(3 Hours) **[Total Marks: 80]**

N.B. (1) Question No. 1 is compulsory
(2) Attempt any three questions out of the remaining five questions
(3) Figures to the right indicate full marks
(4) Assume suitable data whenever require

Q1 a) What are the different issues in ML algorithms? **5M**

b) Explain PEAS descriptors. Provide PEAS descriptors for Part Picking robot **5M**

c) Define and state effects of overfitting and underfitting. **5M**

d) Explain goal based agents with example. **5M**

Q2 a) Differentiate between data scientists, big data professionals and data analysts. **10M**

b) Explain state space based problem formulation. Formulate 8 Puzzle and N Queens problem. **10M**

Q3 a) Compare Informed and Uninformed Search algorithms. Explain working of A* algorithm with an example. Explain which category of search algorithms it belongs to. **10M**

b) What are the different univariate plots in EDA? Explain them in detail. **10M**

Q4 a) Consider Following data. Draw scatter plot for this data. Comment on the relationship between Observed Value 1 and Observed Value 2 based on the graph. Find Coefficient of correlation. Does this statistic confirm your observation? Explain your answer. **10M**

Experiment No.	1	2	3	4	5	6	7	8	9	10
Observed Value 1	20	10	30	15	45	40	30	35	45	30
Observed value 2	20	15	30	10	40	65	20	35	90	55

b) Explain the working of the Hill climbing algorithm. What are issues in Hill climbing? **10M**

Q5 a) Describe steps for developing ML applications with a labeled diagram. **10M**

b) What are the different types of environments? Give examples. Explain the vacuum world problem with its environment. **10M**

Q6 Write Short Note on **(Any four)** **20M**

a) ANNOVA
b) Min Max Algorithm
c) Non graphical EDA
d) Forward chaining based proofs
e) Box Plot

Duration: 3hours **[Max Marks:80]**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

Q.1 **[20]**

(a) What is the difference between classification and prediction? Give examples of each.

(b) What is decision support system

(c) How to improve efficiency of Apriori algorithm?

(d) What is K-Means clustering?

Q.2 (a) Suppose that a data warehouse consists of the three dimensions time, doctor, and patient, and the two measures count and charge, where charge is the fee that a doctor charges a patient for a visit. Draw a star schema diagram for the above data warehouse. Starting with the base cuboid [day, doctor, patient], what specific OLAP operations should be performed to list the total fee collected by each doctor in 2004? **[10]**

(b) Given a data set of 5 elements: [10, 20, 30, 40, 50]. Apply Min-Max Normalization (Range [0, 1]) and give normalized value for each input data element. Also apply z-score normalization and give the normalized value for input 30. **[10]**

Q.3 (a) Explain the following OLAP operations with examples: Roll-up, Drill-down, Slice, Dice, Pivot **[10]**

(b) What is attribute selection in decision trees? Explain Information Gain and Gini Index with formulas. **[10]**

Q.4 (a) What are ensemble methods? Why are they useful in classification tasks? **[10]**

(b) What is BIRCH (Balanced Iterative Reducing and Clustering using Hierarchies) algorithm? **[10]**

Q.5 (a) Consider the transaction details as given below. Apply Apriori algorithm with minimum support of 60% and confidence of 75%. Find all the frequent itemsets and all the association rules. **[10]**

Transaction ID	Items Bought
T1	Milk, Bread
T2	Milk, Diaper
T3	Milk, Bread, Diaper
T4	Bread, Diaper
T5	Milk, Bread

(b) Describe any two outlier detection methods. **[10]**

Q.6 **[20]**

(a) Given scores of 10 students: [45, 50, 55, 58, 60, 65, 70, 72, 75, 80] Create a histogram with 3 bins. And Show bin ranges and frequency counts in graphical form.

(b) Given a confusion matrix:

	Predicted Yes	Predicted No
Actual Yes	50	10
Actual No	5	35

Calculate: Accuracy and Precision

(c) What are the key differences between Business Intelligence and traditional reporting systems?

(d) Write a short note on simple linear regression

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(3 hrs.) **Maximum Marks = 80**

NB:

1. **Question No. 1 is compulsory and solve any THREE questions from the remaining questions**
2. **Assume suitable data if necessary**
3. **Draw clean and neat diagrams**

			Marks
Q1.		Attempt any four	
	a.	What is Python Flask?	5
	b.	Explain AngularJS Scope.	5
	c.	What are the features of MongoDB?	5
	d.	State the features of TypeScript.	5
	e.	Explain different types of Web Analytics	5
Q2.	a.	Explain Arithmetic operators with suitable example	10
	b.	How do you set, access and delete cookies in Python Flask?	10
Q3.	a.	Explain Flask templates with an example	10
	b.	Explain different characteristics of RJÀ in details	10
Q4.	a.	Explain RSET API in detail.	10
	b	Explain Drupal's architecture with its advantages.	10
Q5.	a.	What is an AngularJS dependency injection? State 6 examples of AngularJS built-in helper function	10
	b.	Explain MongoDB Data Types along with syntax.	10
Q6.	a.	List the features of AngularJS. Also state its advantages and disadvantages	10
	b.	Explain how internal and External Modules used in TypeScript with suitable example.	10

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Time: 3 Hours **Marks: 80**

Note: 1. Q. No1 is compulsory
2. Solve any three questions out of the remaining five
3. Figures to right indicate full marks
4. Assume suitable data where necessary

Q.No1 Solve any four **(20)**

a) Explain the difference between an Infrastructures based Network and an Adhoc Network of WLAN

b) Compare Frequency Hopping spread spectrum and Direct Sequence Spread Spectrum

c) Explain role of SGSN and GGSN in GPRS

d) Outline the method that supports mobility in CISCO Unified Wireless Network

e) Compare IEEE802.11 and IEE802.16

Q. 2 a. Draw and explain 4G network architecture and compare with 3G **(10)**

b. What are the different types of GSM logical Channels? Explain in detail **(10)**

Q. 3. a. Give the significance of WEP protocols. What are the features of WPA2 **(10)**

b. Give the features of Cisco Unified Wireless Network and explain its architecture **(10)**

Q.4. a. What are the various challenges in WSN and explain the architecture of WSN **(10)**

b. What do you mean by massive MIMO, Compare 1G- 5G mobile standards. **(10)**

Q. 5 a. Explain Zigbee protocol stack **(10)**

b. i)Compare VANET and MANET
ii) State the features of LoRaWAN **(10)**

Q.6

a. Draw and explain Bluetooth Architecture **(10)**

b. Describe the system architecture of 802.11 **(10)**
