MRCET CAMPUS

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS INSTITUTION – UGC, GOVT. OF INDIA)

Department of AERONAUTICAL ENGINEERING

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

QUESTION BANK

Prepared by:
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ARTIFICIAL INTELLIGENCE
&
MACHINE LEARNING

Question Bank

B.TECH
(III YEAR – II SEM)
(2023-2024)

Prepared by:
Ms.L SUSHMA, Associate Professor

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
Department of Aeronautical Engineering

Recognized under 2(f) and 12 (B) of UGC ACT 1956
(Affiliated to JNTUH, Hyderabad, Approved by AICTE-Accredited by NBA &NAAC–'A'Grade-ISO9001:2015 Certified) Maisammaguda,Dhulapally(PostVia.Kompally),Secunderabad–500100,Telangana State, India

Code No: R20A0513 **R20**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Regular Examinations, December 2022

Artificial Intelligence

(CSE, IT, CSE-CS, CSE-DS, CSE-IOT)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	***A***	List and explain various AI Languages.	**[7M]**
	B	What are the basic components of AI problem solving methodology? Illustrate with an example.	**[7M]**
		OR	
2	***A***	Illustrate the heuristic Hill Climbing Algorithm with an example.	**[7M]**
	B	Explain A* Algorithm with example.	**[7M]**
		SECTION-II	
3	***A***	Discuss Alpha-Beta Pruning and its advantages over min-max method.	**[10M]**
	B	Explain the Syntax and Semantics of Propositional Logic.	**[4M]**
		OR	
4	***A***	Explain forward chaining and backward chaining	**[7M]**
	B	Compare and contrast the two variants of Logic-Predicate and Propositional.	**[7M]**
		SECTION-III	
5	***A***	Explain the issues in Knowledge Representation. Define Inheritance in Semantic Net.	**[8M]**
	B	Differentiate between monotonic and non monotonic reasoning.	**[6M]**
		OR	
6	***A***	Explain acting under uncertainity domain	**[5M]**
	B	Explain Bayesian Networks?	**[9M]**
		SECTION-IV	
7	***A***	Differentiate between Supervised Learning and Unsupervised Learning.	**[4M]**
	B	Discuss Winston's learning briefly with neat sketch.	**[10M]**
		OR	
8	***A***	Describe the role of information gain in Decision Tree Learning.	**[7M]**
	B	Explain decision tree algorithm.	**[7M]**
		SECTION-V	
9	***A***	Explain the Phases in Building Expert System.	**[9M]**
	B	Explain the Applications of the Expert Systems.	**[5M]**
		OR	
10	***A***	List the Characteristics of Expert Systems. Classify various Expert System shells and tools.	**[8M]**
	B	Explain about MYCIN Expert system in detail.	**[6M]**

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R17

Code No: R17A1204

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, November 2022

Artificial Intelligence

(CSE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	***A***	Briefly explain how AI Technique can be represented and list out some of the task domain of AI.	**[7M]**
	B	How to define a problem as state space search? Discuss it with the help of an example.	**[7M]**
		OR	
2	***A***	Explain any one algorithm with the help of an example. i. Hill Climbing: Steepest Ascent. ii. Constraints Satisfaction	**[3M]** **[4M]**
	B	Identify the type of control strategy is used in the 8-puzzle problem. Explain	**[7M]**

SECTION-II

3	***A***	Justify the need for minimax algorithm. Explicate the steps of minimax algorithm	**[7M]**
	B	Explain Non – Monotonic reasoning and discuss the various logic associated with it.	**[7M]**
		OR	
4	***A***	Define the syntactic elements of first-Order logic	**[7M]**
	B	Explain in detail about forward chaining algorithm with example.	**[7M]**

SECTION-III

5		List out the steps involved in the knowledge Engineering process. Explain with an example.	**[14M]**
		OR	
6		Discuss about Bayesian Theory and Bayesian Network.	**[14M]**

SECTION-IV

7	***A***	Define learning. Summarize the learning from examples technique.	**[7M]**
	B	Explain the Winston's Learning Program.	**[7M]**
		OR	
8	***A***	What is a decision tree? Write the decision tree learning algorithm.	**[7M]**
	B	Explain the process of inducing decision trees from examples.	**[7M]**

SECTION-V

9	***A***	Outline stages in the development of an expert systems.	**[7M]**
	B	Summarize the expert system shells and tools.	**[7M]**
		OR	
10	***A***	Illustrate the Knowledge Acquisition system.	**[7M]**
	B	Explain the applications and domains in Expert systems.	**[7M]**

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R18

Code No: R18A1205

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Supplementary Examinations, June 2022

Artificial Intelligence

(EEE, CSE & IT)

Roll No										

Time: 3 hours **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

***

1 Define AI problems and its components. Explain how a problem solving agent works? Explain real-world AI problems with examples **[14M]**

2 What is best first search? Explain in detail A* algorithm? Discuss BFS Algorithm **[14M]**

3 Explain in detail about alpha-beta pruning with example. **[14M]**

4 What is First Order Logic? State and Prove Baye's Theorem and mention its applications? **[14M]**

5 Give a detail note on a generic knowledge-based agent. In the wumpus world, agent will have five sensors. Mention Various Other Knowledge Representation Schemes **[14M]**

6 Prove the following assertion: for every game tree, the utility obtain by MAX using mini max decision against a suboptimal MIN will be never be lower than the utility obtained playing against an optimal MIN. Can you come up with a game tree in which MAX can do still better using a suboptimal strategy against a suboptimal MIN? **[14M]**

7 Discuss in detail about Winston's Learning Program with its implementation details. **[14M]**

8 What is an Expert System? List various components of Knowledge Base? Differentiate Forward and Backward Chaining? **[14M]**

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R17

Code No: R17A1204

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, June 2022

Artificial Intelligence

(CSE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

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1	a.	Explain depth first search strategy algorithm with suitable example.	**[7M]**
	b.	Define Constraint Satisfaction Problem. Explain Constraint Satisfaction Problem for map colouring.	**[7M]**
2	a.	Define Agent Program. Explain the Following Agent Programs with Respect to Intelligent Systems i. Goal-Based Reflex Agent ii. Utility-Based Agent	**[5M]**
	b.	Explain the following Heuristic Search Strategies with Suitable Examples: i. Generic Best-First Algorithm ii. A * Algorithm	**[9M]**
3	a.	Explain alpha –beta pruning search algorithm.	**[7M]**
	b.	Explain the Symbols and Interpretation of First Order Logic	**[7M]**
4	a.	Explain MinMax Search Algorithm.	**[5M]**
	b.	Explain the Forward Chaining and backward chaining Algorithms with suitable	**[9M]**
5	a.	Explain the Baye's Rule and Its Applications in Artificial Intelligence.	**[7M]**
	b.	Differentiate between monotic and non-monotic reasoning.	**[7M]**
6	a.	With an Example, Discuss Conditional and Unconditional Probability	**[7M]**
	b.	Define Bayesian Network. Explain the Semantics of Bayesian Network with suitable example.	**[7M]**
7	a.	Explain Winston's Learning Program with an Example	**[7M]**
	b.	Explain the Following Forms of Learning i. Rote Learning ii. Reinforcement Learning	**[7M]**
8	a.	Explain the Knowledge Acquisition with a neat schematic diagram.	**[7M]**
	b.	Explain the architecture of an Expert System and discuss the working of MYCIN Expert System	**[7M]**

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R18

Code No: R18A0526

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Regular/Supplementary Examinations, November 2022

Machine Learning

(CSE & IT)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	***A***	Explain components involved in the design of a learning system	**[7M]**
	B	Discuss different perspectives and issues in machine learning.	**[7M]**
		OR	
2		Explain different learning models of machine learning	**[14M]**
		SECTION-II	
3	***A***	Explain ID3 algorithm with example.	**[10M]**
	B	Explain different types of SVM algorithm:	**[4M]**
		OR	
4	***A***	Discuss the step wise analysis of k-means clustering algorithm	**[10M]**
	B	With a neat sketch explain the architecture of an artificial neural network.	**[4M]**
		SECTION-III	
5	***A***	What is the importance of ensemble learning? Explain the different methods involved in it .	**[4M]**
	B	Discuss Expectation-Maximization (EM) Algorithm	**[10M]**
		OR	
6	***A***	What are the advantages and disadvantages of random forest algorithm.	**[7M]**
	B	Explain the procedure of Multiexpert combination method	**[7M]**
		SECTION-IV	
7	***A***	Explain the an algorithm for Learning Q.	**[10M]**
	B	Define PAC-learnability with suitable example.	**[4M]**
		OR	
8		How to compute optimal policy? Explain with example.	**[14M]**
		SECTION-V	
9	***A***	Explain different Genetic Operators of Genetic Algorithm.	**[7M]**
	B	Define Hypothesis Space Search of Genetic Algorithm.	**[7M]**
		OR	
10		Discuss about Baldwin effect and Lamarckian evolution	**[14M]**

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R20

Code No: R20A6601

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Regular Examinations, December 2022

Machine Learning

(CSE-AIML)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 **[14M]**

Colour	Hair	Height	Eyes	Class
White	Blond	2	brown	+
Black	Dark	4	brown	-
Brown	Red	2	Blue	+
Brown	Blond	4	Blue	-
Black	Blond	2	Blue	-
Black	Red	2	Brown	+
White	Blond	2	Black	-
Black	Red	4	Blue	-

Apply find 'S' algorithm and candidate elimination algorithm to find the version space

OR

2 The following table contains training examples for a classification problem. Use ID3 algorithm to construct a minimal decision tree that predicts the class label. Show each step of the computation. **[14M]**

ID	Temperature	rain	wind	Visibility	Class
1	Hot	No	Mid	NG	Yes
2	Cool	Yes	Mid	NG	Not
3	Hot	Yes	High	NG	Not
4	Hot	No	Low	Good	Yes
5	Comfort	Yes	Mid	Bad	Not
6	Hot	Yes	High	NG	Not
7	Cool	No	Low	Bad	Yes
8	Hot	No	Low	Good	Yes
9	Comfort	No	Low	Bad	Yes
10	Hot	Yes	Mid	Good	Not
11	Comfort	No	High	Good	Yes
12	Cool	No	Mid	NG	Yes
13	Cool	Yes	High	NG	Not
14	Comfort	Yes	Mid	NG	Not

SECTION-II

3 ***A*** .An aptitude test and statistics tests was conducted randomly for 5 students and the scores were depicted in the table. **[10M]**

Student	Aptitude score	Statistics score
1	60	70
2	70	85

3	80	65
4	85	95
5	95	70

Based on math aptitude ratings, which linear regression equation best predicts statistics performance?

What grade would we anticipate a student to get in statistics if the student scored an 80 on the aptitude test?

B Compare the Multi linear regression, Polynomial regression, and Logistic regression. Provide the applications of each. **[4M]**

OR

4 ***A*** **Apply** K nearest neighbor classifier to predict the Sugar of diabetic patient with the given features BMI, Age. Assume K=3, **Test Example BMI=43.6, Age=40, Sugar=?** If the training examples are **[10M]**

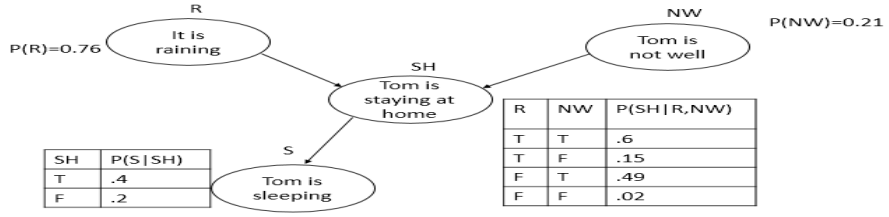
BMI	Age	Sugar
33.6	50	1
26.6	30	O
23.4	40	O
43.1	67	O
35.3	23	1
35.9	67	1
36.7	45	1
25.7	46	O
23.3	29	O
31	56	1

B What is case based reasoning explain with an example. **[4M]**

SECTION-III

5 ***A*** Write the steps in Naive Bayes algorithms for learning and classifying text. **[4M]**

B Apply Bayesian belief network, **[10M]**



SH	P(S|SH)
T	.4
F	.2

R	NW	P(SH|R,NW)
T	T	.6
T	F	.15
F	T	.49
F	F	.02

What is the probability that Tom is not sleeping although it is raining heavily and he is not well? He was upset that he could not join for the sleep over in his friend's home and his mom forced him to stay at home.

OR

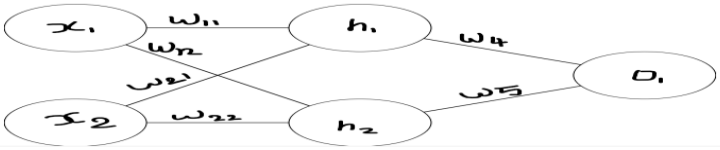
6 A Describe the naive Bayes theorem in text classification **[7M]**

B What are the limitations of Bayes optimal classifier? Explain how does the Gibbs algorithm tries to resolve the issues. **[7M]**

SECTION-IV

7 ***A*** Explain the steps in of the BACKPROPAGATION algorithm for feedforward networks that contains two layers of sigmoid units. **[7M]**

B Consider the Artificial Neural Network with the following values **[7M]**
X1=1,x2=0, w11=0.25,w12=0.10,w21=0.15,w22=0.1,w4=0.3,w5=0.4,b1 to h_1 and h_2=1 and bias b2 to O_1=1. Assume the actual output=0.95. Find the predicted output. Find the error and through backpropagation, find out the weights of w4 and w5 provided learning rate =0.3.



Input values x1, and x2, randomly assigned weights are w1, w2, w3, w4, w5, w6, w7 and w8. Target values o1 = 0.05 and o2 = 0.95. Bias values b1 and b2.

Use the sigmoid activation function. Learning rate $\alpha = 0.5$.

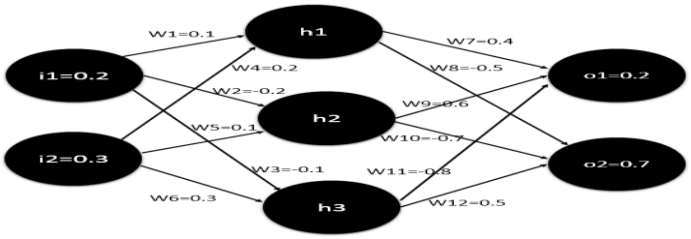
OR

8 Consider the following neural network with the input, output and weight parameters values shown in the diagram. The activation values in each neuron is calculated using the sigmoid activation function. Now, answer the following: **[14M]**

a. For the given input i1 and i2 as shown in the diagram, compute the output of the hidden layer and output layer neurons.

b. Compute the error in the network with the initialized weight parameters shown in the diagram.

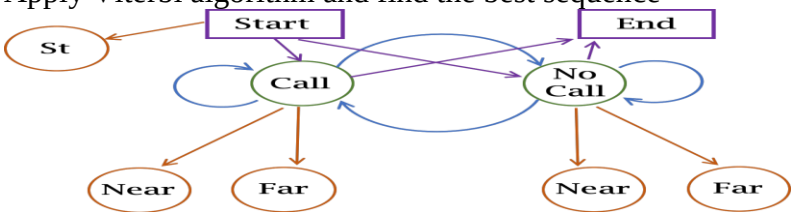
c. Update the weight parameters for w7 and w8 using backpropagation algorithm in the first iteration. Consider learning rate as 0.01.



SECTION-V

9 ***A*** Illustrate how to find the state sequence with any example. **[4M]**

B Apply Viterbi algorithm and find the best sequence 10 **[10M]**



	Call	NoCall	End
Start	0.7	0.3	0
Call	0.2	0.7	0.1
NoCall	0.7	0.2	0.1

State transition probabilities

	St	Near	Far
Start	1	0	0
Call	0	0.7	0.3
NoCall	0	0.4	0.6

Emission probabilities

Find the hidden state sequence for Near Far Far.

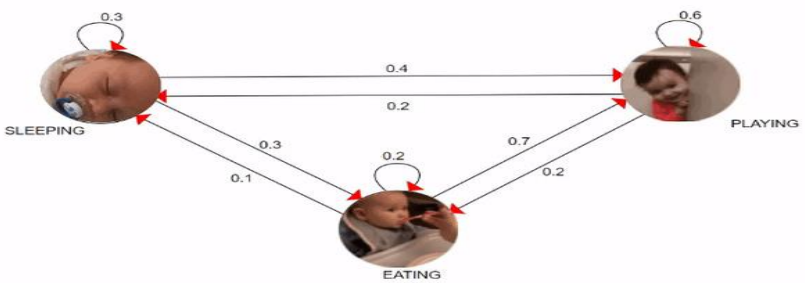
OR

10 ***A*** Describe the three states in Hidden Markov Models. **[4M]**

B Find out the transition matrix from the below diagram. Assume the initial probabilities for sleeping, eating and playing are denoted as $\pi = \{0.25, 0.25, 0.50\}$.

i.Find the probability of the series .Baby is sleeping, sleeping, eating, playing ,playing, sleeping. **[5M]**

ii. Find the probability of baby playing given baby is eating . **[5M]**



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R17

Code No: R17A0534

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech- II Semester Advance Supplementary Examinations, July 2022

Machine Learning

(CSE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

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1 Briefly explain about the various learning models in machine learning. **[14M]**

2 a) Define VC dimension. How VC dimension is related with no of training examples used for learning. **[8M]**

b) Briefly explain about PAC learning framework. **[6M]**

3 a) What are the benefits of pruning in decision tree induction? Explain different approaches to tree pruning? **[8M]**

b) Explain the concept of a Perceptron with a neat diagram. **[6M]**

4 a) Explain how Support Vector Machine can be used for classification of linearly separable data. **[8M]**

b) Give a detail note on kernel functions. **[6M]**

5 Describe boosting and ADA boosting algorithm with neat sketch **[14M]**

6 Explain the concept of EM Algorithm with Gaussian Mixtures model. **[14M]**

7 Summarize about the Q-learning model and explain with diagram **[14M]**

8 a) List out the Genetic algorithm steps with example. **[7M]**

b) Illustrate the prototypical genetic algorithm. **[7M]**

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R18

Code No: R18A0526

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, June 2022

Machine Learning

(CSE & IT)

Roll No										

Time: 3 hours **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

***

1	Define Machine Learning? Explain different Types of Learning with example each?	**[14M]**
2	Explain about probabilistic and geometric models in machine learning?	**[14M]**
3	What is the difference between logistic regression and linear regression give an example?	**[14M]**
4	Write short notes on: a)Multiple regression b) Back propagation algorithm	 **[7M]** **[7M]**
5	Analyze the Expectation-Maximisation (EM) Algorithm with an example?	**[14M]**
6	Explain K-Nearest Neighbor(KNN) Algorithm with an example and list the advantages and disadvantages of K-NN	**[14M]**
7	a) What is the goal of the support vector machine (SVM)? How to compute the margin? b)What are the elements of reinforcement learning?	**[7M]** **[7M]**
8	Explain Genetic Programming with an example? And What are the operators of genetic algorithm?	**[14M]**

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R17

Code No: R17A0534

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech- II Semester Supplementary Examinations, May 2022

Machine Learning

(CSE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

***

SECTION-I

1 a) Explain the useful perspectives of machine learning in different applications. **[7M]**

b) Describe in detail the rule for estimating training values. **[7M]**

OR

2 a) Differentiate between Supervised, Unsupervised and Reinforcement Learning. **[7M]**

b) Define the terms Hypothesis space and Version space. Illustrate with an example. **[7M]**

SECTION-II

3 a) Give the necessary steps and limitations of ID3 algorithm. **[7M]**

b) Explain about the linear regression. **[7M]**

OR

4 a) Explain how Support Vector Machine can be used for classification of linearly separable data. **[7M]**

b) Elucidate K-means algorithm with neat diagram. **[7M]**

SECTION-III

5 a) Describe the random forest algorithm to improve classifier accuracy **[7M]**

b) Explain the concept of Bagging with its uses? **[7M]**

OR

6 a) How can be the data classified using KNN algorithm with neat sketch? **[7M]**

b) Discuss the various distance measure algorithms. **[7M]**

SECTION-IV

7 a) Write about the learning Rule sets. **[7M]**

b) Write some common evaluation functions in the learning rule sets. **[7M]**

OR

8 Explain normal and Binomial Distributions with an example. **[14M]**

SECTION-V

9 a) Discuss about the mutation operator. **[7M]**

b) Examine how genetic algorithm searches large space of candidate objects with an example with fitness function **[7M]**

OR

10 Assess the parallelizing Genetic Algorithms with an example. **[14M]**

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R20

Code No: R20A0566

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, January 2024

Artificial Intelligence & Machine Learning

(ME, ECE & AE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 Explain Depth-first with Iterative Deepening Search strategy with an example. **[14M]**

OR

2 Explain Best - First Heuristic Search strategy with an example. **[14M]**

SECTION-II

3 Explain AO* search implementation strategy with an example. **[14M]**

OR

4 Explain Minimax Search strategy with an example. **[14M]**

SECTION-III

5 Explain Supervised Machine learning with an example. **[14M]**

OR

6 Explain reinforcement Machine Learning with an example **[14M]**

SECTION-IV

7 What is Regression? Explain Linear Regression with an example. **[14M]**

OR

8 Explain Support Vector Machine classification method with an example. **[14M]**

SECTION-V

9 Explain KD Tree With an example in Machine Lerning **[14M]**

OR

10 Describe K-Means Clustering and explain with an example **[14M]**

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