

Paper Code: BIT-33

Roll No:

2020071016

B.Tech

(SEM VI) EVEN SEMESTER

MINOR TEST (EXAMINATION) 2022-2023

Machine Learning

Time: 2 Hours

Max. Marks: 20

Note: Answer all questions

Q.1 Attempt any Three parts of the following.Q.1 (a) is compulsory.

- (a) Explain various types of Machine learning with an example. 4
- (b) Distinguish between Artificial Intelligence, Machine Learning and Deep Learning. 2
- (c) What are bias and variance in Machine Learning? 2
- (d) Explain the types of Linear Regression. 2

Q.2 Attempt any Two parts of the following.Q.2 (a) is compulsory.

- (a) Consider the following set of points: $\{(-2, -1), (1, 1), (3, 2)\}$
 - (i) Find the least square regression line for the given data points.
 - (ii) Plot the given points and the regression line in the same rectangular system of axes.4
- (b) Describe the Support Vector Machine with the help of diagram. 2
- (c) Differentiate between classification and clustering in Machine Learning. 2

Q.3 Attempt any Two parts of the following.Q.3 (a) is compulsory.

- (a) Draw and explain Multilayer Neural Network? How it is different from Perceptron. 4
- (b) What is Overfitting and Underfitting in Machine Learning? Explain with an example. 2
- (c) Explain different kinds of activation functions. 2

B TECH
 (SEM VI) EVEN SEMESTER
 MINOR TEST 2022 - 2023

Artificial Intelligence

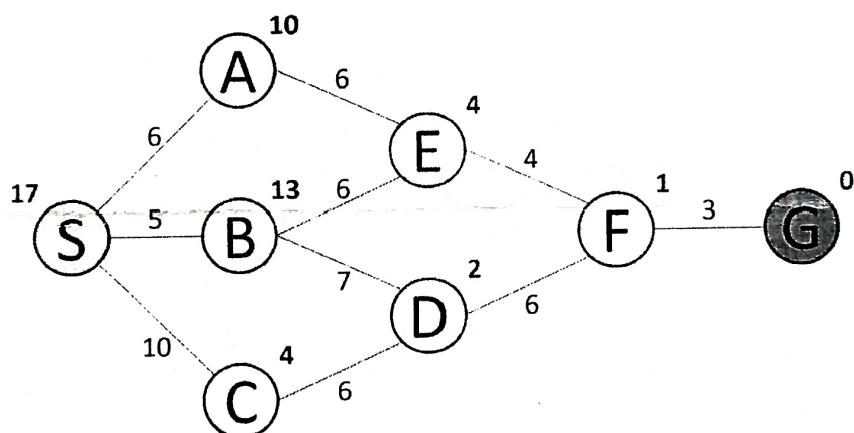
Time: 2 Hrs.

Max. Marks: 20

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

(a) Explain and write the steps of A* Algorithm. Consider the following graph- 4



The numbers written on edges represent the distance between the nodes.

The numbers written on nodes represent the heuristic value.

Find the most cost-effective path to reach from start state S to final state G using A* Algorithm. You are further required to write explicitly the Queue after each step.

(b) Distinguish Informed and Uninformed Search in Artificial Intelligence. 2

(c) Write down names of the different types of intelligent agents in Artificial Intelligence. You are further required to describe any one with suitable diagram or example. 2

(d) Compare and contrast Best First search with Breadth First Search. 3

Q.2 Attempt any Two parts of the following. Q. 2(a) is compulsory.

- (a). Arthur is looking for a group of friends for his start-up, which develops and provides some web-based p2p downloading solutions to college students (this is before the lawsuits). Arthur has determined that he needs 2 C# Programmers, 2 Flash Designers, 1 Photoshop Guru, 1 Database Admin, and 1 Systems Engineer. Assume that if a person knows two languages/software, he or she can take on two roles in the company. So, Arthurs narrowed down his selections to the following people:

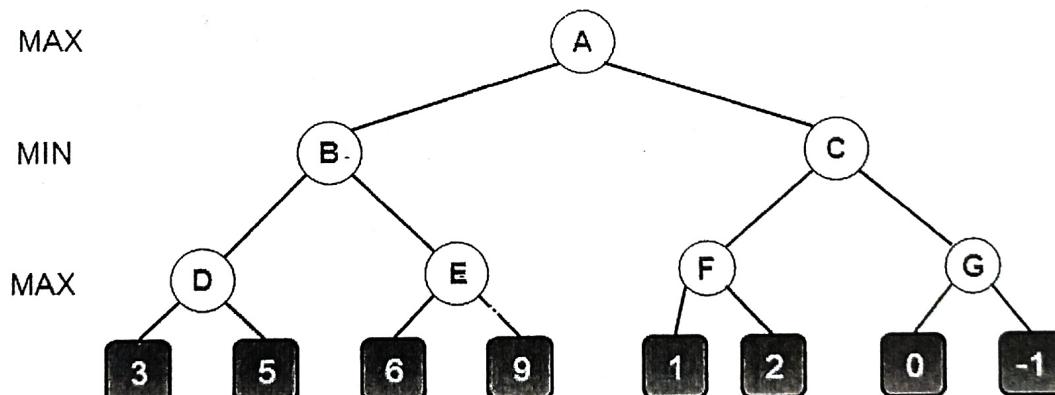
Name	Abilities
Peter	C# and Flash
John	Photoshop and Flash
-Jim	Flash and Systems
-Jane	C# and Database
-Mary	Photoshop and Flash
Bruce	Systems and C#
-Chuck	Photoshop and Flash

Suppose Arthur knows C#, and only has funds to hire three more people. Model this scenario as a CSP - (using variables, value domains, and constraints).

- (b). What is Plausible search generator? Explain with suitable example or diagram
(c). What are the problems in hill climbing algorithm, how it can be overcome.

Q.3 Attempt any Two parts of the following. Q. 3(a) is compulsory.

- (a). Solve given min-max tree with the help of Alpha-Beta pruning



- (b). What is backward chaining in Artificial Intelligence. Example with an example.
(c). What do you understand by Cognitive Science? Explain

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B. TECH

EVEN SEMESTER (SEM - VI)

MINOR EXAMINATION 2022-23

SUBJECT: CRYPTOGRAPHY & NETWORK SECURITY

Time: 2Hrs.

Max. Marks: 20

Note: Attempt all questions. Each question carries equal marks.

Q 1. Attempt any three parts of the following. Q 1 (a) is compulsory.

- (a) What are the active and passive attacks? Illustrate the various types of active attacks with a suitable example. 4
- (b) Define and differentiate the Block Cipher and Stream Cipher with a suitable example. 2
- (c) Implement the Euclidean Algorithm to obtain gcd (53947, 64873). 2
- (d) Explain the working principle of Public Key Cryptography with a suitable diagram. 2

Q 2. Attempt any two parts of the following. Q 2 (a) is compulsory.

- (a) Illustrate the one round of DES encryption process in detail. 4
- (b) Describe the working principle of CBC encryption process of algorithm mode with a suitable diagram. 2
- (c) Implement the simple columnar transposition technique with two rounds to encrypt the plain text "Come Home Tomorrow". Assume the number of column 4 and order of column for getting cipher text is 3, 1, 4 and 2. 2

Q 3. Attempt any two parts of the following. Q 3 (a) is compulsory.

- (a) List the various steps of RSA algorithm. Given two prime numbers P = 47 and Q = 17. Find out N, E, and D in an RSA encryption process. 4

- (b) List the various steps of Diffie-Hellman Key Exchange Algorithm.

Alice and Bob want to establish a secret key using the Diffie-Hellman Key Exchange protocol. Assuming the values as n = 11, g = 5, x = 2 and y = 3, find out the values of A, B and the secret key (K1 or K2). 2

- (c) Implement Chinese Remainder Theorem (CRT) to obtain the value of x that satisfies the following four congruence:

$$X \equiv 4 \pmod{10}$$

$$X \equiv 6 \pmod{13}$$

$$X \equiv 4 \pmod{7}$$

$$X \equiv 2 \pmod{11}$$

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B.Tech
(SEM VI) EVEN SEMESTER
MINOR TEST (EXAMINATION) 2022-2023

Data Mining and Warehousing

Time: 2 Hours

Max. Marks: 30

Note: Answer all questions

Q.1 Attempt any Three parts of the following.Q.1 (a) is compulsory.

- (a) What is data mining and their task primitives? Explain the process of knowledge discovery with neat diagram. 4
- (b) Write short notes on data cleaning, data integration and data transformation. 3
- (c) What is need for pre-processing the data? Explain in detail about data mining functionalities and their issues? 3
- (d) What are the major challenges & characteristics of Data Mining. 3

Q.2 Attempt any Two parts of the following.Q.2 (a) is compulsory.

- (a) Define data warehouse. Draw the architecture of data warehouse and explain the three tiers in details. 4
- (b) Illustrate and explain the OLAP architecture. Also discuss about data cube. 3
- (c) What is data mart? Write in detail about attribute oriented induction with example. 3
- (d) What is the need of data warehouse? Define metadata and explain the types of metadata. 3

Q.3 Attempt any Two parts of the following.Q.3 (a) is compulsory.

- (a) Give the differences between a database and a data warehouse? Explain in detail about the implementation of a data warehouse. 4
- (b) Which kind of data and pattern need to be mind? Explain. 3
- (c) Explain difference and similarity between characterization and clustering. 3
- (d) Discuss the development lifecycle of a data warehouse. 3

B Tech (IT), 6th Sem
Minor Test 2022-23

WIRELESS SENSOR NETWORK & IOT

Time: 2hrs

Marks: 20

Note: Attempt all questions.

Q1. Attempt any 3 parts of the following. Q1(a) is compulsory

- (a) Suppose that in a hard-to-reach territory, you have to deploy some sensors to get some information for any disaster management process? What would be your method of sensor deployment in this situation? In how many ways can you deploy the sensors for designing any sensor network in the real-world problems? Write down the difference between these deployment methods. 4
- (b) Write down the name of any five types of sensors. Differentiate between the accelerometer and the gyroscope. Where are they used? Give some examples of such applications. 2
- (c) Define the terms Virtualization and Virtual Sensor Networks. How do they help an Internet of Things (IoT) system? Discuss the concept of Sensor Cloud Architecture with a neat diagram for any suitable application. 2
- (d) How are the sensors essential to an Internet of Things (IoT) system? Give any example. What are the basic building blocks of an IoT. Explain all such building blocks with help of the neat diagram. 2

Q2. Attempt any 2 parts of the following. Q2(a) is compulsory

- (a) Which type of OS and Simulator are more appropriate to implement a mobile wireless sensor network? Describe the various kinds of operating systems which are used in the sensor networks? Describe the main features of these operating systems? Also discuss about the programming language and the simulation support to these operating systems. 4
- (b) What are the elementary components of a sensor? Explain each component and its characteristics in short. Also, explain the basic architecture of a sensor node with help of a suitable diagram. 2
- (c) What are the basic characteristics of a wireless sensor network? What things should we keep in mind while designing any routing protocol for such sensor networks? Differentiate between the terms data dissemination and data aggregation. 2

Q3. Attempt any 2 parts of the following. Q3(a) is compulsory

- (a) What are the various applications of Internet of Things? Write down at least four IoT applications and describe them in short. Briefly explain some research issues associated with all these applications. Also, discuss how are these IoT applications affecting the life of an individual in today's era. 4
- (b) What do you know about Internet of Things? Explain its main components in short. What are the basic advantages of IoT? Also, discuss some issues and challenges associated with an IoT in brief? 2
- (c) Draw the layered architecture of Internet of Things? Explain details of different layers of the IoT protocol stack? In which layer can we implement the process of data analytics and the security related mechanisms? 2

BIT-35

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B. Tech-III

(SEM - VI) EVEN SEMESTER

MAJOR EXAMINATION 2022-23

Subject: Network Security & Cryptography

Time: 3Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carries equal marks.

Q 1. Attempt any five parts of the following.

5x2 = 10

- (a) Describe the various types of active attacks with a suitable example in brief.
(b) Implement Chinese Remainder Theorem (CRT) to obtain the value of x that satisfies the following four congruence:

$$X \equiv 4 \pmod{10}$$

$$X \equiv 6 \pmod{13}$$

$$X \equiv 4 \pmod{7}$$

$$X \equiv 2 \pmod{11}$$

- (c) What is the significance of Initialization Vector (IV) in CBC Mode of operation? Describe the working of Cipher Block Chaining (CBC) mode encryption process with a suitable diagram.

- (d) Alice and Bob want to establish a secret key using the Diffie-Hellman Key Exchange protocol. Assuming the values as n = 11, g = 7, x = 3 and y = 6, find out the values of A, B and the secret key (K1 or K2).

- (e) Differentiate between Substitution and Transposition cipher. What would be the transformation of a message "*Happy Birthday to You*" using Rail Fence technique?

- (f) List the various steps of Euclid Algorithm. Implement the Euclid algorithm to find the greatest common divisor gcd (19385, 56211).

- (g) Illustrate the various steps involved in one round of DES encryption process in brief.

Q 2. Attempt any two parts of the following.

2x5 = 10

- (a) What is the significance of Message Digest in Cryptography? Describe the working principle of SHA-1 with a suitable diagram.

(b) Illustrate the various steps involved in complete operation of Hash-based Message Authentication Code (HMAC) with a suitable diagram.

(c) What is the concept behind Message Authentication Code (MAC)? Describe the Birthday attacks in detail.

Q 3. Attempt any two parts of the following.

2x5 = 10

(a) What is Digital Signature? How can RSA be used for performing Digital Signature? Explain with a suitable diagram.

(b) How does E-mail communication take place? Illustrate the working principle of Pretty Good Privacy (PGP) of electronic mail security.

(c) What is the significance of Kerberos in authentication? Describe the working of Kerberos with a suitable diagram.

Q 4. Attempt any two parts of the following.

2x5 = 10

(a) What is the Authentication Header (AH)? How does AH solve the replay attack problems? Explain with a suitable example.

(b) What is Clogging Attack? List the various features of Oakley Key Determination Protocol. How does Oakley protocol deal with Congestion attacks. Explain with a suitable example.

(c) What is Web Security? Describe the Secure Socket Layer (SSL) in detail.

Q 5. Attempt any two parts of the following.

2x5 = 10

(a) What are Intruders? Describe the various types of Intruders. Illustrate some popularly known methods of password guessing in brief.

(b) What is Secure Electronic Transaction (SET)? Draw a SET Model for a typical purchase transaction and explain its working in detail.

(c) Differentiate between Circuit and application gateway? Explain the various principles of Firewall Design. List the limitations of Firewall also.

B Tech (IT), 6th Sem.
 Major Examination 2022-23
Wireless Sensor Network & IoT

Time: 3hrs**Marks: 50****Note: Attempt all questions. Each question carries equal marks.****Q1. Attempt any 5 parts of the following.**

- (a) How do various IoT enabling technologies help any IoT? Explain in short. 2
- (b) Describe the terms Process Migration and Virtualization. 2
- (c) Write down the differences between IoT and M2M communication. 2
- (d) How does SDN facilitate an IoT system? Draw a neat diagram to justify your answer. 2
- (e) Is there any relation between NFV and COTS? Explain using suitable diagrams. 2
- (f) Explain the terms IIoT, CIoT, SIoT and IoH. 2
- (g) What are the roles of Physical and Logical Design of IoT for designing any IoT application. 2

Q2. Attempt any 2 parts of the following.

- (a) Suppose that you have to develop following IoT applications: 5
 - i. Smart Street Lighting System
 - ii. Smart Traffic Lighting System

Which limitations do you notice in the existing systems and how it can be overcome?
- (b) What would be your approach before and after creating your design of any IoT application? Also, explain various steps involved in designing such applications. 5
 Write down the name of few dataset sources available in the public domain for any such project.
- (c) Which softwares would you require to develop an IoT application viz., Secure and Smart Food Supply Chain IoT System? Justify your answer by providing suitable reasons. What should be your approach to solve this problem? Discuss about the various modules to be used in your solution. 5

Q3. Attempt any 2 parts of the following.

- (a) Write down the types of sensors to be used in the following IoT systems? Also, mention few existing issues and possible solutions to solve those issues. 5
 - i. Agricultural IoT
 - ii. Vehicular IoT
 - iii. Healthcare IoT
 - iv. Forest Fire Monitoring IoT
 - v. Landslide Monitoring IoT

- (b) Suppose that you are assigned a job to devise a model for any IoT application viz., Secure Smart City. How would you integrate machine learning, deep learning, cloud computing, blockchain and natural language processing techniques for designing this IoT application? Write down the name of some IoT simulation tools that can be used to design this system. 5
- (c) Can we use various performance metrics of machine learning and computer network systems to measure the performance of any IoT model? Justify your answer by providing the suitable reasons. Explain any ten performance metrics to measure the performance of such IoT systems. 5

Q4. Attempt any 2 parts of the following.

- (a) What do you know about the Flat protocols of sensor networks? Why are they called Flat? Describe the mechanism of data dissemination process in SPIN protocol. Explain various categories of SPIN protocol. How does the sensors send the sensed data to the Sink in Directed Diffusion protocol? 5
- (b) Explain LEACH and PEGASIS protocols in brief. How do these protocols help to develop an energy efficient sensor network? Also, discuss the pros and cons of both of these protocols. 5
- (c) Write down a short note on the location based protocols of wireless sensor networks? How the energy consumption is minimized in this kind of protocols? What is the significance of Recursive Geographical Forwarding in GEAR protocol? Also, discuss the advantages and limitations of this protocol. 5

Q5. Attempt any 2 parts of the following.

- (a) How Proactive Routing is different from the Reactive Routing? Explain the significance of both of them. Briefly explain various types of QoS parameters used in QoS routing. Also, give a complete taxonomy on various kinds of data dissemination protocols of the wireless sensor networks. 5
- (b) Which protocols come under Hierarchical protocols of sensor networks? Why are they known as Hierarchical? How does the sensors send the sensed data to the Sink in such kind of protocols? Describe the significance of this mechanism of data dissemination process. Explain various phases of any such hierarchical protocol. 5
- (c) What are the mobile agents? How agent based data dissemination protocols are different from the non-agent based protocols of the sensor networks? How the itinerary is decided in SIP and MIP protocols? Explain with any suitable example using neat diagram. 5

B TECH
EVEN SEMESTER
MAJOR EXAMINATION 2022 - 2023

ARTIFICIAL INTELLIGENCE

Time: 03 Hrs

Max. Marks: 50

Q. No.		Marks
1.	Attempt any Five parts of the following:	5*2=10
	(a) Describe in brief the emergence of Artificial Intelligence.	
	(b) Explain in brief the architecture of Artificial Intelligence with suitable diagram.	
	(c) Write down the properties of Task Environment. Explain any one in brief.	
	(d) What do you mean by search space of a problem? Explain with suitable example.	
	(e) Explain forward chaining in brief with suitable example.	
	(f) Write down the names of different types of informed search. Explain any one in brief with suitable example.	
	(g) What do you understand by Inference Engine in AI? Explain with suitable example or diagram.	
2.	Attempt any Two parts of the following:	2*5=10
	(a) Translate each of the following statements into logical expressions using predicates, quantifiers, and logical connectives.	
	predicates: C(x): x is a CSE 260 student L(x): x loves music Universe of discourse for the variable x is all students. (i) Every student love music (ii) No student loves music (iii) Some students love music (iv) Every CSE 260 student loves music. (v) Some CSE 260 students love music.	

- (b) Draw a semantic network representing the following knowledge:

“Every human, animal and bird are living thing who breathe and eat. All birds can fly. All man and woman are humans who have two legs. Cat is an animal and has a fur. All animals have skin and can move. Giraffe is an animal who is tall and has long legs. Parrot is a bird and is green in color”.

- (c) Show the working of the Minimax algorithm using Tic-Tac-Toe Game.

Q. No.		Marks
3.	Attempt any Two parts of the following:	2*5=10

- (a) Consider the task of buying milk, bananas, and a cordless drill. Create the planning of completing the task using Planning Domain Definition Language (PDDL).
- (b) What is Planning in AI and its types? Explain with example.
- (c) Explain Planning with State-Space Search using suitable diagram or example. Would bidirectional state-space search be a good idea for planning? Explain.

Q. No.		Marks
4.	Attempt any Two parts of the following:	2*5=10

- (a) Explain Random Forest Classifier with an Example? What do you understand by bagging technique in Random Forest.
- (b) How can AI be used in fraud detection? Explain with suitable example.
- (c) Use following dataset to train a decision tree that predicts if people would pass machine learning (Yes or No) based on their past GPA (High, Medium, or Low) and whether they studied.

GPA	Studied	Passed
Low	False -	No
Low	True	Yes
Medium	False -	No
Medium	True	Yes
High	False -	Yes
High	True	Yes

Q. No. **Marks**
 5. Attempt any **Two parts** of the following: 2*5=10

- (a) Consider the following data set and use the Naive Bayes classifier to classify X.
 Where X= <Red, Suv, Domestic>.

Example No.	Color	Type	Origin	Stolen?
1	Red	Sports	Domestic	Yes
2	Red	Sports	Domestic	No
3	Red	Sports	Domestic	Yes
4	Yellow	Sports	Domestic	No
5	Yellow	Sports	Imported	Yes
6	Yellow	SUV	Imported	No
7	Yellow	SUV	Imported	Yes
8	Yellow	SUV	Domestic	No
9	Red	SUV	Imported	No
10	Red	Sports	Imported	Yes

- (b) Explain the following terms with suitable example or diagram:
 (i) Machine Translation
 (ii) Chatbots
- (c) (i) Briefly explain what is meant by the *semantics* of a natural language utterance, and how this differs from the *pragmatics*.
 (ii) Explain with an example of a sentence where knowledge of the syntactic structure is needed (rather than, say, just knowledge of the words in the sentence) in order to determine what is meant.

B. Tech. VI Sem.
Major Examination 2022-23
DATA MINING AND WAREHOUSING

Time: 3hrs**Marks: 50**

Note: Attempt all questions. Each question carries equal marks.

Q1. Attempt any Five parts of the following.

- (a) Describe 3-tier Architecture of Data Warehouse with a neat sketch. 2
- (b) Differentiate among ROLAP, MOLAP and HOLAP server functionalities. 2
- (c) How are association rules generated from frequent item sets? Illustrate. 2
- (d) Summarize the smoothing techniques followed in data cleaning process. 2
- (e) Compare among roll-up, drill-down, slice & dice operations. 2
- (f) Design Fact constellation table with suitable example 2
- (g) Briefly explain important approaches to build the data warehouse. 2

Q2. Attempt any Two parts of the following.

- (a) Why naive Bayesian classification is called “naive”? Briefly outline the major ideas of naive Bayesian classification. Explain Naive-Bayes classification. 5
- (b) For the following given Transaction Data-set, Generate Rules using Apriori Algorithm. Consider the values as Support=50% and Confidence=75% 5

Transaction Id	Items Purchased
1	Bread, Cheese, Egg, Juice
2	Bread, Cheese, Juice
3	Bread, Milk, Yogurt
4	Bread, Juice, Milk
5	Cheese, Juice, Milk

- (c) Explain various key issues in hierarchical clustering? 5

3

Q3. Attempt any Two part of the following.

- (a) What is association rule mining? Illustrate and explain how the association rules generated from frequent itemsets? What are the applications of association rule mining?

5

- (b) Explain data mining as a step-in knowledge discovery process. Differentiate between data retrieval and data mining.

5

- (c) Explain about the Mining Multilevel Association rules with example.

5

Q4. Attempt any Two parts of the following.

- (a) Discuss Decision tree-based classifier in detail. Discuss issues that are important to consider when employing a decision tree classification algorithm. What is overfitting & how can it be prevented for decision trees?

5

- (b) What is the main objective of clustering? Give the categorization of clustering approaches. Briefly discuss them.

5

- (c) Write a short note on Bayes theorem and illustrate maximum likelihood method for predicting probabilities in Bayesian learning with an example. How it can be applied for data classification.

5

Q5. Attempt any Two parts of the following.

- (a) Write short notes on any **three** the following:

5

- i. Web Content Mining
- ii. Rule based classification.
- iii. Ensemble Learning
- iv. Spatial data mining

- (b) What is posterior probability and prior probability in Naïve Bayes? Why naïve Bayesian classification is called “naïve”? Briefly outline the major ideas of naïve bayes classification.

5

- (c) What is prediction? Explain the various prediction techniques. Explain about Decision tree Induction classification technique.

5

B.Tech (IT), 6th Sem.
Major Examination 2022-23
Machine Learning

Time: 3hrs**Marks: 50**

Note: Attempt all questions. Each question carries equal marks.

Q1. Attempt any 5 parts of the following.

- (a) Distinguish between Artificial Intelligence, Machine Learning and Deep Learning. 2
- (b) Differentiate between Classification and Clustering in Machine Learning. 2
- (c) What is the trade-off between bias and variance in machine learning? 2
- (d) Differentiate between Univariate and Multivariate Linear Regression. 2
- (e) Differentiate between Perceptron and Multilayer Neural Network in Deep Learning. 2
- (f) What is the significance of Support Vector Machine? Explain. 2
- (g) Explain Under fitting and Over fitting in Machine Learning with an example. 2

Q2. Attempt any 2 parts of the following.

- (a) Predict the T-shirt size of a new customer named 'Monica' who has height 161cm and weight 61kg with the help of KNN algorithm. Data regarding Height, Weight and T-Shirt Size is given as below: 5

Height (in cm)	Weight (in kg)	T Shirt Size
1- 158	58	M
2- 158	59	M
3- 158	63	M
4- 160	59	M
5- 160	60	M
6- 163	60	M
7- 163	61	M
8- 160	64	L
9- 163	64	L
10- 165	61	L

- (b) What are regression trees? Explain with an example. How do you prevent overfitting in the regression trees? 5
- (c) A dataset consists of 10 instances as shown below. Construct the decision tree using the decision tree algorithm. 5

Colour	Type	Origin	Stolen?
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Imported	Yes
-	Yellow	SUV	Imported
-	Yellow	SUV	Imported
-	Yellow	SUV	Domestic
-	Red	SUV	Imported
	Red	Sports	Domestic
			Yes

Q3. Attempt any 2 parts of the following.

- (a) What is the significance of K-Means clustering? From the data given below, form 5 clusters with the help of K-Means clustering algorithm:

$$K = \{2, 3, 4, 10, 11, 12, 20, 25, 30\}$$

$$m_1=4, m_2=12$$

- (b) The table given below is a distance matrix for 5 objects. Show the final result of the 5 hierarchical clustering with single link by drawing a dendrogram

	1	2	3	4	5
1	0				
2	6	0			
3	5	8	0		
4	9	3	9	0	
5	2	7	11	10	0

- (c) What is the significance of Ensemble Learning, and what are the different types of 5 Ensemble Learning? Explain Bagging and Random Forest with an example.

Q4. Attempt any 2 parts of the following.

- (d) Discuss the characteristics of Rule-Based Classifier. Also demonstrate the learning of 5 unordered rule list in machine learning with an example.

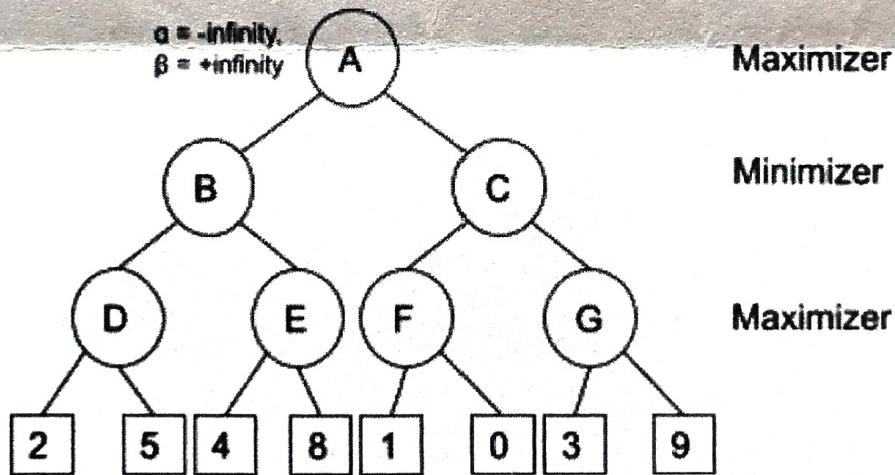
- (b) Explain the Utility function in Artificial Intelligence using an appropriate example? 5
 When pizza consumption increases from four to five, determine the marginal utility using the following dataset:

Pizza	Utilities
0	0
1	12
2	16
3	25
4	21
5	11

- (c) Explain min-max tree with an example? How reinforcement learning is used in designing the mobile games? Also, discuss the various kinds of search generators used in the games. 5

Q5. Attempt any 2 parts of the following.

- (a) What is Alpha Beta Pruning in Artificial Intelligence? In the example given below, 5 apply alpha beta pruning to the two-player search tree.



- (b) Write short note on the followings: 5
 - Types of reinforcement learning
 - Adaptive dynamic programming
- (c) Explain Generative Adversarial Network with the help of neat diagram? List out the 5 types of architecture in GAN and their applications.