Printed page: 04 **Subject Code: ABT0512**

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM-V THEORY EXAMINATION (2024-2025)

Subject: Artificial Intelligence in Biotechnology

Time: 3 Hours **Max. Marks:100**

General Instructions:

IMP: Verify that you have received question paper with correct course, code, branch etc.

1. *This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*
2. *Maximum marks for each question are indicated on right hand side of each question.*
3. *Illustrate your answers with neat sketches wherever necessary.*
4. *Assume suitable data if necessary.*
5. *Preferably, write the answers in sequential order.*
6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION – A 20

1. Attempt all parts:-

1-a. Which of the following is the primary goal of Artificial Intelligence (AI)? (CO1,K1) 1

(a) To simulate human intelligence in machines
(b) To create physical robots
(c) To replace human decision-making
(d) To design faster computers

1-b. Who is known as the father of Artificial Intelligence? (CO1,K1) 1

(a) John McCarthy
(b) Alan Turing
(c) Marvin Minsky
(d) Geoffrey Hinton

1-c. Which data structure is used in Depth-First Search (DFS)? (CO2,K2) 1

(a) Queue
(b) Stack
(c) Priority Queue
(d) Array

1-d. What is the primary difference between Tree Search and Graph Search? (CO2,K2) 1

(a) Graph Search uses a priority queue
(b) Tree Search avoids cycles
(c) Graph Search tracks visited nodes
(d) Tree Search is faster

1-e. What is the first step in the AI project cycle? (CO3,K2) 1

(a) Modelling
(b) Data Acquisition
(c) Problem Scoping
(d) Data Exploration

1-f. What is an example of structured data? (CO3,K2) 1

(a) An audio recording
(b) A text document
(c) A table in a database
(d) Images

1-g. Identify the purpose of sorting data in Excel?(CO4,K3) 1

(a) To filter irrelevant data
(b) To create graphs
(c) To organize data alphabetically
(d) To highlight specific data

1-h. How do you create a table in Excel? (CO4,K3) 1

(a) Use the "Table" menu
(b) Select data and press "Ctrl + C"
(c) Select data and press "Ctrl + T"
(d) Type "Table" in the cell

1-i. How can ML assist in protein engineering? (CO5,K3) 1

(a) Predicting mutations
(b) Folding predictions
(c) Protein stability
(d) All of these

1-j. How does ML help in environmental sustainability? (CO5,K3) 1

(a) Waste optimization
(b) Water quality prediction

(c) Both (a) and (b)
(d) None

2. Attempt all parts:-

2.a.	Explain the term "initial state" in problem formulation. (CO1,K1)	2
2.b.	Illustrate the main characteristic of a Random Search algorithm? (CO2,K2)	2
2.c.	Explain the role of data pre-processing in the AI project cycle.(CO3,K2)	2
2.d.	"How would you use a pivot table in Excel to analyse a dataset, and what specific purpose does it serve in data summarization?" (CO4,K3)	2
2.e.	How could you apply machine learning techniques to predict biofuel production rates? (CO5,K3)	2

SECTION – B 30

3. Answer any <u>five</u> of the following-

3-a.	Provide two examples of how AI is being utilized in healthcare today. (CO1,K1)	6
3-b.	Define the term "search tree" and explain how it is used to represent solutions in AI problem-solving. (CO1,K1)	6
3-c.	Explain the concept of a heuristic function in Best-First Search. What role does the heuristic play in guiding the search? (CO2,K2)	6
3-d.	What is the key difference between Tree Search and Graph Search? How does Graph Search manage previously visited nodes to optimize the search process? (CO2,K32)	6
3-e.	Illustrate the purpose of the AI project cycle.(CO3,K2)	6
3-f.	How would you use Excel’s sorting and filtering tools to identify top-selling products from a large dataset of product sales? (CO4,K3)	6
3-g.	Demonstrate how AI could assist in identifying trends in biochemical process data. (CO5,K3)	6

SECTION – C 50

4. Answer any <u>one</u> of the following-

4-a.	Define Artificial Intelligence (AI) and explain its importance in today's technological world. (CO1,K1)	10
4-b.	Explain how AI is transforming healthcare, and provide specific examples of its applications. (CO1,K1)	10

5. Answer any <u>one</u> of the following-

5-a.	Explain how a heuristic function is designed in the A algorithm*. What makes a good heuristic function? (CO2,K2)	10
5-b.	How does the A algorithm* improve upon Best-First Search? Explain the role of the cost function in A*.(CO2,K2)	10

6. Answer any <u>one</u> of the following-

6-a.	"Discuss how would you implement each stage of the AI project cycle in a real-world scenario, and how do these stages contribute to the successful development of an AI solution?" (CO3,K2)	10
6-b.	Explain the role of statistical analysis in data exploration for AI projects? (CO3,K2)	10

7. Answer any <u>one</u> of the following-

7-a.	Explain how you would apply regression analysis in Excel to predict the effects of ice cream sales on the basis of temperature. (CO4,K3)	10
7-b.	Explain the process of filtering and sorting data in Excel and its impact on summarizing and analysing large datasets. (CO4,K3)	10

8. Answer any <u>one</u> of the following-

8-a.	How would you apply machine learning to optimize enzyme activity in biochemical processes? (CO5,K3)	10
8-b.	Demonstrate the application of AI in monitoring greenhouse gas emissions from bioprocesses. (CO5,K3)	10