[Time: 3 hrs] **[Total Marks: 80]**

Note : 1. Question 1 is compulsory
2. Answer any three out of remaining question
3. assume suitable data where required

Q1	Attempt any **4**	**[20]**
[A]	Explain problems faced by Hill Climbing algorithm.	**[05]**
[B]	Write PEAS descriptor for Shopping for used AI books on the Internet.	**[05]**
[C]	Write a program in Prolog to create a family tree.	**[05]**
[D]	Draw and explain architecture of Expert System.	**[05]**
[E]	Discuss different types of environments for Intelligent Agents.	**[05]**
Q2		**[20]**
[A]	Explain A algorithm with an example. Also discuss its performance.	**[10]**
[B]	What are the different types of agents? Explain Goal based agent with a diagram.	**[10]**
Q3		**[20]**
[A]	What is formulation of a problem? Formulate 8-Puzzle problem in terms of following components: initial state, actions, successor function, goal test and path cost.	**[10]**
[B]	Define chromosome, selection, fitness function, cross over and mutation as used in genetic algorithm. Explain the working of genetic algorithm.	**[10]**
Q4		**[20]**
[A]	"As per the law, it is a crime for an American to sell weapons to hostile nations. Country A, an enemy of America, has some missiles, and all the missiles were sold to it by Robert, who is an American citizen." Prove that "Robert is criminal." Using forward and backward Chaining.	**[10]**
[B]	What is planning in AI? Explain partial order planning with an example.	**[10]**

Q5 **[20]**

[A] Write first order statements for following **[10]**

(i) Every dolphin is Mammal

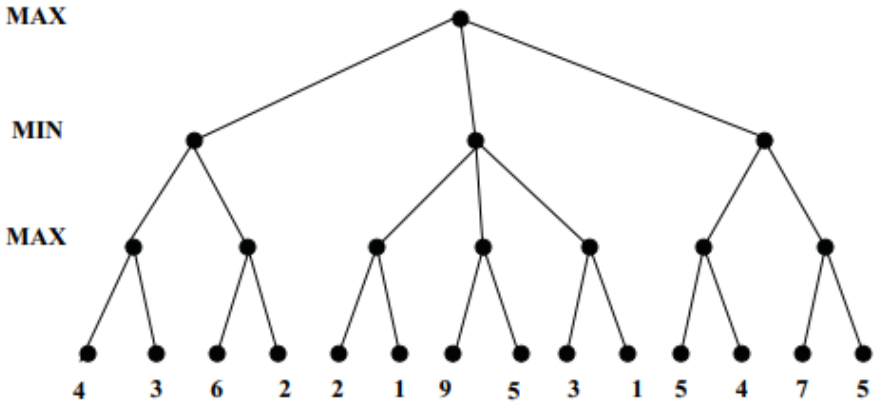
(ii) No purple mushroom is poisonous.

(iii) Every gardener loves sun.

(iv) You can fool someone all the time.

(v) All Romans were either loyal to ceaser or hated him.

[B] Explain Alpha-beta pruning algorithm. Apply alpha beta pruning on the following example considering the first node as MAX. **[10]**



Q6 **[20]**

[A] Explain Bayesian Belief Networks with an example. **[10]**

[B] Explain different types of learning in AI. **[10]**

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Time: 3 hours **Max. Marks: 80**

N.B. (1) Question one is Compulsory.
(2) Attempt any 3 questions out of the remaining.
(3) Assume suitable data if required.

Q. 1 a) Explain features of Datawarehouse. 05

b) What is Data Preprocessing? Explain the different methods for the Data integration phase 05

c) What is hierarchical clustering? Explain divisive clustering 05

d) Define Metadata and explain the types of metadata 05

Q. 2 a) Explain association rule mining and mutilevel association rules giving example of multidimensional association rules 10

b) Give Data mining as a step in KDD. Give the architecture of typical Data Mining system 10

Q. 3 a) Explain Extraction and transformation in ETL process. 10

b) Illustrate Multidimensional association rules with suitable examples 10

Q. 4 a) Define classification, issues of classification and explain Naïve bayesian classification with example 10

b) Find the mean, median, mode, midrange, variance of data
13,15,16,16,19,20,20,21,22,25,26,26,26,30,33,36,40,45,46,52,52,70 10

Q. 5 a) Explain HITS algorithm and illustrate its working 10

b) Explain Web structure mining in detail 10

Q. 6 a) What is clustering? Explain k-means clustering algorithm. Suppose the data is {2,4,10,12,3,20,11,25} Consider k=2,cluster the given data using above algorithm 10

b) Illustrate with various operations and examples of OLAP cube 10

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Time: 3 hours **Max. Marks: 80**

N.B. (1) Question one is Compulsory.
(2) Attempt any 3 questions out of the remaining.
(3) Assume suitable data if required.

Q. 1 a) Describe the different guided transmission medias used in the network 05

b) Explain Repeater, Hub, Bridge, Switch & Routers. 05

c) Enumerate the main responsibilities of the DLL 05

d) Differentiate between TCP and UDP. 05

Q. 2 a) Explain TCP/IP reference model & compare it with OSI reference model. 10

b) With the help of suitable example explain sliding window protocol using Go-Back-N technique. 10

Q. 3 a) Consider an error detecting CRC With the generator10101.

(i) Compute the transmitted bit sequence for the data bit sequence 110010101.

(ii) The string of bits 110011001100 is received. Check whether there are errors in the received code word. 10

b) What is routing? what are desirable characteristics of routing algorithm? Explain Dijkstra's algorithm as shortest path routing with suitable example. 10

Q. 4 a) What is subnetting? Given the class C network 192.168.10.0 use the subnet mask 255.255.255.192 to create subnets and answer the following: 10

(i) What is the number of subnets created?

(ii) How many hosts per subnet?

(iii) Calculate the IP address of the first host, the last host and the broadcast address of each subnet

b) Explain in brief classic three-layer Hierarchical model for network design by Cisco 10

Q. 5 a) Explain with the help of suitable diagram TCP connection management and release? 10

b) Elaborate the architecture of Nox and Pox controller of SDN with their comparison. 10

Q. 6 Write a short note on :

a) DNS 05

b) SDN 05

c) PPDIOO Network design Methodology. 05

d) NAT 05

(3 hours) **Total Marks: 80**

N.B. 1. Question **No. 1** is compulsory
2. Attempt any **three** questions from remaining five questions
3. Assume suitable data if **necessary** and justify the assumptions
4. Figures to the **right** indicate full marks

Q1		**Answer the Following.**	
	A	Draw and illustrate web 3-tier architecture.	05
	B	Write a Javascript to accept a number from the user and check if it is even or odd.	05
	C	Explain React JSX with suitable react examples such as rendering the greeting message "Hello! Welcome to React"	05
	D	What is callback in node.js? Give an example.	05
Q2	A	1) Explain React Component Life cycle with suitable diagram. 2) Write a JavaScript code to set a cookie in the user's computer.	12
		What is a single page application? What are components in React? Create one class component "Car" in React and invoke it using index.js.	08
Q3	A	Write the code to process online Alumni information for your college. Create a form to get a name, date of birth and email id. Use check boxes for taking hobbies and radio buttons for selecting branch. Write JavaScript code to validate the following. -User has to fill all the fields prior to the form submission. -Valid email id (@ and .) -Age validation using DOB (>=22 years)	10
	B	Explain the concept of React Hooks. What are the rules of using Hooks? Write the code making use of Hooks useState function that displays the number of times a button named "CLICK" is clicked.	10
Q4	A	Write a short note on Document Object Model(DOM)	05
	B	Explain different types of node.js modules? What are different modules that provide core functionality?	05
	C	What are the features of React.js	05
	D	Write a Javascript Program that changes the background color of page by refreshing the page every 2 seconds	05
Q5	A	Explain the architecture of node.js with a neat diagram. Write an asynchronous file reading node.js program and explain how it is executed.	10
	B	What is NodeJs and Express.js? Discuss the features and advantages of Express.js. Explain cookies concept in Express.js with example.	10
Q6	A	Differentiate between MVC, FLUX and Redux.	10
	B	Differentiate between ES5 and ES6. Describe the concepts of Arrow Functions, classes and inheritance in JavaScript.	10

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

(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.

1 Attempt any **four** **[20]**

a) Write a short note on hypothesis testing.
b) What is Fisher's exact test?
c) Write a short note Simple Linear Regression
d) Write a short note on Random sampling
e) What is the empirical CDF function?

2 a) Construct a frequency distribution table for the following weights (in gm) of 30 oranges using the equal class intervals, one of them is 40-45 (45 not included). The weights are: 31, 41, 46, 33, 44, 51, 56, 63, 71, 71, 62, 63, 54, 53, 51, 43, 36, 38, 54, 56, 66, 71, 74, 75, 46, 47, 59, 60, 61, 63. **[10]**

(a) What is the class mark of the class intervals 50-55?
(b) What is the range of the above weights?
(c) How many class intervals are there?
(d) Which class interval has the lowest frequency?

b) What is the primary purpose of conducting a one-way ANOVA. Explain the key components of a one-way ANOVA, including the dependent variable, independent variable, and factors. **[10]**

3 a) Find the standard error of the estimate for the average number of children in a household in your city by using the data collected from a sample of households in your city. Then find a 95% confidence interval for the data. **[10]**

Household	No. of children
1	2
2	3
3	1
4	0
5	5
6	2
7	1
8	4

b) What is the concept of correlation in statistics, how is it different from regression? **[10]**

4 **a)** A radar unit is used to measure speeds of cars on a motorway. The speeds are normally distributed with a mean of 90 km/hr and a standard deviation of 10 km/hr. What is the probability that a car picked at random is travelling at more than 100 km/hr? **[10]**

b) Explain Numerical and Categorical data types with appropriate examples **[10]**

5 **a)** Duracell manufactures batteries that the CEO claims will last an average of 300 hours under normal use. A researcher randomly selected 20 batteries from the production line and tested these batteries. The tested batteries had a mean life span of 270 hours with a standard deviation of 50 hours. Do we have enough evidence to suggest that the claim of an average lifetime of 300 hours is false? **[10]**

b) Explain linear least square regression (LLSR) along with it's advantages and disadvantages. **[10]**

6 **a)** A farmer is trying out a planting technique that he hopes will increase the yield on his pea plants. The average number of pods on one of his pea plantsis 145 pods with a standard deviation of 100 pods. This year, after trying his new planting technique, he takes a random sample of his plants and finds theaverage number of pods to be 147. He wonders whether or not this is a statistically significant increase. What are his hypotheses and the test statistic? **[10]**

b) What is the Chi-Square Test in statistics, and in what kind of situations or research scenarios is it commonly used? **[10]**

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