Duration: 3 Hours **[Total Marks -80]**

N.B. (i) **Q. No. 1** is compulsory
(ii) Attempt any **three** questions out of the remaining **five** questions

1	(a)	How Pipeline Architecture is different from Array Processor architecture	**05**
	(b)	Explain the various types of Parallel Programming Models?	**05**
	(c)	Explain a method of Dynamic Instruction scheduling for minimizing hazards.	**05**
	(d)	Explain Dataflow Computer with examples.	**05**
2	(a)	Explain different types of pipeline Hazards and the techniques used to eliminate those hazards.	**10**
	(b)	Describe Architectural Model of Distributed System with neat diagram.	**10**
3	(a)	Discuss in detail the various performance metrics in parallel computing.	**10**
	(b)	Explain Lamport's Distributed Mutual Algorithm.	**10**
4	(a)	Explain Matrix Multiplication on SIMD.	**10**
	(b)	Discuss File caching for Distributed Algorithm.	**10**
5	(a)	Compare and contrast Task Assignment, Load Balancing and Load Sharing approaches	**10**
	(b)	Explain call Semantics of RPC.	**10**
6	(a)	Describe any one Election algorithm in detail with an example.	**10**
	(b)	Explain File Accessing Models.	**10**

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Time: 03 Hours **Marks: 80**

Note: 1. Question 1 is compulsory
2. Answer any three out of remaining questions.

Q1 A) A manufacturing company has a huge sales network. To control the sales, it is divided into regions. Each region has multiple zones. Each zone has different cities. Each sales person is allocated different cities. The objective is to track sales figure at different granularity levels of region and to count no. of products sold. Design a star schema by considering granularity levels for region, sales person and time. Convert the star schema to snowflake schema. [10]

B) Discuss: [10]

i) Architecture of a typical data mining system.

ii) Application and major issues in Data Mining

Q2 A) Consider a data warehouse for a hospital where there are three dimension [10]
a) Doctor b) Patient c) Time
Consider two measures i) Count ii) Charge where charge is the fee that the doctor charges a patient for a visit. For the above example create a cube and illustrate the following OLAP operations.
1) Rollup 2) Drill down 3) Slice 4) Dice 5) Pivot.

B) Consider the data given below. Create adjacency matrix. Apply single link algorithm to cluster the given data set and draw the dendogram [10]

Object	Attribute 1 (X):	Attribute 2 (Y):
A	2	2
B	3	2
C	1	1
D	3	1
E	1.5	0.5

Q3 A) Define Metadata. Discuss the types of Metadata stored in a data warehouse. Illustrate with an example. [10]

B) Discuss different steps involved in Data Pre-processing [10]

Q4 A) Discuss various OLAP Models and their architecture [10]

B) Define Classification. Discuss the issues in Classification. A simple example from the stock market involving only discrete ranges has profit as categorical attribute, with values { Up, Down} and the training data is: [10]

Age	Competition	Type	Profit
Old	Yes	Software	Down
Old	No	Software	Down
Old	No	Hardware	Down
Mid	Yes	Software	Down
Mid	Yes	Hardware	Down
Mid	No	Hardware	Up
Mid	No	Software	Up
New	Yes	Software	Up
New	No	Hardware	Up
New	No	Software	Up

Apply decision tree algorithm and show the generated rules.

Q5 A) Differentiate top-down and bottom-up approaches for building data warehouse. Discuss the merits and limitations of each approach. [10]

B) i) Discuss Association Rule Mining and Apriori Algorithm. [10]

ii) A database has four transactions. Let minimum support = 50% and minimum confidence = 50%

TID	**Items-bought**
T100	A,B,C
T200	A,C
T300	A,D
T400	B,E,F

Find all frequent item sets using apriori algorithm. List strong association rules.

Q6 Write short note on the following (Answer any **FOUR**) [20]

a) Fact Constellation

b) Data visualization

c) FP Tree

d) DBSCAN

e) ETL Process

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Q.P. Code: 27188

Time: 3 Hours **(Total Marks 80)**

Question no 1 is compulsory
solve any 3 from Q2 to Q6
Indicate your answers with neat sketch wherever necessary

Q1 . ATTEMPT ANY FOUR **20**

a) Explain The term “Poor Design Affects Reading”
b) Explain the steps to design Persona.
c) What do you mean by Direct Manipulation and Indirect Manipulation?
d) Explain Goal Directed Design in Detail.
e) What are various advantages of Digital and Graphics Systems?

Q2a) Provide various factors of Interface Design, justify your answer with proper example. **10**
b) Differentiate between Qualitative and Quantitative Research **10**

Q3 a) What do you mean by response time? Explain salient features that are adopted with respect to response time. **10**
b) Explain in detail about Gestalt's Principles. **10**

Q4 a) Explain Various Menus in HMI. **10**
b) Explain what do you mean by Keyboard Accelerators? **10**

Q5 a) Explain How Colours Play Major Role in Human Interface Design? **10**
b) Differentiate between Web Page Navigation and Printed Page Navigation. **10**

Q6 Write Short Note on following **20**

a) Windows
b) Interview Techniques
c) Mental Model
d) Statistical Graphics.

Q.P. Code: 25685

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

i. **Q. 1. is Compulsory.**
ii. **Attempt any three from the remaining.**
iii. **Assume suitable data.**

Q. 1	**(a)**	Describe any five characteristics of Big Data.	**(5)**
	(b)	Describe the structure of HDFS in a Hadoop ecosystem using a diagram.	**(5)**
	(c)	Define Social networks and Social Network Mining	**(5)**
	(d)	Explain Hamming distance measure with an example.	**(5)**
Q. 2	**(a)**	Describe characteristics of a NoSQL database.	**(10)**
	(b)	Explain concept of Map Reduce using an example. Write Map Reduce pseudocode for "Group By" "aggregation" in a database.	**(10)**
Q. 3	**(a)**	Why is finding similar items important in Big Data? Illustrate using two example applications.	**(10)**
	(b)	Explain the concept of a Bloom Filter using an example.	**(10)**
Q. 4	**(a)**	Explain any one algorithm to count number of distinct elements in a Data stream.	**(10)**
	(b)	Draw the diagram showing the structure of the World Wide Web and explain the different parts.	**(10)**
Q. 5	**(a)**	What are Recommendation Systems? Clearly explain two applications for Recommendation Systems.	**(10)**
	(b)	Explain in detail any one Ranking algorithm used by Search Engines.	**(10)**
Q. 6	**(a)**	Explain with diagrams the Park Chen Yu (PCY) algorithm for frequent itemset mining.	**(10)**
	(b)	What is a "Community" in a Social Network Graph? Explain any one algorithm for finding communities in a Social Graph.	**(10)**