

A9.5-R5 : Artificial Intelligence Concepts and R Programming

अवधि : 03 घंटे

DURATION : 03 Hours

अधिकतम अंक : 100

MAXIMUM MARKS : 100

ओएमआर शीट सं. :

OMR Sheet No. :

रोल नं. :

Roll No. :

उत्तर-पुस्तिका सं. :

Answer Sheet No. :

परीक्षार्थी का नाम :

Name of Candidate :

परीक्षार्थी के हस्ताक्षर :

; Signature of Candidate :

परीक्षार्थियों के लिए निर्देश :	Instructions for Candidates :
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 अंग्रेजी भाषा में है। परीक्षार्थी उत्तर लिखने के लिए केवल अंग्रेजी भाषा का ही प्रयोग कर सकते हैं।	Question Paper is in English language. Candidate has to 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 हैं तथा भाग दो "व्यक्तिपरक" प्रकार का है और इसके कुल अंक 60 हैं।	PART ONE is Objective type and carries 40 Marks. PART TWO is Subjective type and carries 60 Marks.
भाग एक के उत्तर, इस प्रश्न-पत्र के साथ दी गई ओएमआर उत्तर-पुस्तिका पर, उसमें दिये गए अनुदेशों के अनुसार 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, supplied with the question paper, as per the instructions contained therein. 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 यह जाँच कर 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; each question carries **ONE** mark)

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. Weak Artificial Intelligence refers to :

- (A) A set of computer programs that produce output that would be considered to reflect intelligence if it were generated by humans
- (B) The embodiment of human intellectual capabilities within a computer
- (C) Simulation of human cognition to benefit mankind by automating time-consuming tasks
- (D) None of these

1.2 In learning agents, which of the following is responsible for suggesting actions ?

- (A) Learning element
- (B) Critic
- (C) Performance element
- (D) Problem generator

1.3 If I have two vectors $x \leftarrow c(1,3, 5)$ and $y \leftarrow c(3, 2, 10)$, what is produced by the expression `cbind(x, y)` ?

- (A) 1 by 3 numeric matrix
- (B) 3 by 2 numeric matrix
- (C) 5 by 10 numeric matrix
- (D) None of these

1.4 Consider the following function :

```
f <- function (a) {  
  g <- function (b) {  
    b + c  
  }  
  c <- 5  
  a + g (a)  
}
```

What is the output of executing the following commands ?

```
c <- 10  
f(5)  
(A) 20  
(B) 10  
(C) 15  
(D) 5
```

1.5 The most widely used metrics and tools to assess a classification model are :

- (A) Confusion matrix
- (B) Cost-sensitive accuracy
- (C) Area under the ROC curve
- (D) All of the above

1.6 Machine Learning technique that finds out some very useful relations between parameters of a large data set is :

- (A) Classification
- (B) Regression
- (C) Association
- (D) Clustering

- 1.7 Which of the following is a regression task ?
- (A) Predicting nationality of a person
 - (B) Predicting age of a person
 - (C) Predicting whether a patient's condition is related to a disease
 - (D) Predicting whether stock price of a company will fall tomorrow
- 1.8 Which of the following distribution is suitable to model "The number of patients arriving in an emergency room between 10 and 11 pm"?
- (A) Normal distribution
 - (B) Poisson distribution
 - (C) Binomial distribution
 - (D) None of these
- 1.9 What is the property of a Binomial distribution ?
- (A) There are only two possible outcomes in a trial - either a success or a failure
 - (B) Each trial is independent
 - (C) The probability of success and failure is same for all trials
 - (D) All of these
- 1.10. Which of the following is a structured data ?
- (A) Relational data
 - (B) XML data
 - (C) Video data
 - (D) None of these
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 Strong Artificial Intelligence is the embodiment of human intellectual capabilities within a computer.
- 2.2 Artificial intelligence is programming with intelligence.
- 2.3 An agent function is a map from the percept sequence to an action.
- 2.4 Model based reflex agents ignore the rest of the percept history and act only on the basis of the current percept.
- 2.5 OLTP is used in planning, problem solving and decision making.
- 2.6 A data warehouse is built to extract useful information and patterns from data.
- 2.7 In R matrix is not an atomic data type.
- 2.8 Missing values in a csv file has been represented by an exclamation mark ("!") and a question mark ("?"). The `csv("Dataframe.csv",header=FALSE,sep=',',na.strings = c ("?','!'))` code will read the file correctly into R.
- 2.9 In K means clustering, if K will increase, then the average distortion will decrease.
- 2.10 Structured data is more flexible than unstructured data.

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

Column X		Column Y	
3.1	Infrared range finders	A.	Data Cleaning
3.2	Analyzing customer profitability	B.	Regression
3.3	Artificial Intelligence	C.	Robotic agent
3.4	Received network packages	D.	Classification
3.5	ATM Centre	E.	Decision making
3.6	Machine learning	F.	OLAP application
3.7	Netflix movie recommendation	G.	Software agent
3.8	Spam Filtering	H.	OLTP application
3.9	Predicting stock prices	I.	Learning new things
3.10	Irrelevant data	J.	Clustering
		K.	Association
		L.	Tools
		M.	Manipulator

4. Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Choose the most appropriate option, enter your choice in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

A	Model-based agent	B	A. M. Turing	C	John McCarthy	D	Machine Learning
E	Debugger	F	Data Validity	G	Data reduction	H	Unsupervised
I	Supervised	J	Regression	K	Utility-based agent	L	Model-based agent
M	Normal Distribution						

- 4.1 _____ developed a technique for determining whether a computer could or could not demonstrate the artificial Intelligence.
- 4.2 _____ coined the word 'artificial intelligence' at a conference held at Dartmouth college.
- 4.3 _____ agent can handle partially observable environments.
- 4.4 _____ choose actions based on a preference for each state.
- 4.5 _____ manages influencing user's machine to gain from the external environment.
- 4.6 _____ method aims to increase the storage efficiency and reduce data storage and analysis costs.
- 4.7 R comes with _____ to help you optimize your code and improve its performance.
- 4.8 Recommendation systems found on the web in the form of marketing automation are based on _____ learning.
- 4.9 _____ describes how an independent variable is numerically related to the dependent variable.
- 4.10 _____ is the degree to which the data conform to defined business rules or constraints.

PART TWO

(Answer any FOUR questions)

- 5. (a) Define rational agent. Describe different types of structures for intelligent agents in artificial intelligence.
- (b) What is the difference between Business Intelligence and Analytics ? **(10+5)**
- 6. (a) How AI can be useful in finance sector ? Explain.
- (b) List some areas of application of AI. Illustrate the application of AI in automation. **[5+10]**
- 7. (a) Consider the following set of points : $\{(-2, -1), (1, 1), (3, 2)\}$. Find the least square regression line for the given data points.
- (b) Differentiate between Supervised learning and unsupervised learning.
- (c) Explain K-Nearest Neighbour algorithm. **(5+5+5)**

8. (a) Explain the data structures in R that is used to perform statistical analyses and create graphs.

(b) (i) Create the following dataframe :

	emp_id	emp_name	salary	start_date
1	1	Rick	623.30	2012-01-01
2	2	Dan	515.20	2013-09-23
3	3	Michelle	611.00	2014-11-15
4	4	Ryan	729.00	2014-05-11
5	5	Gary	843.3	2015-03-27

- (ii) Get the structure of the dataframe.
 - (iii) Print the statistical summary of the data
 - (iv) Extract Employee name and salary from the data frame
 - (v) Extract Employee name and start date for 3rd and 5th employee
 - (vi) Add "dept" column vector to the dataframe. **(8+7)**
9. (a) Write in short about the probability distributions (i) Normal distribution and (ii) Poisson distribution.
- (b) Explain structured, unstructured and semi-structured data with example.
- (c) Write a R program to convert a given matrix to a 1 dimensional array. **(5+5+5)**

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SPACE FOR ROUGH WORK

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