

(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. 10  
Username and Password should not be blank and minimum length of password =8. Email should have @ character.
- 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. 12  
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.
- 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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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  $X^3 + 1$ . 10  
 i) What is the actual bit stream transmitted?  
 ii) Verify that receiver had received the correct bit stream.
- Q 3 a) Compare and contrast between 10  
 i) IPv4 vs IPv6  
 ii) Connection oriented protocol vs Connectionless protocol  
 b) Explain in brief Cisco PPDIIO 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? 10  
 Explain distance vector routing with suitable example
- 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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[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? | <b>5</b> |
| b) Draw and explain architecture of Expert System         | <b>5</b> |
| c) Compare goal-based agent with knowledge-based agent.   | <b>5</b> |
| d) Write a PROLOG program for factorial of given number.  | <b>5</b> |
| e) Write PEAS for English Speaking Tutor                  | <b>5</b> |

**Q2**

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

**Q3**

- |  |           |
|--|-----------|
| a) Explain bayes theorem with example.   | <b>10</b> |
| b) Explain Hill Climbing algorithm. Explain problems faced by hill climbing algorithm. | <b>10</b> |

**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. | <b>10</b> |
| b) Enlist different types of environments and Explain environment for 8 queen problem.  | <b>10</b> |

**Q5**

- |   |           |
|---|-----------|
| a) Explain Alpha Beta pruning with example.                                   | <b>10</b> |
| b) Explain Iterative Deepening Search Algorithm based on performance measure. | <b>10</b> |

**Q6**

- |   |           |
|---|-----------|
| a) Explain Utility Based Agents with diagram.     | <b>10</b> |
| b) Explain partial order planner with an example. | <b>10</b> |

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. 10  
 {2, 4, 10, 12, 3, 20, 30, 11, 25, 56, 23}. Apply k-means algorithm.
- 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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Time: 3Hrs

Marks:80

**N.B. 1. Question No. 1 is compulsory.****2. Attempt any three questions out of remaining five.****3. All questions carry equal marks****4. Assume Suitable data, if required and state it clearly.**

1 Attempt any four: 20

- What is sampling in statistics? Explain different sampling methods ?
- Explain Histogram and Bar graph?
- What do you understand by the term Test significance?
- Define mean ,Weighted mean ,Median and Weighted Median?
- State the central limit theorem ?

2 (a) Following data is the growth of employment in India in lakhs between 1988 to 1995 10

Find correlation coefficient of the given data between public and private sector and give your comments

Year	1988	89	90	91	92	93	94	95
Public sector	98	101	104	107	113	120	125	128
Private sector	65	65	67	68	68	69	68	68

(b) Out of 1000 families with 4 children each,how many would you expect to have 10

- At least one boy
- No girl
- At most 2 girls

3 (a) You have just taken ownership of a pizza shop. previous owner told you that you would save money if you bought the mozzarella cheese in a 4.5 pound slab on the average. Each time you purchase a slab of cheese, you weigh it to ensure that you are receiving a standard deviation of 72 ounces of cheese. The results of 7 random measurements are 70, 69, 73, 68, 71, 69 The and 71 ounces. Are these differences due to chance or is the distributor giving you less cheese than you deserve? i. State the hypotheses. ii. Calculate the test statistic. iii. Would the null hypothesis be rejected at the 10% level? The 5% level? The 1% level? 10

(b) Solve using one-way Anova method 10

Observation	A	B	C
1	25	31	24
2	30	39	30
3	36	38	28
4	38	42	25
5	31	35	28

- 4 a) A researcher is interested in comparing the prices of houses in four rural towns. She obtains the following data on three recent sales from each town and ranks the observations from lowest to highest. The ranks are presented in the table below: 10

calculated value of the Kruskal-Wallis test statistic ?

Town A	Town B	Town C	Town D
7	1	4	7
11.5	2	9.5	9.5
7	3	5	11.5

- b) 7 random people are given 3 different drugs and for each person the reaction time corresponding to the drugs were noted. Test the claim at the 5% significance level that all 3 drugs have same probability distribution (chi square for DF = 2 and 5% is 5.991) use friedman test ? 10

	Drug A	B	C
1	1.24	1.50	1.62
2	1.71	1.85	2.05
3	1.37	2.12	1.68
4	2.53	1.87	2.62
5	1.23	1.34	1.51
6	1.94	2.33	2.86
7	1.72	1.43	2.86

- 5 a) Find out what is the relation between salary of a group of people in an organization and the number of year of experience and age of employee ? 10

Salary	Age	Experience
26315	18	5
39493	20	7
37209	22	8
24380	23	6
25741	23	7
44629	25	5
37616	2	8
33305	28	6
42551	32	7
25700	37	9
37303	41	6
24659	46	7
32617	49	8
35771	53	6

- b) Answer the following: 10

- a) State Type 1 and Type 2 Error  
 b) One way v/s two way ANNOVA
- 6 a) i. Compare 10  
 a. Binomial and Poisson Distribution  
 b. Box plot and Violin Plot
- b) i. State the concept of Boot strapping along with its key features?  
 ii. In the context of multiple regression explain what is overfitting and multicollinearity? 10