

Sl. No.

**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 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 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, 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; 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** In which of the following situations might a blind search be acceptable ?

- (A) Complex Games
- (B) Real life Problems
- (C) Small Search Space
- (D) All of the above

**1.2** Issues with simple reflex agents are :

- (A) No knowledge of non-perceptual parts of state
- (B) Very limited intelligence
- (C) Usually too big to generate and store
- (D) All of the above

**1.3** In a learning agent, which of the following is irresponsible for selecting external action ?

- (A) No knowledge of non-perceptual parts of state
- (B) Very limited intelligence
- (C) Usually too big to generate and store
- (D) All of the above

**1.4** OLAP stands for :

- (A) Online Advanced Processing
- (B) Online Aggregate Processing
- (C) Online Analytical Processing
- (D) Online Language Processing

**1.5** The process of viewing the cross-tab (one dimensional) with a fixed value of one attribute is :

- (A) Slicing
- (B) Pivoting
- (C) Dicing
- (D) None of these

**1.6** Which of the following exposes the information being captured, stored and managed by operational systems ?

- (A) Top-down view
- (B) Data source view
- (C) Business query view
- (D) Data warehouse

**1.7** Which of the following is invalid assignment in R programming ?

- (A) `>c(10.4, 5.6, 3.1, 6.4, 21.7) -> x`
- (B) `>assign("x", c(10.4, 5.6, 3.1, 6.4, 21.7))`
- (C) `> x <- c(10.4, 5.6, 3.1, 6.4, 21.7)`
- (D) None of these

- 1.8 What will be the output of `> sqrt(-17)` in R ?
- (A) 4.02
  - (B) -4.02
  - (C) NaN
  - (D) None of these
- 1.9 Which of the following is suitable to model "The number of laser photons hitting a detector in a particular time interval" ?
- (A) Normal distribution
  - (B) Poisson distribution
  - (C) Binomial distribution
  - (D) None of these
- 1.10 Which of the following is a source of unstructured data ?
- (A) Videos
  - (B) Survey reports
  - (C) Webpages
  - (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 Strong Artificial Intelligence is a set of computer programs that produce output that would be considered to reflect intelligence if it were generated by humans.
  - 2.2 Simple reflex agents ignore the rest of the percept history and act only on the basis of the current percept.
  - 2.3 Business intelligence equips enterprises to gain business advantage from data.
  - 2.4 The action of a rational agent doesn't depend on the preferences of the agent.
  - 2.5 In R, `class()` is used to determine data type of the variable.
  - 2.6 If the true function is complex, then a learning algorithm with high bias and low variance will be able to learn it from a small amount of data.
  - 2.7 Removing the suspected noisy training examples prior to training decreases generalization error.
  - 2.8 Regression refers to the degree to which pair of variables are linearly related.
  - 2.9 A goal-based agent can handle partially observable environments.
  - 2.10 It is more difficult to scale structured data than unstructured 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	Agent function	A.	Market segmentation
3.2	K-Nearest Neighbour	B.	Capital asset pricing
3.3	Linear Regression	C.	Unstructured data
3.4	Scatter Plot	D.	Classification and Regression
3.5	K-means clustering	E.	Clustering and Association
3.6	Social media activity data	F.	Correlation of variables
3.7	JSON documents	G.	Condition-action rule
3.8	Data stored in a relational database	H.	Structured data
3.9	Supervised learning	I.	Lazy Learning
3.10	Unsupervised learning	J.	Semi-structured data
		K.	Regression
		L.	Genetic Algorithm
		M.	Dimensionality reduction

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.	Robotic agent	B.	Poisson distribution	C.	Machine Learning
D.	Classification	E.	Transaction Processing	F.	Dimensionality Reduction
G.	K-Nearest Neighbour	H.	K-means clustering	I.	Learning element
J.	Confusion matrix	K.	Structured data	L.	Linear Regression
M.	Unstructured data				

- 4.1 \_\_\_\_\_ is not a data warehouse application.
- 4.2 \_\_\_\_\_ seeks to map the input data into a lower-dimensional space prior to running the supervised learning algorithm.
- 4.3 \_\_\_\_\_ is a non-parametric method used for classification.
- 4.4 \_\_\_\_\_ is an approach to model the relationship between a dependent variable and one or more explanatory variables.
- 4.5 \_\_\_\_\_ is a table that is often used to describe the performance of a classification model.
- 4.6 A \_\_\_\_\_ has cameras and infrared range finders which act as sensors and various motors acting as actuators.
- 4.7 \_\_\_\_\_ takes feedback from critic to describe how well the agent is doing with respect to a fixed performance standard.
- 4.8 \_\_\_\_\_ is highly-organized and formatted in a way so it's easily searchable in relational databases.
- 4.9 \_\_\_\_\_ is useful to model the number of meteorites greater than 1 meter diameter that strike Earth in a year.
- 4.10 \_\_\_\_\_ is an application of AI that provides systems the ability to automatically learn and improve from experience.

**PART TWO**

(Answer any **FOUR** questions.)

5. (a) Explain different components of intelligence studied in artificial intelligence.  
 (b) Explain data warehousing and data mining. List out their benefits in different applications of AI.  
**(7+8)**

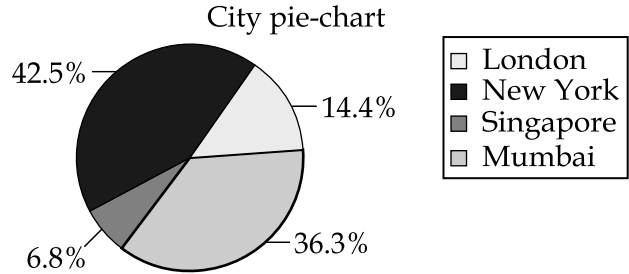
6. (a) Discuss few applications of AI.  
 (b) Illustrate the application of AI and it's usefulness in  
 (i) travel services and  
 (ii) automobile industry  
**(5+10)**

7. (a) The sales of a company (in million dollars) for each year are shown in the table below.

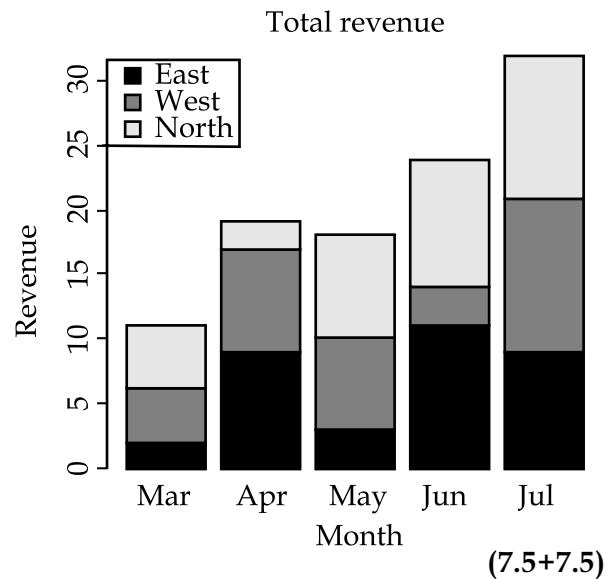
$x$ (year)	2005	2006	2007	2008	2009
$y$ (sales)	12	19	29	37	45

- (i) Find the least square regression line  $y = ax + b$ .  
 (ii) Use the least squares regression line as a model to estimate the sales of the company in 2012.  
 (b) Explain supervised and unsupervised learning with example.  
**(7+8)**

8. (a) What is the basic syntax for creating a pie-chart in R ? Describe the input parameters to the pie() function. Write the code to plot the following pie-chart.



- (b) What is the basic syntax for creating a bar-chart in R ? Describe the input parameters to the barplot() function. Write the code to plot the following bar-chart.



9. (a) Define correlation and regression in statistical analysis. Compare both the methods.  
 (b) Differentiate between structured, unstructured and semi-structured data.  
**(7+8)**

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SPACE FOR ROUGH WORK

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