[3 hrs] **[80 Marks]**

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

Q1 Solve **any 4**

a)	Explain applications of AI in the field of healthcare?	**5**
b)	Draw and explain architecture of Expert System	**5**
c)	Compare goal-based agent with knowledge-based agent.	**5**
d)	Write a PROLOG program for factorial of given number.	**5**
e)	Write PEAS for English Speaking Tutor	**5**

Q2

a)	Explain the steps involved in converting the propositional logic statement into CNF with suitable example	**10**
b)	Define chromosome, selection, fitness function, cross over and mutation as used in Genetic Algorithm. Explain how Genetic Algorithm in works.	**10**

Q3

a)	Explain bayes theorem with example.	**10**
b)	Explain Hill Climbing algorithm. Explain problems faced by hill climbing algorithm.	**10**

Q4

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)	Enlist different types of environments and Explain environment for 8 queen problem.	**10**

Q5

a)	Explain Alpha Beta pruning with example.	**10**
b)	Explain Iterative Deepening Search Algorithm based on performance measure.	**10**

Q6

a)	Explain Utility Based Agents with diagram.	**10**
b)	Explain partial order planner with an example.	**10**

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) Every data structure in the data warehouse contains the time element. Why? 05

(b) Calculate Accuracy, Recall and Precision with the help of following data: 05
True Positive (TP)= 50, True Negative (TN) = 20, False Positive (FP)= 20, False Negative (FN)= 10

(c) What is Market basket analysis? 05

(d) Draw and explain KDD process. 05

Q. 2 a) Suppose that a data warehouse consists of the four dimensions, date, spectator, location, and game, and the two measures, count and charge, where charge is the fare that a spectator pays when watching a game on a given date. Spectators may be students, adults, or seniors, with each category having its own charge rate.

a) Draw a star schema diagram for the data warehouse.
b) Draw the base cuboid [date, spectator, location] and apply any four OLAP operations. 10

b) What is clustering? Explain K-mean clustering algorithm. Suppose that the data mining task is to cluster the following items into two clusters.
{2, 4, 10, 12, 3, 20, 30, 11, 25, 56, 23}. Apply k-means algorithm. 10

Q.3 a) A database has five transactions. Let min sup = 50% and min conf = 70%.

T_id	Items
T100	a,b
T200	a,c,d
T300	e,c,a
T400	c,d,b
T500	a,c,d,b,e

Find all frequent itemsets and strong association rules using Apriori Algorithm. 10

b) What is data preprocessing? Explain different data cleaning techniques. 10

Q. 4 a) The following table contains a training set D, of class-labeled tuples randomly selected from the AllElectronics customer database. Let buys_computer be the class label attribute. Using Naïve Bayesian classification predict the class label of a tuple X = (age = youth, income = medium, student = yes, credit rating = fair).

RID	Age	income	student	credit_rating	buys_computer
1	Youth	High	No	fair	No
2	Youth	High	No	excellent	No
3	middle-aged	High	No	fair	Yes
4	Senior	medium	No	fair	Yes
5	Senior	low	Yes	fair	yes
6	Senior	low	Yes	excellent	no
7	middle-aged	low	Yes	excellent	yes
8	Youth	medium	No	fair	no
9	Youth	low	Yes	fair	yes
10	Senior	medium	Yes	fair	Yes
11	Youth	medium	Yes	excellent	Yes
12	middle-aged	medium	No	excellent	Yes
13	middle-aged	high	Yes	fair	Yes
14	Senior	medium	No	excellent	No

b) What is web mining? Explain HITS algorithm. 10

Q. 5 a) Explain with example multilevel association mining and multidimensional rule mining. 10

b) Clearly explain the working of DBSCAN algorithm using appropriate diagram. 10

Q.6 (a) Explain with example different data sampling techniques. 10

(b) Write short note on any 2 10

i. Differentiate between OLTP and OLAP

ii. Web Content mining

iii. Data Loading in ETL

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

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	What is HTTP? Explain its working along with request and response example.	05
	B	Write a Javascript to change the background color of the web page to red color if button named "RED" is clicked and to green color if button named "GREEN" is clicked.	05
	C	Write the program to create a simple HTTP server to display a welcome message with node.js.	05
	D	What are components in React? Create one class component "Car" in React and invoke it using index.js.	05
Q2	A	Write JavaScript to validate Username, Password and Email. Username and Password should not be blank and minimum length of password =8. Email should have @ character.	10
	B	What is a single page application? Explain React JSX with suitable examples such as rendering the greeting message "Hello! Welcome to React"	10
Q3	A	1) Write a Javascript to accept two numbers and display their sum using pop up box. 2) 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 button named "CLICK" is clicked.	12
	B	Explain React Component Life cycle with suitable diagram.	8
Q4	A	Write an XML file marksheet.xml representing your semester mark sheet. How do you prove that it is well formed and valid XML?	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	Draw and illustrate 3-tier web architecture.	05

Q5	A	Explain the working of the event loop along with different phases 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.	10
Q6	A	Explain the architecture of Flux in detail.	10
	B	Differentiate ES5 and ES6. Give an example of the Anonymous and Arrow function in ES6.	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)	List and describe the different network connection topologies.	05
	b)	Describe the different guided transmission medias used in the network	05
	c)	What is subnetting? What are the default subnet mask?	05
	d)	Explain Three Way Handshaking for connection establishment in TCP.	05
Q 2	a)	Describe in detail OSI reference model with a neat diagram	10
	b)	A bit stream 10011101 is transmitted using standard CRC method. The generator polynomial is $\mathbf{X^3 + 1}$. i) What is the actual bit stream transmitted? ii) Verify that receiver had received the correct bit stream.	10
Q 3	a)	Compare and contrast between i) IPv4 vs IPv6 ii) Connection oriented protocol vs Connectionless protocol	10
	b)	Explain in brief Cisco PPDIOO Network design Methodology	10
Q 4	a)	Write notes on DNS and Explain components on DNS.	10
	b)	What is Routing? What are desirable characteristics of routing algorithms? Explain distance vector routing with suitable example	10
Q 5	a)	What is SDN? Explain the concept of control plane and data plane with respect to SDN	10
	b)	Elaborate Cisco SONA Architecture in detail	10
Q 6		Write a short note on	
	a)	Sliding Window Protocol	05
	b)	OpenFlow messages	05
	c)	NAT	05
	d)	DHCP	05

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