Sl. No.

A9.5-R5 : ARTIFICIAL INTELLIGENCE CONCEPTS AND R PROGRAMMING

अवधि : 03 घंटे **अधिकतम अंक : 100**
DURATION : 03 Hours **MAXIMUM MARKS : 100**

ओएमआर शीट सं. : OMR Sheet No. :						

रोल नं. : **Roll No. :** | | | | | | |

उत्तर-पुस्तिका सं. : **Answer Sheet No. :** | | | | | | |

परीक्षार्थी का नाम : **परीक्षार्थी के हस्ताक्षर :**
Name of Candidate : _____ **Signature of Candidate :** _____

परीक्षार्थियों के लिए निर्देश :	**Instructions for Candidate :**
कृपया प्रश्न-पुस्तिका, ओएमआर शीट एवं उत्तर-पुस्तिका में दिये गए निर्देशों को ध्यानपूर्वक पढ़ें।	Carefully read the instructions given on Question Paper, OMR Sheet and Answer Sheet.
प्रश्न-पुस्तिका की भाषा अंग्रेजी है। परीक्षार्थी केवल अंग्रेजी भाषा में ही उत्तर दे सकता है।	Question Paper is in English language. Candidate can answer in English language only.
इस मॉड्यूल/पेपर के **दो भाग** हैं। **भाग एक** में **चार** प्रश्न और **भाग दो** में **पाँच** प्रश्न हैं।	There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
भाग एक ''वैकल्पिक'' प्रकार का है जिसके कुल अंक 40 है तथा **भाग दो** ''व्यक्तिपरक'' प्रकार का है और इसके कुल अंक 60 है।	**PART ONE** is Objective type and carries 40 Marks. **PART TWO** is Subjective type and carries 60 Marks.
भाग एक के उत्तर, **ओएमआर उत्तर-पुस्तिका** पर ही दिये जाने हैं। **भाग दो** की उत्तर-पुस्तिका में **भाग एक** के उत्तर **नहीं** दिये जाने चाहिए।	**PART ONE** is to be answered in the **OMR ANSWER SHEET** only. **PART ONE** is **NOT** to be answered in the answer book for **PART TWO**.
भाग एक के लिए अधिकतम समय सीमा **एक घण्टा** निर्धारित की गई है। **भाग दो** की उत्तर-पुस्तिका, **भाग एक** की उत्तर-पुस्तिका जमा कराने के पश्चात् दी जाएगी। तथापि, निर्धारित एक घंटे से पहले **भाग एक** पूरा करने वाले परीक्षार्थी **भाग एक** की उत्तर-पुस्तिका निरीक्षक को सौंपने के तुरंत बाद, **भाग दो** की उत्तर-पुस्तिका ले सकते हैं।	Maximum time allotted for **PART ONE** is **ONE HOUR**. Answer book for **PART TWO** will be supplied at the table when the Answer Sheet for **PART ONE** is returned. However, Candidates who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the Answer Sheet for **PART ONE** to the Invigilator.
परीक्षार्थी, उपस्थिति-पत्रिका पर हस्ताक्षर किए बिना और अपनी उत्तर-पुस्तिका, निरीक्षक को सौंपे बिना, परीक्षा हॉल/कमरा नहीं छोड़ सकते हैं। ऐसा नहीं करने पर, परीक्षार्थी को इस मॉड्यूल/पेपर में अयोग्य घोषित कर दिया जाएगा।	**Candidate cannot leave the examination hall/room without signing on the attendance sheet and handing over his/her Answer Sheet to the invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.**
प्रश्न-पुस्तिका को खोलने के निर्देश मिलने के पश्चात् एवं उत्तर लिखना आरम्भ करने से पहले उम्मीदवार जाँच कर यह सुनिश्चित कर लें कि प्रश्न-पुस्तिका प्रत्येक दृष्टि से संपूर्ण है।	After receiving the instruction to open the booklet and before starting to answer the questions, the candidate should ensure that the Question Booklet is complete in all respect.

जब तक आपसे कहा न जाए, तब तक प्रश्न-पुस्तिका न खोलें।
DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

PART ONE

(Answer all the questions)

1. Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the "OMR" answer sheet supplied with the question paper, following instructions therein. **(1x10)**

1.1 The performance of an agent can be improved by :

(A) Learning

(B) Observing

(C) Perceiving

(D) None of the above

1.2 The action of the Simple reflex agent completely depends upon :

(A) Perception history

(B) Current perception

(C) Learning theory

(D) Utility functions

1.3 A certain Professor at the Stanford University coined the word 'artificial intelligence' in 1956 at a conference held at Dartmouth college. Can you name the Professor ?

(A) David Levy

(B) John McCarthy

(C) Joseph Weizenbaum

(D) Hans Berliner

1.4 What is meant by agent's percept sequence ?

(A) Used to perceive the environment

(B) Complete history of actuator

(C) Complete history of perceived things

(D) None of the above

1.5 Which method is effective for escaping from local minima ?

(A) Updating heuristic estimate

(B) Reducing heuristic estimate

(C) Eliminating heuristic estimate

(D) None of the above

1.6 Which term is used for describing the judgmental or commonsense part of problem solving ?

(A) Heuristic

(B) Critical

(C) Value based

(D) Analytical

1.7 What is Machine learning ?

(A) The autonomous acquisition of knowledge through the use of computer programs

(B) The autonomous acquisition of knowledge through the use of manual programs

(C) The selective acquisition of knowledge through the use of computer programs

(D) The selective acquisition of knowledge through the use of manual programs

1.8 Which of the factors affect the performance of learner system does not include ?

(A) Representation scheme used

(B) Training scenario

(C) Type of feedback

(D) Good data structures

1.9 In which of the following learning the teacher returns reward and punishment to learner ?

(A) Active learning

(B) Reinforcement learning

(C) Supervised learning

(D) Unsupervised learning

1.10 Which of the following argument in R programming denotes if the file has a header line ?

(A) header

(B) sep

(C) file

(D) all of the above

2. Each statement below is either TRUE or FALSE. Choose the most appropriate one and enter your choice in the "OMR" answer sheet supplied with the question paper, following instructions therein. **(1x10)**

2.1 Rational agent is the one who always does the right thing.

2.2 The game of Poker is a single agent.

2.3 Clustering is an example of supervised learning.

2.4 Classification is an example of unsupervised learning.

2.5 Two vectors are independent if their correlation is zero.

2.6 The maximum probability for normal distribution is present at mean.

2.7 The intracluster distance is measured with mean.

2.8 In R programming, columns can be arranged in descending order by using descending() operator.

2.9 K nearest neighbor is an example of regression.

2.10 Vector is a basic data structure of R containing same type of data.

3. **Match words and phrases in column X with the closest related meaning/ word(s)/phrase(s) in column Y. Enter your selection in the "OMR" answer sheet supplied with the question paper, following instructions therein.** **(1x10)**

	X		Y
3.1	Sensor	**A.**	Learning
3.2	Actuator	**B.**	R programming
3.3	Clustering	**C.**	Actions affecting the environments
3.4	Classification	**D.**	Gaussian function
3.5	Training	**E.**	Scatter matrix
3.6	Performance	**F.**	KDD
3.7	Data frame	**G.**	Data received from environment
3.8	Normal distribution	**H.**	K-nearest neighbor
3.9	Association rule mining	**I.**	Confusion matrix
3.10	Data Visualization	**J.**	Overfitting
		K.	Frequent item sets
		L.	K-means
		M.	Bagging

4. **Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Enter your choice in the "OMR" answer sheet attached to the question paper, following instructions therein.** **(1x10)**

A.	proc_time	**B.**	procedure_time	**C.**	qplot_ggplot
D.	ggplot.data.frame	**E.**	Mean	**F.**	Variance
G.	OLAP	**H.**	Correlation	**I.**	Regression
J.	Confusion Matrix	**K.**	Unsupervised	**L.**	Supervised
M.	Boosting				

4.1 _____ tools enable users to analyze different dimensions of multidimensional data.

4.2 system.time function returns an object of class _____ which contains two useful bits of information.

4.3 _____ is a statistical technique that can show whether and how strongly pairs of variables are related.

4.4 The change in shape of the bell shaped curve is due to _____.

4.5 _____ creates a new ggplot plot from a data frame.

4.6 Labeled data is required for _____ learning.

4.7 _____ is helpful in shifting the normal distribution from one location to another.

4.8 Unlabeled data is required for _____ learning.

4.9 _____ is a statistical technique for estimating the relationships between a dependent variable and one or more independent variables.

4.10 _____ is a table that is often used to describe the performance of a classification model.

PART TWO

(Answer any FOUR questions)

5. (a) Describe the Building Blocks of AI System in detail.

(b) Describe the following agents :

(i) Goal-based agents

(ii) Utility-based agents

(iii) Learning agents **(6+[3+3+3])**

6. (a) What are the applications of AI ?

(b) Explain the ways/techniques for cleaning the raw data. **(7+8)**

7. (a) What are the metrics to analyze the performance of machine learning models ?

(b) Explain the neural networks with feed forward with back propagation in detail with example. **(7+8)**

8. (a) How missing values and impossible values are represented in R language ?

(b) How many data structures does R language have ?

(c) R language have several packages for solving a particular problem. How do you make a decision on which one is the best to use ? **(5+6+4)**

9. (a) Write a program in R assuming six kids are standing in line. What is the probability that they are in alphabetical order by name ? Assume no two children have the same exact name.

(b) Write a program in R to calculate the probability of drawing two face cards (Jack, Queen, King) in a row. Simulate a standard deck of 52 cards (no jokers). Sample two cards from the deck 1000 times (remember we do not replace the card after drawing). How does the proportion of times two face cards were drawn compare to the probability you calculated ? **(6+9)**

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SPACE FOR ROUGH WORK

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