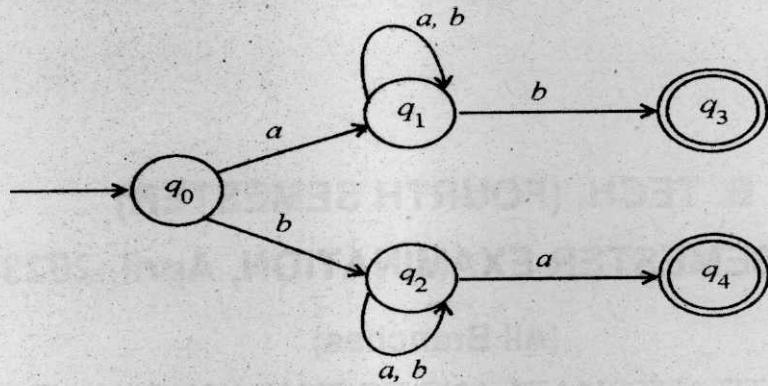
OR

- (b) Define ϵ -NFA. Construct ϵ -NFA for the given Regular expression : (CO1)

$$(0 + 1)^* 1 (0 + 1)$$

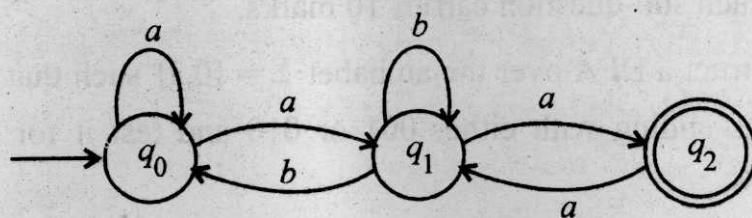
P. T. O.

3. (a) Define DFA (Deterministic Finite Automata). Convert the given NFA to DFA and draw the state transition graph of DFA : (CO1)



OR

- (b) State and prove Arden's Theorem. Find the regular expression for the given Finite Automata using Arden's Theorem : (CO1)



4. (a) Convert the given Mealy machine to equivalent Moore machine. Also, construct the state transition diagram for the Moore machine : (CO2)

| Present State | Next State | | | |
|-------------------|---------------|--------|---------------|--------|
| | Input $a = 0$ | | Input $a = 1$ | |
| | Next State | Output | Next State | Output |
| $\rightarrow q_1$ | q_3 | 1 | q_2 | 1 |
| q_2 | q_1 | 1 | q_4 | 0 |
| q_3 | q_2 | 0 | q_1 | 1 |
| q_4 | q_4 | 1 | q_3 | 0 |

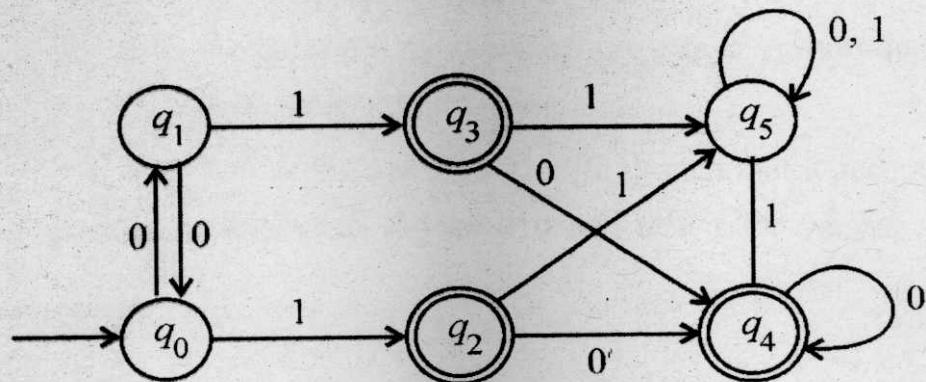
(3)

OR

- (b) Define Moore machine. Convert the given Moore machine into equivalent Mealy machine : (CO2)

| Present State | Next State | | Output |
|-------------------|---------------|---------------|--------|
| | Input $a = 0$ | Input $a = 1$ | |
| $\rightarrow q_1$ | q_1 | q_2 | 0 |
| q_2 | q_1 | q_3 | 0 |
| q_3 | q_1 | q_3 | 1 |

5. (a) Minimize the given Finite Automata : (CO2)



OR

- (b) State Pumping Lemma for Regular Languages. Prove that Language $L = \{a^p, \text{ where } p \text{ is prime}\}$ is not regular. (CO2)

Roll No.

TCS-403

B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023

MICROPROCESSORS

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
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(ii) LXI H 2060 & LHLD 2060

P. T. O.

(2)

OR

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XRA A

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JNZ LOOP

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OR

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OR

- (b) Write a program in 8085 which determine subtraction of two 8-bit decimal numbers. Assume that numbers are stored at starting location 2020 and store the result at 3020. (CO2/CO3)

Roll No.

TCS-435

**B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023**

(Elective)

INTRODUCTION TO AI AND ML

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) What is the difference between goal-based search agent and utility-based search agent ? Explain with proper block diagram. (CO1)

OR

- (b) Define the following uninformed search algorithms with proper explanation and example : (CO1)
(i) Iterative Deepening Depth-First Search (IDDFS)
(ii) Uniform-cost Search Algorithm

2. (a) Describe the McCulloch-Pitts neuron model and use appropriate diagrams to demonstrate its similarities to the biological neuron. (CO2)

OR

- (b) What do you understand by Artificial Intelligence (AI) ? Explain with proper background and advancement. (CO2)

P. T. O.

3. (a) Define the following intelligent agents with proper block diagram :

(CO2)

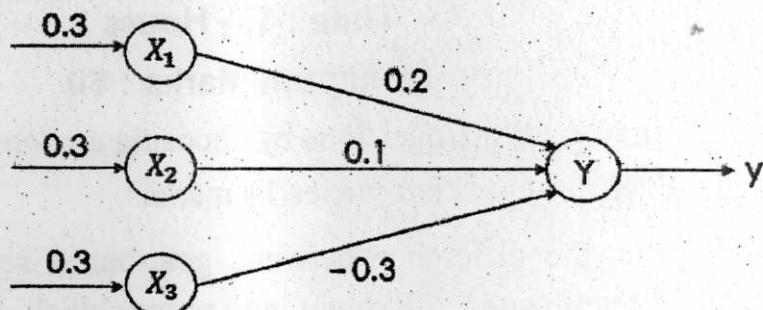
- (i) Model-Based Agents
- (ii) Learning Agents

Also mention their advantages and disadvantages.

OR

(b) Using perceptron learning mechanism find the new weights for the following neural network. Use learning rate 0.25 and sign as a activation function :

(CO2)



4. (a) Write short notes on the following :

(CO1)

- (i) Turing Test
- (ii) Neural Network
- (iii) Activation Functions
- (iv) Perceptron Learning Mechanism

OR

(b) Discuss the role of the following :

(CO1)

- (i) Learning factor
- (ii) Weights
- (iii) Activation Function

In context of designing a single layer neural network.

(3)

5. (a) Design and develop a single layer neural network by using perceptron learning a, mechanism for the OR gate. Also, discuss the step-by-step procedure. (CO1)

OR

- (b) Describe the characteristics of the environment and provide an explanation for an intelligent agent system. (CO2)

Roll No.

TCS-404

B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023

COMPUTER ORGANIZATION

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) Explain the unsigned binary division method along with its flow chart.
Perform division operation with following numbers : (CO1, CO2)
 $M(\text{Divisor}) = 00011, Q(\text{Dividend}) = 10011.$

OR

- (b) Explain the evolution of computer systems for all computer generations.
Provide your remark on the Moore's law and its applicability for future generation computers. (CO1, CO2)
2. (a) Perform the signed binary multiplication using Booth's algorithm on given numbers. NI = 0101 N2 = 100011. Also draw the flow chart of the method used to perform signed binary multiplication. (CO1, CO2)

P. T. O.

OR

- (b) What do you mean by instruction branching and instruction sequencing ? Explain it with a suitable examples and diagrams.

(CO1, CO2)

3. (a) Consider yourself an R&D engineer for a weather forecast company. For designing a computer machine for computation involved in climate prediction, which architecture will you prefer out of RISC and CISC. Justify your answer with suitable remark. (CO1, CO3)

OR

- (b) Explain the normalized and unnormalized floating point number representation of binary numbers. Represent the given number in floating point representation with single precision. $N = +208.129$.

(CO1, CO3)

4. (a) Explain the process for completion of a single instruction in computer machines. Also explain the single bus structure used in computer systems. (CO2, CO3)

OR

- (b) Explain the 'Big-endian' and 'Little Endian' method of addressability in computer memory systems. An instruction contains the data 2BFF3C281OEB which has to be stored in a computer machine memory having 32-bit word length. Show that how data will be stored in the memory : (CO2, CO3)

- (i) Big Endian method with Byte addressability
(ii) Little Endian method with Byte addressability

(3)

5. (a) What is Addressing Modes ? Explain all the 'Addressing Modes' used in RISC computer machines with suitable examples and diagrams. (CO2, CO3)

OR

- (b) Compare between the hardwired control and microprogrammed control methods used in generation of control signal for instruction execution. (CO2, CO3)

Roll No.

TCS-408

**B. TECH. (CSE/CE/CST/AI & DS/AI & ML)
(FOURTH SEMESTER)**

MID SEMESTER EXAMINATION, April, 2023

JAVA PROGRAMMING LANGUAGE

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) What are the object oriented features supported by Java ? Is this mandatory to save the file with the same name as name of class in Java ? Justify your answer with appropriate programming example. (CO1)

OR

- (b) WAP to input any string and count the vowels, consonants and special charactersseparately. Also delete all the vowels and print the string on the output screen. (CO1)
2. (a) Explain the terms JDK, JVM and iRE. Also explain that how java is a platform independent language. (CO1)

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(2)

OR

- (b) Write a program in java to take input as a command line argument. You have to take name, course, University Roll Number and semester as a input. Display the information for at least 5 students. (CO1)
3. (a) What is method overloading and method overriding ? How to achieve it in java ? Explain with programming example. (CO2)

OR

- (b) What is static variables and static methods in java ? Explain your answer with suitable example. Also explain why main() is declared as static in java. (CO2)
4. (a) Constructor cannot be inherited although a derived class constructor can call the base class constructor. Justify your answer with suitable program. (CO2)

OR

- (b) Differentiate abstract method, abstract class and final class in java with a suitable program. (CO2)
5. (a) Explain the following terms with an example : (CO2)
- (i) Package
 - (ii) Interface
 - (iii) Exception Handling

OR

- (b) Differentiate the keyword “extends” and “implements”. Write a program in java to implement multiple inheritance by using interface with appropriate comment for every line of code. (CO2)

Roll No. :

MID SEMESTER EXAMINATION APRIL 2023

Name of the Program: B.Tech

Semester: 4th

Name of the Course: Design and analysis of Algorithm

Course Code: TCS 409

Time : 90 Minutes

Maximum Marks : 50

Note:

- i. Answer all the questions by choosing any one of the subs questions
- ii. Each question carries 10 marks

| Q1 | | (10 Marks) | CO1 |
|--|--|------------|-----|
| (a) Explain asymptotic notations (Ω , θ , O , ω , \mathcal{O}) which are used to define the complexity of an algorithm. | | OR | |
| (b) Write the pseudo-code to multiply two numbers a and b on a machine where we have only '+' and no '*'. i.e we cannot multiply the numbers directly. Try to do it in minimum time complexity possible. | | | CO2 |
| Q2 | | (10 Marks) | |
| (a) Prove mathematically after writing the pseudo-code that complexity of merge sort is $O(n \cdot \lg(n))$. | | OR | CO2 |
| (b) Draw and show how merge sort will work on the following array of numbers. 36, 2, 9, 20, 17, 15, 30, 29, 1. | | | |
| Q3 | | (10 Marks) | CO2 |
| (a) Write Pseudo code for stable counting sort and explain why we cannot use counting sort always. | | OR | |
| (b) What do you understand by stable, inplace, external and online sorting. Explain with few examples of each. | | | CO1 |
| Q4 | | (10 Marks) | |
| (a) Write the pseudo code of best algorithm to find if a number is prime or not, also find the worst-case time complexity of the code. | | OR | CO1 |
| (b) Write the recursive code for Tower of Hanoi and find the time complexity of the algorithm using recurrence relation and backward substitution. | | | |
| Q5 | | (10 Marks) | CO1 |
| (a) Using Backward substitution solve the following recurrence relation. $T(n) = 3*T(n/4) + n^4$ $T(1) = 1$ | | OR | CO2 |
| (b) Write the pseudo code for quick sort and find the time and space complexity of the algorithm. | | | |

Roll No.

TCS-472

B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023
INTRODUCTION TO AI AND NEURAL NETWORKS
(Elective)

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) What do you understand by intelligent agents ? Define the types of intelligent agents with proper block diagram and example. (CO1)

OR

- (b) Define the following two informed search algorithms with proper explanation, advantages, and disadvantages : (CO1)

- (i) Uniform cost search
(ii) Bidirectional search

2. (a) Define the McCulloch-Pitts neuron model and show its resemblance with the biological neuron with proper diagram. (CO2)

OR

- (b) Define and analyze the Delta learning rule with proper steps and block diagram. (CO2)

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3. (a) Elucidate the activation function. What is the difference between linear activation function and non-linear activation function ? (CO2)

OR

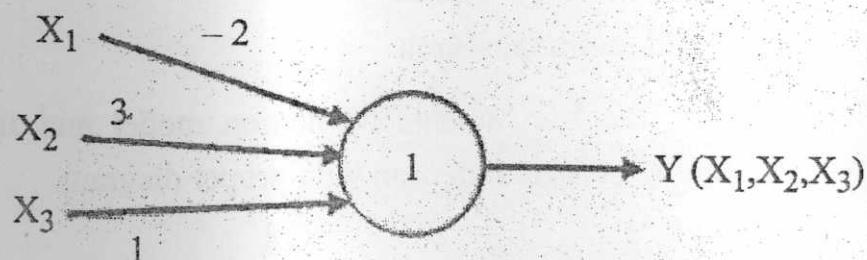
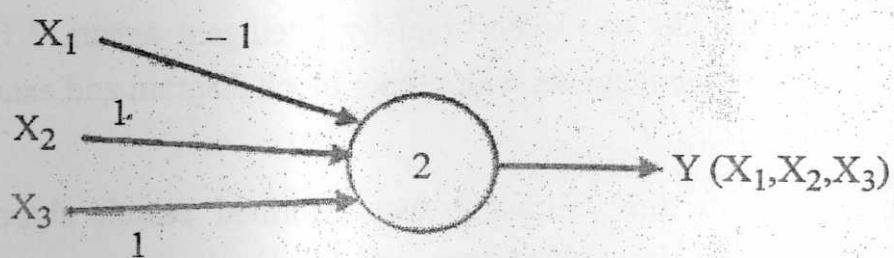
- (b) Define the features of the environment with a proper explanation for an intelligent agent system. (CO2)

4. (a) Implement the following logic gates by using McCulloch-Pitts neuron model : (CO1)

- (i) NAND gate
- (ii) NOR gate

OR

- (b) The logic network shown in figure, use the McCulloch-Pitts neuron model. Find the logic function implemented by each network : (CO1)

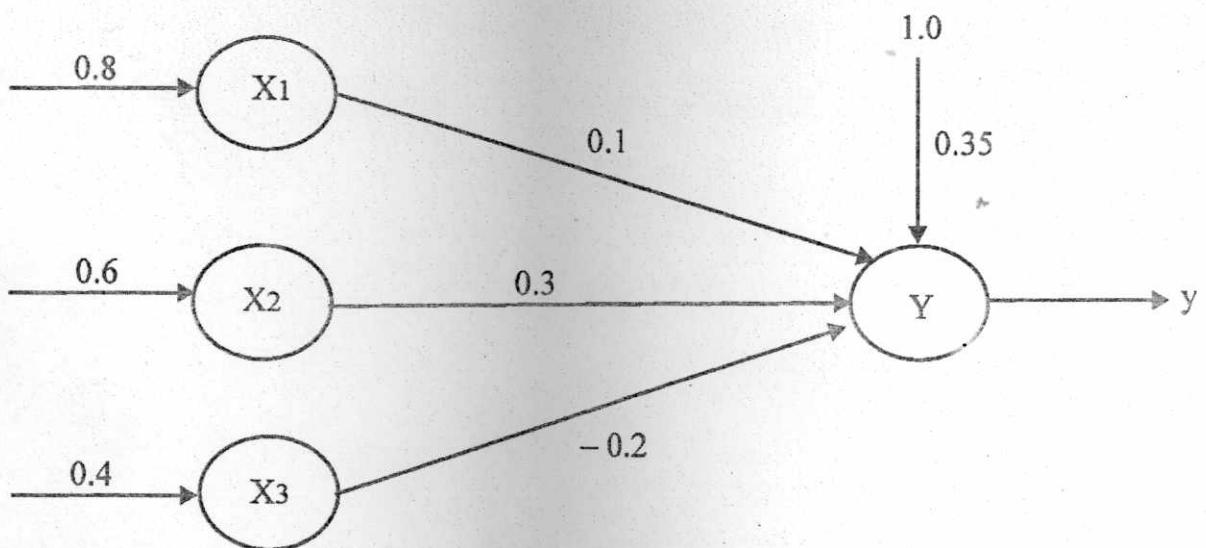


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5. (a) What do you understand by Perceptron Learning Rule ? Define with proper explanation. (CO1)

OR

- (b) Obtain the output (Y) of the neuron for the network shown in figure using activation function as : (1) binary sigmoid and (2) tanh. (CO2)



Roll No.

TCS-442

B. TECH. (AI-DS) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023

INTRODUCTION TO DATA MINING AND MACHINE LEARNING

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) Present an example where data mining is crucial to the success of a business. Describe three challenges to data mining regarding data mining methodology and user interaction issues. (CO1)

OR

- (b) Outliers are often discarded as noise. However, one person's garbage could be another's treasure. For example, exceptions in credit card transactions can help us detect the fraudulent use of credit cards. Using fraudulence detection as an example, propose two methods that can be used to detect outliers and discuss which one is more reliable. (CO1)

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2. (a) Explain the difference and similarity between discrimination and classification, between characterization and clustering, and between classification and regression. (CO1)

OR

- (b) It is important to define or select similarity measures in data analysis. However, there is no commonly accepted subjective similarity measure. Results can vary depending on the similarity measures used. Nonetheless, seemingly different similarity measures may be equivalent after some transformation. Suppose we have the following 2-D data set :

| | A ₁ | A ₂ |
|----------------|----------------|----------------|
| x ₁ | 1.5 | 1.7 |
| x ₂ | 2 | 1.9 |
| x ₃ | 1.6 | 1.8 |
| x ₄ | 1.2 | 1.5 |
| x ₅ | 1.5 | 1.0 |

Consider the data as 2-D data points. Given a new data point, $x = (1.4, 1.6)$ as a query, rank the database points based on similarity with the query using Euclidean distance, and Manhattan distance. (CO1)

3. (a) The following table consists of training data from an employee database. The data have been generalized. For example, "31 ... 35" for

age represents the age range of 31 to 35. For a given row entry, count represents the number of data tuples having the values for department, status, age, and salary given in that row : (CO2)

| Department | Status | Age | Salary | Count |
|------------|--------|---------|-----------|-------|
| sales | senior | 31...35 | 46K...50K | 30 |
| sales | junior | 26...30 | 26K...30K | 40 |
| sales | junior | 31...35 | 31K...35K | 40 |
| systems | junior | 21...25 | 46K...50K | 20 |
| systems | senior | 31...35 | 66K...70K | 5 |
| systems | junior | 26...30 | 46K...50K | 3 |
| systems | senior | 41...45 | 66K...70K | 3 |
| marketing | senior | 36...40 | 46K...50K | 10 |
| marketing | junior | 31...35 | 41K...45K | 4 |
| secretary | senior | 46...50 | 36K...40K | 4 |
| secretary | junior | 26...30 | 26K...30K | 6 |

Let status be the class label attribute.

- (i) How would you modify the basic decision tree algorithm to take into consideration the count of each generalized data tuple (i.e., of each row entry) ?
- (ii) Use your algorithm to construct a decision tree from the given data.

OR

- (b) Suppose that the data mining task is to cluster points (with (x, y) representing location) into three clusters, where the points are :

$A_1(2, 10), A_2(2, 5), A_3(8, 4), B_1(5, 8), B_2(7, 5), B_3(6, 4), C_1(1, 2), C_2(4, 9)$.

The distance function is Euclidean distance. Suppose initially we assign A_1 , B_1 , and C_1 as the center of each cluster, respectively. Use the k-means algorithm to show only

- (i) The three cluster centers after the first round of execution.

- (ii) The final three clusters.

(CO2)

4. (a) Both k-means and k-medoids algorithms can perform effective clustering.

- (i) Illustrate the strength and weakness of k-means in comparison with k-medoids.

- (ii) Illustrate the strength and weakness of these schemes in comparison with a hierarchical clustering scheme (e.g., AGNES). (CO2)

OR

- (b) Why is Naïve Bayesian classification called “naïve”? Briefly outline the major ideas of Naïve Bayesian classification. (CO2)

5. (a) Present conditions under which density-based clustering is more suitable than partitioning-based clustering and hierarchical clustering. Give application examples to support your argument. Write the algorithmic steps of DBSCAN. (CO3)

OR

- (b) Provide the pseudocode of the KNN classification algorithm. (CO3)

Roll No.

TCS-451

B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023

VIRTUALIZATION AND CLOUD COMPUTING

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) Nationwide Children's Hospital, CalvertHealth, and Rush University System for Health provide seamless patient care using AWS services. Evaluate Total cost of ownership (TCO) in above-mentioned organization. (CO1)

OR

- (b) Investor servicing and compliance solutions supplier Deep Pool Financial Solutions unlocked insights from its project-management software using Amazon QuickSight. Evaluate Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, and Utility-Oriented Computing in above-mentioned organization. (CO1)

P. T. O.

2. (a) Rush University System for Health is reducing the life expectancy gap and addressing the social determinants of health with its Health Equity Care & Analytics Platform built on AWS. Evaluate Xen, Vmware and Microsoft Hyper-V in above-mentioned organization. (CO3)

OR

- (b) Automotive technology company Cox Automotive used data from the AWS Well Architected Tool to secure executive sponsorship to invest in increased security across its workloads and to reduce risk. Evaluate Cloud Computing Reference Model in above-mentioned organization.

(CO2)

3. (a) Rackspace Technology used AWS Systems Manager to automate management of multicloud and hybrid infrastructures, saving hundreds of labor hours monthly, cutting costs, and reducing complexity. Evaluate Taxonomy of Virtualization Techniques in above-mentioned organization. (CO3)

OR

- (b) Gilead Sciences Inc. (Gilead) modernized its data infrastructure and improved its operational performance through a data mesh framework built on AWS, reducing data search times by over 50 percent. Evaluate Desktop virtualization, Software virtualization, Memory virtualization, Storage virtualization, and Data Virtualization in above mentioned organization. (CO3)

(3)

4. (a) Neeva, an ad-free search engine, uses Karpenter and Amazon EC2 Spot Instances to maintain cost optimization and reduce the time spent waiting on infrastructure management by 10—100 hours per week. Evaluate the ignioTM, BaNCSTM, Quartz, ADDTM, OptumeraTM, OmnistoreTM, HOBSTM, ION, MasterCraftTM, & JileTMin above mentioned organization. (CO2)

OR

- (b) Merck KGaA, Darmstadt, Germany improves its time to data insights with a connected data and analytics platform on AWS, helping data teams access secure, custom environments faster. Evaluate Virtual machines basics in above mentioned organization. (CO3)
5. (a) Mircom, a global designer, manufacturer, and distributor of intelligent building solutions, wanted to modernize its Open Graphic Navigator (OpenGN)—a single-site digital twin and on-premises Internet of Things (IoT) software platform. Evaluate System virtual machines in above mentioned organization. (CO3)

OR

- (b) Fatshark, a Swedish video game developer, wanted to build its most complex game yet— Warhammer 40,000 : Darktide. To build on the success of the studio's Warhammer : Vermintide series, the combat-focused cooperative miiltiplayer game must offer ultralow latency to over 100,000 concurrent players. Evaluate ENA Express, EC2 instance (C7gn, R7iz, Hpc7g, Inf2), Connect, EKS Clusters, Aurora, RDS application composer, Code catalyst, Gamelift, Omics, Sagemaker, Code Whisperer, Cloudwatch, VPS Lattice Inspector, EFS, IoT Twinmaker, EMR, and Amplify Studio in above-mentioned organization. (CO1)

Roll No.

TCS-467

**B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023**

LAMP TECHNOLOGIES

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) Try to execute some commands on the terminal which can perform the following tasks. (*Note* : You don't need to use file handling for performing these tasks.)

Create a folder

Create two empty files

Write some text inside those files

Use some operations and exchange the text of two files

Show the content of both the files

Combine the text of both the files into another file

Delete the file and folder

(CO1, CO2)

OR

- (b) Define LAMP stack. Explain all the components along with the way these components work together to create a web application.

(CO1, CO2)

- (a) Give a complete HTML document that would create a set of frames as follows : the right half of the browser window is a single frame named

P. T. O.

fright showing the file right.html. The left half of the browser window is divided into an upper portion 135 pixels tall, and two lower portions taking up one third and two thirds of the remainder of the window, respectively. These three frames should display the files logo.jpg, toc.html, and help.html, respectively, and should be named flogo, ftoc, and fhelp.

(CO2, CO4)

OR

- (b) What does DOM stand for ? Explain the top most objects in the DOM. Explain The Navigator Object in detail. (CO2, CO4)
3. (a) Explain how validations are done on the client-side and server-side. Which one is more secure and justifies your answer with a form validation using regular expression ? (CO2, CO3)

OR

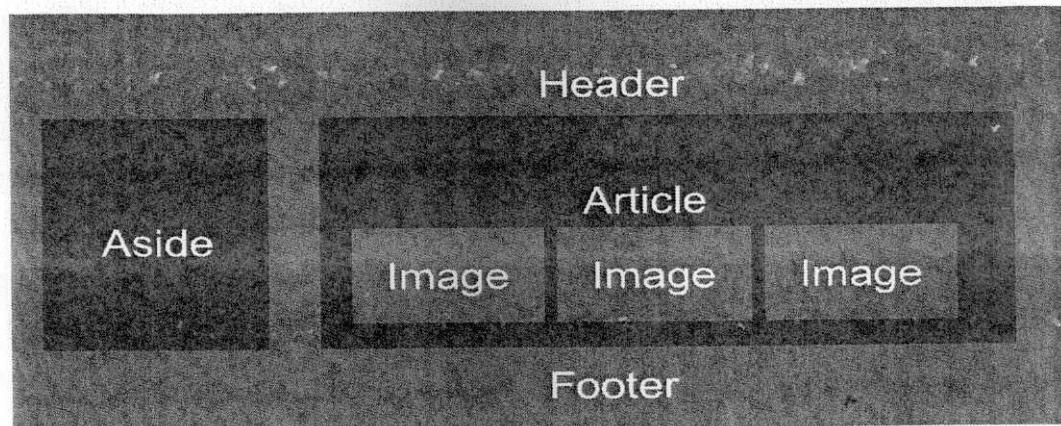
- (b) Difference between GET and POST methods in form tag. Write Code for HTML From along with CSS properties. (CO2, CO3)

Project Management

| |
|---|
| Project Name |
| <input type="text" value="project name"/> |
| Assigned to |
| <input type="text" value="Er Merry Person"/> |
| Start Date |
| <input type="text" value="dd-mm-yyyy"/> |
| End Date |
| <input type="text" value="dd-mm-yyyy"/> |
| Priority |
| <input checked="" type="radio"/> High <input type="radio"/> Average <input type="radio"/> Low |
| Description |
| <input type="text"/> |
| Submit |
| Clear |

(3)

4. (a) What is BOX Model in CSS ? Design a page with the following CSS properties : (CO3, CO4)



OR

- (b) Explain, how events are handled in JavaScript. Write an event handler program using function to hide email addresses to protect from unauthorized user. Test Data : (CO3, CO4)
- (protect_email("robin_singh@example.com"));
"robin...@example.com".

5. (a) Explain the use of Java Script functions like getElementById, getElementsByClassName and getElementsByName. Write a program for simple calculator. (CO5)

OR

- (b) Explain, how events are handled in JavaScript. Write an event handler program using function to start a counter clock on a single click of start button and stop a counter clock on another click of a stop button. (CO5)

Roll No.

TCS-433

**B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, 2023
BLOCKCHAIN AND ITS APPLICATIONS**

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) What do you mean by Cryptography ? What are the different types of Cryptographic protocols based on key-sharing schemes ? Describe each of them using its block diagram. (CO1)

OR

- (b) Discuss all possible types of cryptographic attacks. Discuss each of the detail. What are the features of cryptography ? Describe all of the detail. (CO1)

2. (a) What do you mean by hash function ? What are the fundamentals properties of a hash function ? Describe each of them. (CO1)

OR

- (b) What are the applications of the has function in Blockchain ? Mention each of them in detail. (CO1 & CO2)

P. T. O.

(2)

3. (a) What are the measures for achieving authentication ? Describe the signing and verification process used in the process of generating a Digital Signature. (CO1 & CO2)

OR

- (b) Explain the concept of divisibility. Find the GCD of the two numbers using the Euclid theorem. Write a program for the same.

(CO1 & CO2)

4. (a) Describe a Discrete Logarithm Problem (DLP). Explain the Diffie-Hellmann Key Exchange Algorithm using DLP with an example. (CO2)

OR

- (b) Describe Modular Arithmetic for all possible operations including Arithmetic operations, inverses, and exponentiation with the appropriate examples. (CO2)

5. (a) Define RSA cryptosystems with appropriate examples and write the program for the operations i.e. encryption-decryption for the message "HI" using the same. (CO)

OR

- (b) Describe OSI Security Architecture suitable for Blockchain in context of Security services, Security attacks and Security mechanisms. (CO3)

Roll No.

TCS-434

B. TECH. (CST-CC) (FOURTH SEMESTER)

MID SEMESTER EXAMINATION, April, 2023

CLOUD COMPUTING ARCHITECTURE AND DEPLOYMENT MODELS

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) Rush University System for Health is reducing the life expectancy gap and addressing the social determinants of health with its Health Equity Care & Analytics Platform built on AWS. Evaluate High-performance computing in above mentioned organization. (CO1)

OR

- (b) Investor servicing and compliance solutions supplier Deep Pool Financial Solutions unlocked insights from its project-management software using Amazon QuickSight. Evaluate Utility and Enterprise grid computing in above mentioned organization. (CO1)
2. (a) ActionIQ has increased scalability and optimized costs for its customer data platform using Amazon EC2 Spot Instances. Evaluate challenges and risks of cloud adoption in above mentioned organization. (CO3)

P. T. O.

OR

- (b) Automotive technology company Cox Automotive used data from the AWS Well Architected Tool to secure executive sponsorship to invest in increased security across its workloads and to reduce risk. Evaluate cloud computing limitations in above mentioned organization. (CO2)
3. (a) Samsung relies on the Amazon Chime SDK to deliver a television live chat solution in months, give viewers a more engaging experience, and scale to support chat services on televisions produced from 2020 to present. Evaluate advantages of VMware virtualization in above mentioned organization. (CO1)
- OR
- (b) Gilead Sciences Inc. (Gilead) modernized its data infrastructure and improved its operational performance through a data mesh framework built on AWS, reducing data search times by over 50 percent. Evaluate PaaS in above mentioned organization. (CO2)
4. (a) Neeva, an ad-free search engine, uses Karpenter and Amazon EC2 Spot Instances to maintain cost optimization and reduce the time spent waiting on infrastructure management by 10—100 hours per week. Evaluate the IaaS in above mentioned organization. (CO3)

OR

- (b) Merck KGaA, Darmstadt, Germany improves its time to data insights with a connected data and analytics platform on AWS, helping data teams access secure, custom environments faster. Evaluate Cloud deployment model in above mentioned organization. (CO3)

(3)

5. (a) Mircom, a global designer, manufacturer, and distributor of intelligent building solutions, wanted to modernize its Open Graphic Navigator (OpenGN)—a single-site digital twin and on-premises Internet of Things (IoT) software platform. Evaluate CloudSim Architecture in above mentioned organization. (CO2)

OR

- (b) Fatshark, a Swedish video game developer, wanted to build its most complex game yet— Warhammer 40,000 : Darktide. To build on the success of the studio's Warhammer : Vermintide series, the combat-focused cooperative multiplayer game must offer ultralow latency to over 1,00,000 concurrent players. Evaluate VMware virtualization in above mentioned organization. (CO3)

Roll No.

TCS-435

B. TECH. (CST-SPL) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023

INTRODUCTION TO AI AND ML

(Elective)

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) What is the difference between Breadth First Search (BFS) and Depth First Search (DFS) algorithms ? (CO1)

OR

- (b) Define any two informed search algorithms with proper explanation and example. (CO1)

2. (a) Define the McCulloch-Pitts neuron model and show its resemblance with the biological neuron with proper diagram. (CO2)

OR

- (b) What do you understand by Artificial Intelligence (AI). Explain with proper background and advancement. (CO2)

P. T. O.

3. (a) Define the following intelligent agents with proper block diagram :

(CO2)

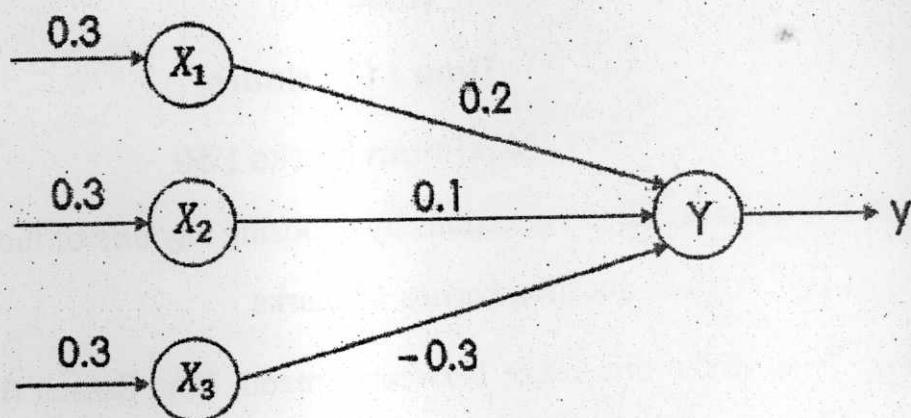
(i) Goal-Based Agents

(ii) Simple Reflex Agents

Also mention their advantages and disadvantages.

OR

(b) Obtain the output (Y) of the neuron for the network shown in figure using activation function as : (1) binary sigmoid and (2) tanh. (CO2)



4. (a) Explain the Turing test with proper block diagram and steps.

(CO1)

OR

(b) Define the following terms with respect to search algorithms : (CO1)

(i) Search tree

(iii) Path cost

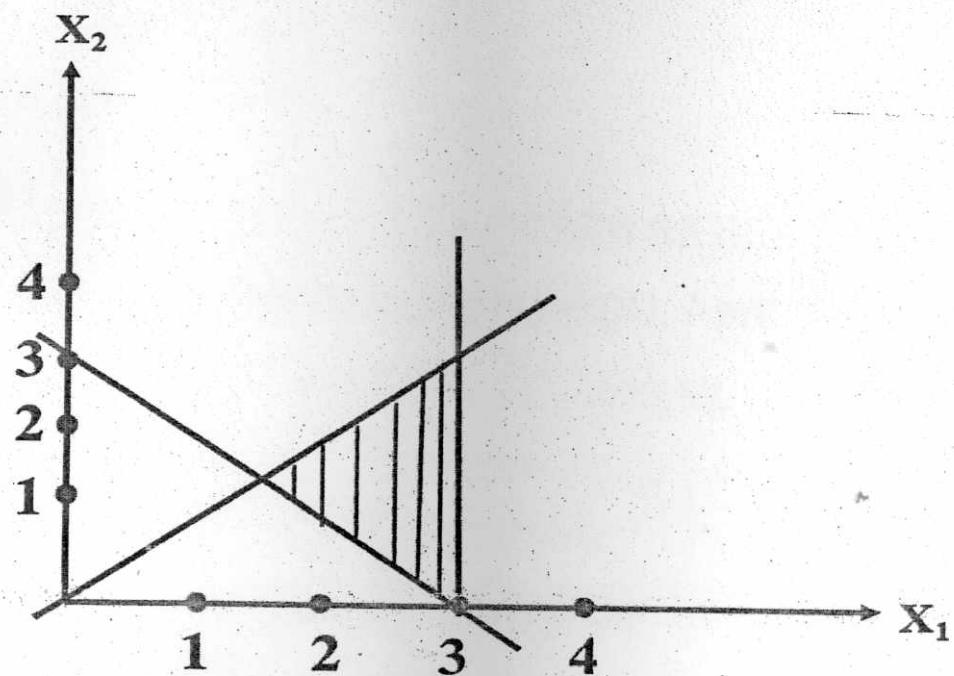
(iii) Time complexity

(iv) Space complexity

(v) Optimality

(3)

5. (a) Develop a neural network to classify the shaded region : (CO1)



- (b) Define the features of the environment with a proper explanation for an intelligent agent system. (CO2)

Roll No.

TCS-426

B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023
INFORMATION SECURITY RISK MANAGEMENT
(Elective)

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) Define Information Security. How can access control policy help in information security ? (CO1)

OR

- (b) Define OSI Security. Explain in brief the OSI Model. (CO1)

2. (a) Explain with a suitable example authorized access and unauthorized access of data. (CO1)

OR

- (b) Why do we use prime no. in RSA cryptography approach ? Explain the practical mathematical model/working flow of Diffie-Hellman algorithm. (CO1)

P. T. O.

(2)

3. (a) Explain cryptography and its real-time application in information security. (CO2)

OR

- (b) Write the risk management. How is it important ? (CO2)

4. (a) Explain different types of access control techniques for information security. (CO2)

OR

- (b) Explain network security model. (CO2)

5. (a) Define the following approach in short : (CO2)

- (i) Encryption and Decryption
(ii) Zero trust model

OR

- (b) Explain the following (any *three*) : (CO2)

- (i) Confidentiality
(ii) Data integrity
(iii) Authentication
(iv) Risk identification

Roll No.

TCS-423

B. TECH. (CSE) (FOURTH SEMESTER)

MID SEMESTER EXAMINATION, April, 2023

INTRODUCTION TO MACHINE LEARNING AND DEEP LEARNING

(DL & RObot)

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) What do you mean by a well-posed learning problem ? Explain the important features that are required to a well-defined learning problem.

OR

- (b) What are the basic design issues and approaches to machine learning ?
2. (a) Differentiate between Supervised, Unsupervised and Reinforcement Learning. Give examples for each type of learning.

OR

- (b) Explain the concept of a Perceptron with a neat diagram. Discuss the Perceptron training rule with an example.

P. T. O.

(2)

3. (a) Explain Linear separability and Decision regions with examples.

OR

- (b) Explain Naïve Bayes Classifier with an example.

4. (a) Explain the concept of Linear Regression. Also discuss its advantages and limitations.

OR

- (b) Explain the concept of overfitting and underfitting. Discuss the Bias-Variance tradeoff.

5. (a) Give decision trees to represent the following boolean functions :

(i) $A \wedge \neg B$

(ii) $A \vee [B \wedge C]$

(iii) A XOR B

(iv) $[A \wedge B] \vee [C \wedge D]$

OR

- (b) Suppose that a credit card company decided to deploy a new system for assessing credit worthiness of its customers. The new system is using a feed-forward neural network with a supervised learning algorithm. Suggest in a form of essay what should the bank have before the system can be used. Discuss problems associated with this requirement.

Roll No.

TCS-421

B. TECH. (CSE) (FOURTH SEMESTER)

MID SEMESTER EXAMINATION, April, 2023

FUNDAMENTALS OF STATISTICS AND AI

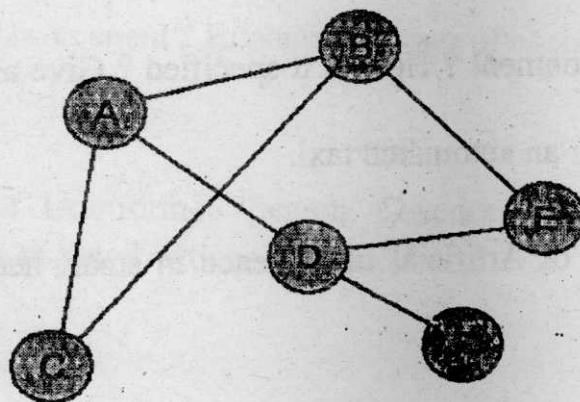
Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each sub-question carries 10 marks.

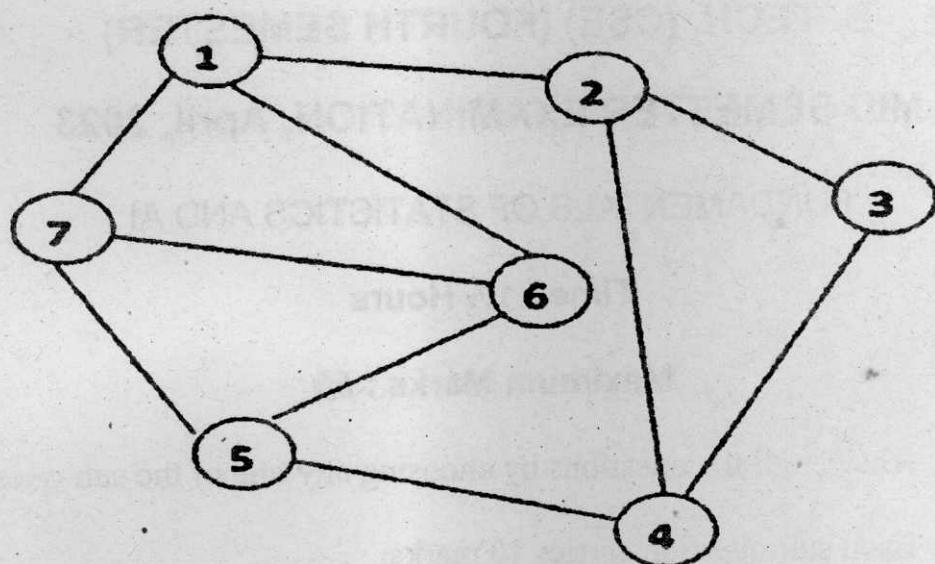
1. (a) Discuss the benefits and shortcomings of Breadth first search method and apply the same for the given graph. Consider start node = A and goal node = F. (CO3)



P. T. O.

OR

- (b) Compare Uninformed search method and Informed search method. Find the path to reach the goal node (4) from the star node (1) by applying DFS : (CO3)



2. (a) Describe the concept of Artificial Intelligence and explain AI Type I and II in detail. (CO1)

OR

- (b) What is a task environment ? How is it specified ? Give an example of PEAS description for an automated taxi. (CO1)

3. (a) Summarize the role of Artificial Intelligence in smart health care and agriculture. (CO2)

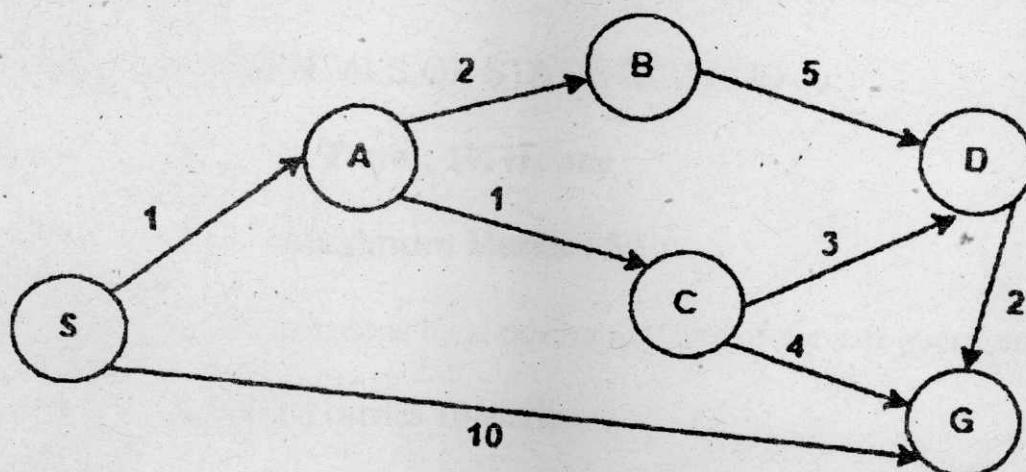
(3)

OR

- (b) Discuss A* search algorithm and apply the same for the given graph to search the goal node. Consider Start Node = S and Goal Node = G :

(CO3)

| S | A | B | C | D | G |
|---|---|---|---|---|---|
| 5 | 3 | 4 | 2 | 6 | 0 |



4. (a) Elaborate the components of Artificial Intelligence and current trends in Artificial Intelligence. (CO2)

OR

- (b) Discuss hill climbing search method with suitable example. (CO2)

5. (a) What is an agent ? Explain the types of agents and rules for AI agents.

(CO1)

OR

- (b) Define Uninformed Search. Discuss Iterative deepening depth-first search in detail with suitable example. (CO1)

Roll No.

TCS-491

B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023
INTRODUCTION TO CRYPTOGRAPHY

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) Explain the Model for network security with the help of a suitable diagram. (CO1)

OR

- (b) Explain the OSI Security Architecture. (CO1)
2. (a) What do you mean by the term Security Attacks ? Differentiate the active and passive attacks. (CO1)

OR

- (b) Encrypt “HIDEME” via affine cipher, where $k_1 = 7$ and $k_2 = 9$. Also decrypt the ciphertext obtained. (CO1)
3. (a) What are the various types of cryptanalytic attacks based on the amount of information known to the cryptanalyst ? (CO2)

P. T. O.

(2)

OR

- (b) Encrypt the plaintext "FILEISINPD" using Playfair cipher. The key for encryption is "expert". (CO2)
4. (a) What are Rotor Machine ? Explain its functioning and discuss its cryptanalysis. (CO3)

OR

- (b) Encrypt the plain text "SUDOKU" using Hill Cipher. The key for the same is : (CO2)

$$\begin{bmatrix} 20 & 3 \\ 15 & 7 \end{bmatrix}$$

5. (a) What are symmetric-key block cipher ? Explain with the concept of DES. (CO3)

OR

- (b) Calculate using Euclid algorithm : (CO3)
- (i) GCD (1024, 140)
 - (ii) GCD (96, 60)
 - (iii) Multiplicative inverse of 11 in Z_{35}^*

Roll No.

TCS-471

B. TECH. (CSE) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, April, 2023

STATISTICAL DATA ANALYSIS WITH R

Time : 1½ Hours

Maximum Marks : 50

- Note :** (i) Answer all the questions by choosing any *one* of the sub-questions.
(ii) Each sub-question carries 10 marks.

1. (a) Why statistical analysis is required in digital era ? State the concept of resampling and its relevant assumptions. (CO1)

OR

- (b) Compare and contrast descriptive and summary statistics. (CO1)

2. (a) The number of ATM transactions per day were recorded at 15 locations in a large city. The data were : 35, 49, 225, 50, 30, 65, 40, 55, 52, 76, 48, 325, 47, 32, and 60. Find (a) the median number of transactions and (b) the mean number of transactions. (CO3)

OR

- (b) Four groups of students, consisting of 15, 20, 10, and 18 individuals, reported mean weights of 162, 148, 153, and 140 pounds (lb), respectively. Find the mean weight of all the students. (CO3)

P. T. O.

3. (a) A and B play 12 games of chess, of which 6 are won by A, 4 are won by B, and 2 end in a draw. They agree to play a match consisting of 3 games. Find the probability that (a) A wins all 3 games, (b) 2 games end in a draw, (c) A and B win alternately, and (d) B wins at least 1 game. (CO3)

OR

- (b) One bag contains 4 white balls and 2 black balls; another contains 3 white balls and 5 black balls. If one ball is drawn from each bag, find the probability that (a) both are white, (b) both are black, and (c) one is white and one is black. (CO3)

4. (a) Illustrate the reasons for providing preference over R language for statistical analysis and visualization as compared to python ? (CO2)

OR

- (b) Compare standard packages and command packages in R ? Elaborate the steps for Installing Extra Packages for Windows Users. (CO2)

5. (a) How can you load and use csv file and Scan function for both numeric and Character data in R ? Specify with suitable examples. (CO3)

OR

- (b) You have the results of a simple experiment to look at the visitation of various bee species to different plants. The number of bees observed was as follows : (CO3)

Buff tail : 10 1 37 5 12

Garden bee : 8 3 19 6 4

Red tail : 18 9 1 2 4

(3)

Honeybee : 12 13 16 9 10

Carder bee : 8 27 6 32 23

Write the syntax in R to :

- (i) Creation of five simple numeric vectors of these data.
- (ii) Save all the items you just created to a disk file in your working directory.
- (iii) To remove all the vectors that you just made.
- (iv) To recall the vectors from disk.