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.
(5) Use of Statistical Tables are allowed

Q1. Attempt any four **[20]**

a Formulate the problem for 8 queens.

b What is the difference between unification and Skolemization?

c Define over fitting and under fitting in detail with a diagram.

d Explain utility based agent architecture with diagram.

e Compare box-plot and scatter-plot.

f Explain working of Forward and Backward Chaining algorithms

Q2. a Consider following 5*5 grid where S represents start and G goal position, # represents an obstacle. .(dot) represents free to move in cell. consider agent can follow four standard moves in this puzzle world. **[10]**

S	.	.	#	.
#	.	#	.	.
.	.	.	#	.
.	#	.	.	.
.	.	.	.	G

Represent this puzzle as state space search problem. Apply Hill Climbing Search. Does the algorithm stuck in Local Minima ?

b Write note on following supervised learning techniques: a) SVM b) ID3 **[10]**

Q3. a What do you mean by data analytics? What are the different types of data analytics? **[10]**

b What is linear regression? Explain its significance in ML. Compare it with logistic regression **[10]**

Q4. a Perform t-test on following data about choice of customers who peferred either tea or coffee. The experiment was repeated 5 times and results are tabulated below. Comment weather the mean of two sets are same based on test result? (Consider α=0.05, t(0.05,3)=3.182, t(0.05,4)= 2.776, t(0.05,8)=2.306 t(0.05,9)=2.262 t(0.05,10)=2.228) **[10]**

Tea	4	5	7	6	9
Coffee	3	8	6	14	7

Clearly mention Null and Alternate hypothesis. Also comment weather t-test fails or succeeds in rejecting Null Hypothesis.

b What are the different uni-variate plots in EDA? Explain them in detail **[10]**

Q5. a What are the different issues in ML algorithms? **[10]**

b Compare Z-Test, T-Test and ANOVA in detail. **[10]**

Q6. a Describe the architecture of ML application. Explain with a diagram. **[10]**

b Describe any four uninformed search strategies. Compare them with time complexity, space complexity, optimality and completeness. **[10]**
