**Assignment 7:**

**X-Mart Data Integration and Decision Support System**

**1. Introduction**

X-Mart operates multiple malls in the city and records daily sales for various products. The management requires an integrated system for better decision-making and return on investment (ROI). This document outlines the requirements, dimensional model, and database schema for the proposed system.

**2. Requirements Analysis**

To design an effective system, we identified key requirements by consulting management and department heads. The system must provide insights on:

**2.1 Business Requirements**

* Daily, weekly, monthly, and quarterly profit per store.
* Sales and profit comparisons across different time periods.
* Sales analysis based on time bands of the day.
* Demand analysis for products based on location.
* Sales trend analysis over different periods (day, week, month, year).
* Identification of peak sales days.
* Analysis of sales and profit on Sundays.
* Trends in weekday vs. weekend sales.
* Comparison of weekly, monthly, and yearly sales to track growth and KPIs.

**3. Dimensional Model Design**

A dimensional model is designed to store and retrieve data efficiently for analysis. It must support OLAP cubes for fast querying.

**3.1 Dimensions**

Dimensions provide filtering, grouping, and labeling functionalities.

* **Product Dimension**: Product ID, Name, Category, Brand, Price.
* **Customer Dimension**: Customer ID, Name, Age, Gender, Location, Loyalty Status.
* **Store Dimension**: Store ID, Name, Location, Manager, Size.
* **Date Dimension**: Date Key, Day, Week, Month, Quarter, Year, Weekend Flag.
* **Time Dimension**: Time Key, Hour, Time Band (Morning, Afternoon, Evening, Night).
* **Salesperson Dimension**: Salesperson ID, Name, Store ID, Experience Level.

**3.2 Measures**

Measures are quantifiable values stored in the fact table.

* **Actual Cost**
* **Total Sales**
* **Quantity Sold**
* **Fact Table Record Count**

**3.3 Fact Table (Fact Sales Table)**

The Fact Table records historical sales transactions and references the dimension tables.

| **Column Name** | **Type** | **Description** |
| --- | --- | --- |
| Sales Date Key | Foreign Key | References Date Dimension |
| Sales Time Key | Foreign Key | References Time Dimension |
| Invoice Number | Primary Key | Unique transaction identifier |
| Sales Person ID | Foreign Key | References Salesperson Dimension |
| Store ID | Foreign Key | References Store Dimension |
| Customer ID | Foreign Key | References Customer Dimension |
| Product ID | Foreign Key | References Product Dimension |
| Actual Cost | Numeric | Cost price of sold items |
| Total Sales | Numeric | Selling price of sold items |
| Quantity | Integer | Number of items sold |
| Fact Record Count | Integer | Count of sales transactions |

**4. Database Schema Design**

To support analytical queries, we will use the **Star Schema**. The Fact Sales Table forms the center of the schema, with dimension tables radiating outward.

**4.1 Schema Type: Star Schema**

* **Fact Table**: Sales Fact Table
* **Dimension Tables**: Product, Customer, Store, Date, Time, Salesperson

This schema allows hierarchical data storage while optimizing query performance for OLAP operations.

**5. Conclusion**

The designed system will enable X-Mart’s management to analyze sales trends effectively, compare KPIs, and make data-driven decisions. The Star Schema ensures efficient data retrieval, and OLAP cube support will provide near-instantaneous analytics.