2. CONCEPTS OF DATA & DBMS

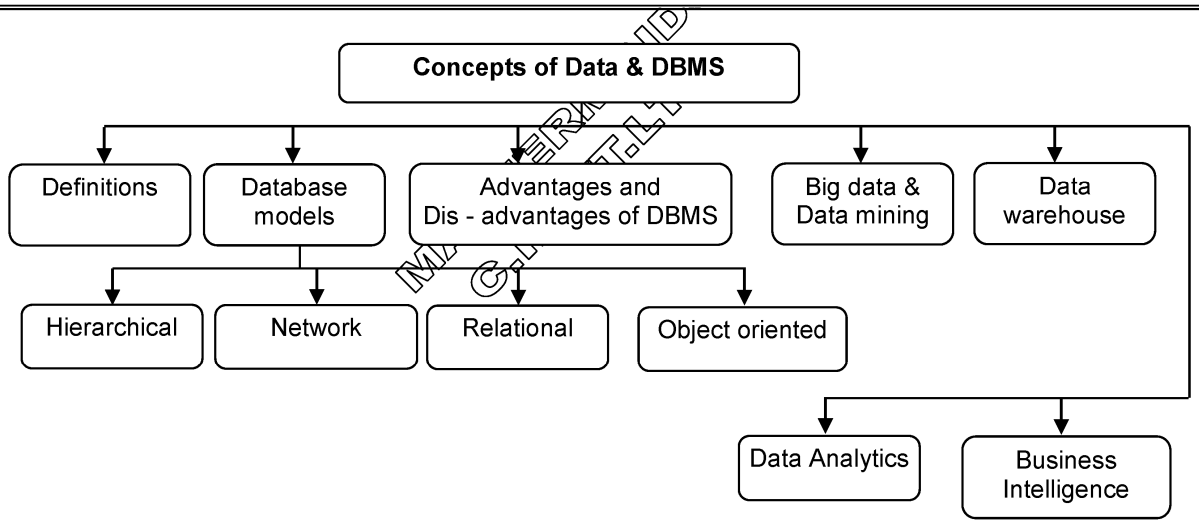
QUESTION WISE ANALYSIS OF PREVIOUS EXAMINATIONS

No.	M-14	N-14	M-15	N-15	M-16	N-16	M-17	N-17	M-18 (O)	M-18 (N)	N-18 (O)	N-18 (N)	M-19 (O)	M-19 (N)	N-19 (O)	N-19 (N)	N-20 (O)	N-20 (N)
THEORY QUESTIONS FOR CLASSROOM DISCUSSION																		
9.	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-
14.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-

CHAPTER OVERVIEW

SECTION	TOPIC	STARTING PAGE NO.
1.	THEORY FOR CLASSROOM DISCUSSION	2.1

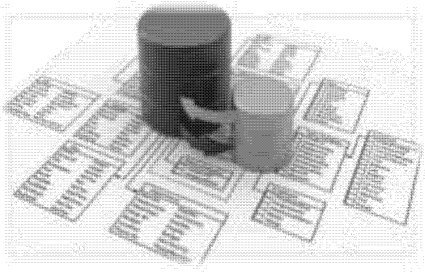
SECTION 1: THEORY FOR CLASSROOM DISCUSSION



PART 1: DATA-DEFINITIONS, DATABASE MODELS

Q.No.1. What is Data, Database and Database Management System (DBMS)? What are various operations that can be performed on files by DBMS? (C) (MTP M20)

1) **DATA:**



a) Data are the raw bits and pieces of information with no context.

b) Data can be quantitative or qualitative.

c) Quantitative data is numeric EX: the result of a measurement, count.

d) Qualitative data is descriptive. EX: Tastes & Preferences, Trends, etc.

DATABASE: A set of logically inter-related organized collection of data is Database.

DATABASE MANAGEMENT SYSTEMS (DBMS): DBMS is a software system that helps in organizing, controlling and using the data in databases needed by the application software. DBMS provide the facility to create and maintain a well-organized database.

2) Commercially available Data Base Management Systems are Oracle, MySQL, SQL Server, DB2 etc.

3) *DBMS helps us do various operations on files, such as:*

a) *Adding new files to database,*

b) *Deleting existing files from database,*

c) *Inserting data in existing files,*

d) *Modifying data in existing files,*

e) *Deleting data in existing files, and*

f) *Retrieving or querying data from existing files.*

Q.No.2. What is a Database Model? What are different types of Database Models? (M18) (B)

Database model is a logical structure of a database and fundamentally determines in which manner data can be stored, organized and manipulated.

HIERARCHY OF A DATABASE IS AS UNDER:

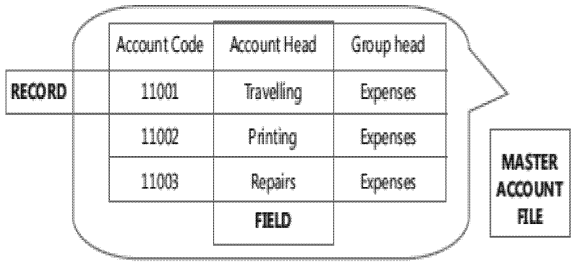
1) **DATABASE:** This is a collection of Files / Tables.

2) **FILE OR TABLE:** This is a collection of Records. It is also referred as Entity

3) **RECORD:** This is a collection of Fields.

4) **FIELD:** This is a collection of Characters. It defines a relevant attribute of Table.

5) **CHARACTERS:** These are a collection of Bits.



SOME DATABASE MODELS ARE AS FOLLOWS:

1) **HIERARCHICAL DATABASE MODEL:**

a) In **this Model**, records are logically organized in an inverted tree pattern.

b) All records in a hierarchy are called Nodes. Each node is related to others in a parent-child relationship.

2) **NETWORK DATABASE MODEL:** A network database structure views all records in sets. Each set is composed of an owner record and one or more member records. This feature allows the network model to implement all types of relationships one-to-one, one-to-many, many-to-one and many-to- many.

3) **RELATIONAL DATABASE MODEL:** In a **Relational Database** model all data can be organized in a table structure. A table is a collection of records and each record in a table contains the same fields. A record is one instance of a set of fields in a table.

4) **OBJECT ORIENTED DATABASE MODEL:** An object - oriented database is a set of objects. Objects are predefined set of program code that is used to perform a specific task. An **Object-Oriented Database** provides a mechanism to store complex data such as images, audio and video, etc.

SIMILAR QUESTIONS:

1. **Data models are a communication tool; they can facilitate interaction among the designer, the applications programmer, and the end user. A well-developed data model can even foster improved understanding of the organization for which the database design is developed. Then explain briefly some of the popular database models.**

A. **Refer "Some database models are as follows" section in the above answer**

Q.No.3. What is Hierarchical Database Model? Explain? (c)

1) In a **Hierarchical Database Model**, records are logically organized in an inverted tree pattern.

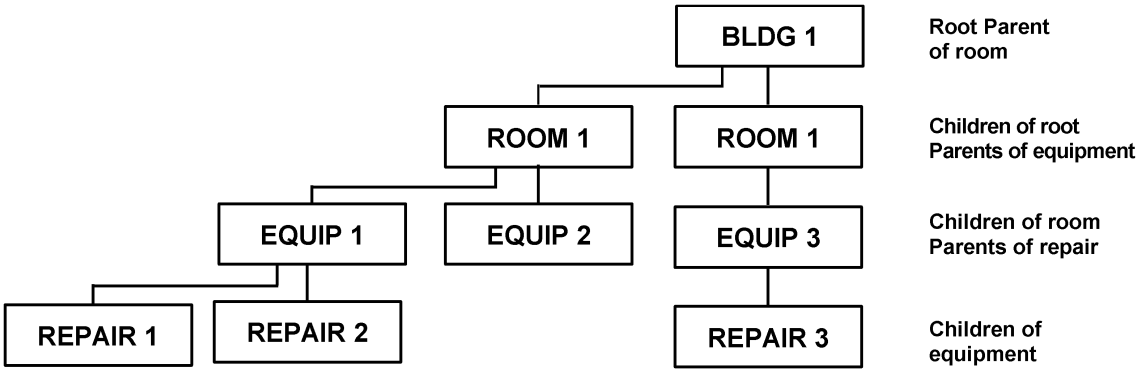
2) All records in a hierarchy are called Nodes. Each node is related to others in a parent-child relationship.

3) Each parent record may have one or more child records, but no child record may have more than one parent record.

4) Thus, the hierarchical data structure implements one-to-one and one-to-many relationships.

5) **Hierarchical Database Model cannot support many-to-one and many-to-many relationships.**

6) The top parent record in the hierarchy is called the Root Record.



SIMILAR QUESTIONS:

1. **The hierarchical structure was developed by IBM in the 1960s, and used in early mainframe DBMS. This structure is simple but inflexible because the relationship is confined to a one-to-many relationship. Then elucidate about Hierarchical database model.**

A. **Refer above answer.**

Q.No.4. What is Network Database Model? Explain? (c)

1) **IMPROVED VERSION:** This is an improved version of hierarchical model.

2) **REDUNDANCY:** The network model can represent redundancy in data more efficiently than in the hierarchical model.

3) **VIEWS RECORDS AS SETS:** A network database structure views all records in sets. Each set is composed of an owner record and one or more member records.

4) **SUPPORTS ALL TYPES OF RELATIONSHIPS:** However, unlike the hierarchical model, the network model also permits one child record to have more than one parent record. This feature allows the network model to implement all types of relationships one-to-one, one-to-many, many-to-one and many-to- many.

SIMILAR QUESTION:

1. **The network database model was created to solve the shortcomings of the hierarchical database model but in due course network model has become much more complicated than the Hierarchical model. As such, it is difficult to handle and maintain. Then write your observations about Network database model? [N19RTP]**

A **Refer above answer.**

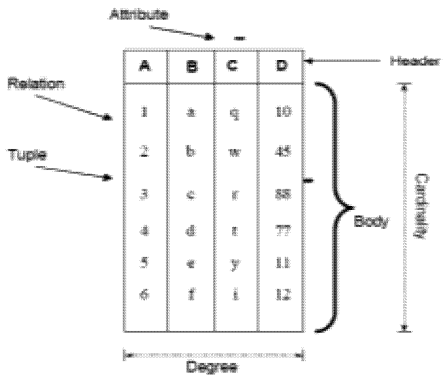
Q.No.5. What is Relational Database Model? Explain? (A)

1) In a **Relational Database** model all data can be organized in a table structure.

2) A table is a collection of records and each record in a table contains the same fields. A record is one instance of a set of fields in a table.

3) Three key terms can be used in relational database models: Relations, Attributes, and Domains.

4) A relation is a table with columns and rows. The named columns of the relation are called attributes, and the domain is the set of values the attributes can take.



5) For each table, one of the fields is identified as a Primary Key, which is the unique identifier for each record in the table.

6) Keys are commonly used to join or combine data from two or more tables.

7) Popular examples are RDBMS, Microsoft Access, MySQL, and Oracle.

SIMILAR QUESTION:

1. **Relational data model is the popular and primary data model, which is used widely around the world for data storage and processing. This model is simple and secure and it has all the properties and capabilities required to process data with storage efficiency. In this context describe some aspects of Relational data model?**

A. **Refer above answer.**

Q.No.6. What is Object Oriented Data Base Model? Explain. (A)

1) An object - oriented database is a set of objects.

2) Objects are predefined set of program code that is used to perform a specific task. In other words, an object is a software bundle of variables and related methods.

3) It is based on the concept of objects and their interactions.

4) An **Object-Oriented Database** provides a mechanism to store complex data such as images, audio and video, etc.

5) An **Object-Oriented Database model can be used in different areas EX:** Expert Systems, Image Processing Systems, Multimedia Systems.

SIMILAR QUESTION:

1. **As applications have grown more sophisticated, they have placed greater demands on underlying database technology. Object-oriented database technology addresses these shortcomings in several specific application areas like user interface applications, multimedia databases etc., Elucidate what actually is OODBMS?**

Ans: Refer above answer

PART 2: ADVANTAGES AND DISADVANTAGES OF DBMS

Q.No.7. What are Major advantages and disadvantages of DBMS? (M-20 RTP) (B)

DBMS is a software system that helps in organizing, controlling and using the data in databases needed by the application software. DBMS provides the facility to create and maintain a well-organized database.

ADVANTAGES:

1) **PERMITTING DATA SHARING:** The same information can be made available to different users.

2) **MINIMIZING DATA REDUNDANCY:** In a DBMS, duplication of information or redundancy is carefully controlled or reduced. Minimizing redundancy can significantly reduce the cost of storing information on hard drives and other storage devices.

3) **INTEGRITY CAN BE MAINTAINED:** Data integrity is maintained by having accurate, consistent and up-to-date data. Updates and changes to the data are made in only one place in DBMS to ensure Integrity.

4) **PROGRAM AND FILE CONSISTENCY:** Using DBMS file formats and Programs are standardized. This makes the data files easier to maintain because the same rules and guidelines are applied for all types of data.

5) **USER-FRIENDLY:** DBMS provides friendly interfacing which makes the data access and manipulation easier for the user.

6) **IMPROVED SECURITY:** DBMS allows multiple users to access the same data resources in a controlled manner by defining the security constraints. Information should be protected or secured and it is accessible only to authorized personnel.

7) **ACHIEVING PROGRAM / DATA INDEPENDENCE:** In a DBMS, application program and data are independent of each other.

8) **FASTER APPLICATION DEVELOPMENT:** The data already exists in databases. So, application developer has to think of only the logic required to retrieve the data in the way a user needs.

DISADVANTAGES:

1) **COST:** Implementing a DBMS system can be expensive and time-consuming. Training requirements alone can be quite costly.

2) **SECURITY:** Even with safeguards in place, it may be possible for some unauthorized users to access the database.

SIMILAR QUESTIONS:

1. **Database management system is an efficient way to create, manage and update databases and is a prolific replacement of the old file systems which were earlier used to store and retrieve records. The DBMS facilitates the users to work with large number of databases with much ease and efficiency hence it is important to know the advantages and disadvantages of DBMS. Make a brief note on the advantages and disadvantages of DBMS?**

A. **Refer above answer.**

PART 3: ADVANCED CONCEPTS OF DATA

Q.No.8. What is Data Warehouse? What are the two primary schools of thought when designing a data warehouse? (A) (M-19 MTP)

DATA WAREHOUSE:

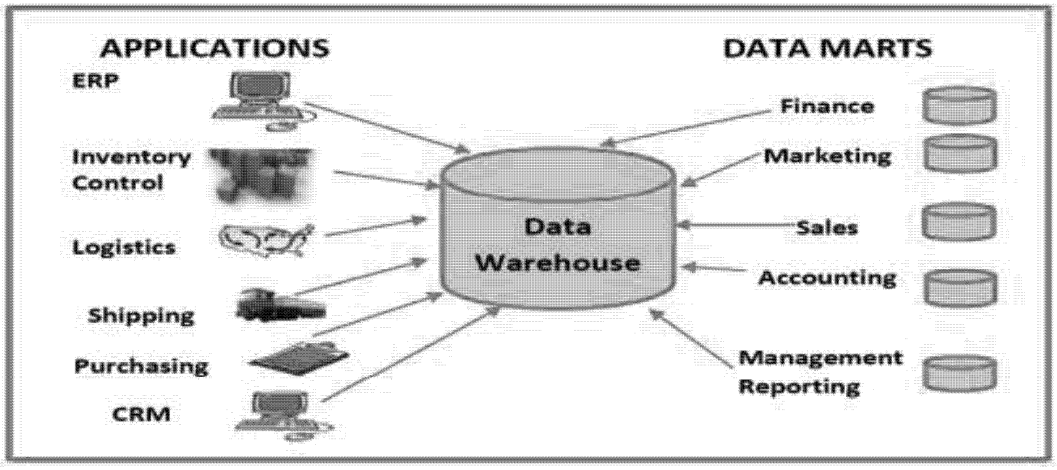
1) The concept of data warehouse is to extract data from one or more databases and load it into the data warehouse (which is itself another database) for storage and analysis.

2) It uses non-operational, Time-variant and standardized data.

WAYS OF DESIGNING DATA WAREHOUSE: There are two ways to design a data warehouse

1) **The Bottom-Up Approach** starts by creating small data warehouses, called data marts to solve specific business problems. Then they can be combined into a one larger data warehouse.

2) **The Top-Down Approach** starts by creating an enterprise-wide data warehouse and then create smaller data marts from the data warehouse to address specific business needs.



Centralized view of Data Warehouse

SIMILAR QUESTION:

1. **When the integrated storage of all data is a pressing need for the development and expansion of a company, the solution recommended by leading system analysts is to implement a data warehouse. Then what exactly is data warehouse and what are the approaches to design it?**

   Ans: Refer above answer.

Q.No.9. The concept of Data Warehouse is simple: Extract data from one or more of the organization's databases and load it into the data warehouse for storage and analysis. However, the execution of this concept is not that simple. Then, what is the criteria to be followed to design a data warehouse? (B) (M-19 MTP2) (M18)

A DATA WAREHOUSE SHOULD BE DESIGNED SO THAT IT MEETS THE FOLLOWING CRITERIA:

1) A data warehouse uses non-operational data. This means that the data warehouse will use a copy of data from the active databases that the company uses in its day-to-day operations. It is done on a regular, scheduled basis.
2) The data is time-variant. This means whenever data is loaded into the data warehouse, it receives a time stamp, which allows for comparisons between different time periods.
3) The data is standardized. Data in a data warehouse usually comes from several different sources where the data formats will not be same .All data loaded into the data warehouse would have to be converted in to standard format using the process of Extraction – Transformation - Load (ETL).

SIMILAR QUESTIONS:

1. **Data Warehouse extracts data from one or more of the organization's databases and loads it into another database for storage and analysis purpose. As a Data Warehouse Manager, determine the design criteria, which should be met while designing Date Warehouse. (M18 - 6M)**

   Answer: Refer above answer.

Q.No.10. List out the benefits of Data Warehouse? (A)

The concept of data warehouse is to extract data from one or more databases and load it into the data warehouse (which is itself another database) for storage and analysis.

BENEFITS OF DATA WAREHOUSE:

1) Developing a data warehouse forces an organization to better understand the data that it is currently collecting and what data is not being collected.
2) A data warehouse provides a centralized view of all data being collected across the enterprise and provides a means for determining data that is inconsistent.
3) Once all data is identified as consistent, an organization can generate one version of the truth. This is important when the company wants to report consistent statistics about itself, such as revenue or number of employees.
4) By having a data warehouse, snapshots of data can be taken over time. This creates a historical record of data, which allows for an analysis of trends.
5) A data warehouse provides tools to combine data, which can provide new information and analysis.

SIMILAR QUESTION:

1. **In general, the benefits of data warehousing are all based on one central premise: warehousing solves the ongoing problem of analyzing separate data and converting it into actionable information you can use. Warehousing also allows you to process large amounts of complex data in an efficient way. Then what benefits can a business entity derive from data warehousing?**

A **Refer above answer.**

2. **Share & Care is a multinational FMCG company having various branches in different cities across the country. The company used a centralized Data warehouse to store data of all branches at its headquarters in Mumbai. Elaborate the benefits of Data Warehouse that may be availed by Share & Care company. (RTP N20)**

A **The benefits of Data Warehouse that may be availed by Share & Care company are as follows: Refer above answer.**

Q.No.11. Explain the concepts of a) Big Data b) Data Mining? (B)

1) **BIG DATA:** The term refers to such massively large data sets that conventional database tools do not have the processing power to analyze them. For example, Flipkart must process over millions of customer transactions every hour during the Billion Day Sale.
   Some examples of industries that use big data analytics include the hospitality industry, healthcare companies, public service agencies, and retail businesses.

2) **DATA MINING:** Data Mining is the process of analyzing data to find previously unknown trends, patterns, and associations to make decisions. Generally, data mining is automated in extremely large data sets, such as a data warehouse.

Examples:

a) A baseball team may find that collegiate baseball players with specific statistics in hitting, pitching, and fielding make for more successful major league players.

b) An example of data mining includes an analysis of sales from a large grocery chain that might determine that milk is purchased more frequently the day after it rains in cities with a population of less than 50,000.

Q.No.12. Big Data is the new buzzword that has been capturing the attention of businesses lately and many business organizations are looking forward to implement Big Data processing in their organizations. Then what are the benefits of big data processing? (B) (M-20 MTP)

BIG DATA: The term refers to such massively large data sets that conventional database tools do not have the processing power to analyze them.

BENEFITS OF BIG DATA PROCESSING ARE AS FOLLOWS:

1) **ABILITY TO PROCESS BIG DATA BRINGS IN MULTIPLE BENEFITS, SUCH AS:**
   a) Businesses can utilize outside intelligence while taking decisions.
   b) Access to social data from search engines and sites like Facebook, Twitter are enabling organizations to fine tune their business strategies.
   c) Early identification of risk to the product / services, if any.
2) **IMPROVED CUSTOMER SERVICE:** Traditional customer feedback systems are getting replaced by new systems designed with Big Data technologies. In these new systems, Big Data and natural language processing technologies are being used to read and evaluate consumer responses.
3) **BETTER OPERATIONAL EFFICIENCY:** Integration of Big Data technologies and data warehouses helps an organization to offload infrequently accessed data. This leads to better operational efficiency.

SIMILAR QUESTIONS:

1. **The quantity of data on planet earth is growing exponentially for many reasons. Various sources and our day to day activities generates lots of data. With the invent of the web, the whole world has gone online, every single thing we do leaves a digital trace. In this scenario Big Data has been playing a role of a big game changer for most of the industries over the last few years. Then what benefits can a business organization accrue through big data processing?**

A. **Refer answer above**

Q.No.13. Data mining is very important to businesses today to analyze huge volumes of data and find the hidden trends. Then what are the steps involved in data mining process? (B) (M18)

DATA MINING: Data Mining is the process of analyzing data to find previously unknown trends, patterns, and associations to make decisions. Generally, data mining is automated in extremely large data sets, such as a data warehouse.

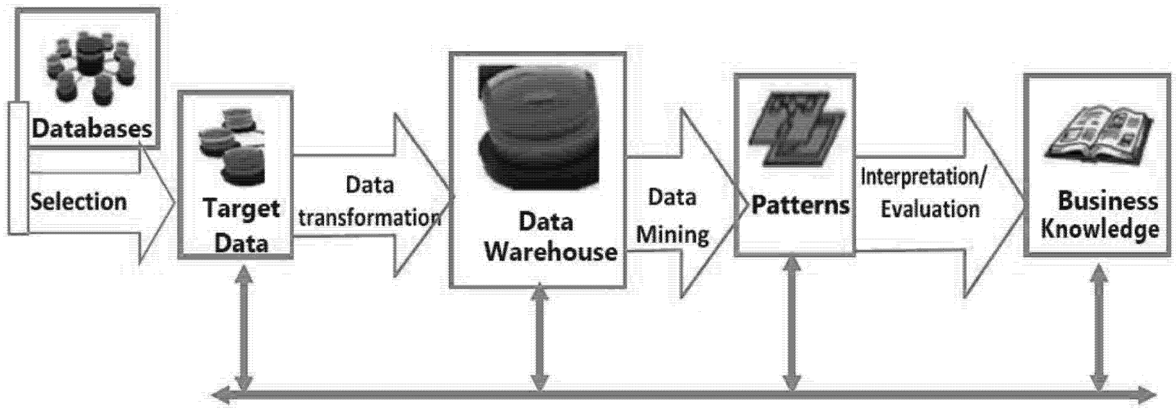
FOLLOWING ARE THE STEPS INVOLVED IN DATA MINING:

1) **DATA INTEGRATION:** Firstly, the data are collected and integrated from all the different sources.
2) **DATA SELECTION:** It may be possible that all the data collected may not be required in the first step. So, in this step we select only those data which we think useful for data mining.
3) **DATA CLEANING:** The data that is collected are not clean and may contain errors, missing values, noisy or inconsistent data. Thus, we need to apply different techniques to get rid of such anomalies.
4) **DATA TRANSFORMATION:** The data even after cleaning are not ready for mining as it needs to be transformed into an appropriate form for mining using different techniques like smoothing, aggregation, normalization, etc.

5) **DATA MINING:** In this, various data mining techniques are applied on the data to discover the interesting patterns. Techniques like clustering and association analysis are among the many different techniques used for data mining.

6) **PATTERN EVALUATION AND KNOWLEDGE PRESENTATION:** This step involves visualization, transformation, removing redundant patterns etc. from the patterns we generated.

7) **DECISIONS / USE OF DISCOVERED KNOWLEDGE:** This step helps user to make use of the knowledge acquired to take better decisions.



Steps involved in Data Mining

SIMILAR QUESTIONS:

1. **The companies with clusters of customer database require a tool to refine that data and highlight only the one that is relevant to them. Data mining process is the best tool to highlight the information that is relevant to one's requirement. Then in general what are the steps involved in data mining process?**

A. **Refer above answer.**

Q.No.14. Define the term Data Analytics? What are the two approaches of Data Analytics? (B) (N18-2M)

1) **Data Analytics** is the process of examining data sets to draw conclusions about the information they contain, with the help of specialized systems and software.

2) **Data Analytics** can help businesses to increase revenues, improve operational efficiency, respond more quickly to emerging market trends and gain a competitive edge over rivals.

3) Data Analytics can also be separated into quantitative data analysis and qualitative data analysis.

4) The quantitative data analysis involves analysis of numerical data with quantifiable variables that can be compared or measured statistically.

5) The qualitative approach is more interpretive - it focuses on understanding the content of non-numerical data like text, images, audio and video, including common phrases, themes and points of view.

SIMILAR QUESTION:

1. **Data helps businesses to better understand their customers, improve their advertising campaigns, personalize their content etc., While raw data has a lot of potential, you need data analytics to unlock the power to grow your business. As a data scientist explain what data analytics is, along with its approaches?**

A. **Refer above answer.**

Q.No.15. At a high level, Data Analytics consists of two methodologies. Write about them. (C)

At a high level, Data Analytics methodologies include:

1) **EXPLORATORY DATA ANALYSIS (EDA)**, which aims to find patterns and relationships in data. EDA is often compared to detective work.

2) **CONFIRMATORY DATA ANALYSIS (CDA)**, which applies statistical techniques to determine whether hypotheses about data set are True or False. CDA is akin (=Similar) to the work of a judge or jury during a court trial.

Q.No.16. What are the more advanced types of Data Analytics? (B)

MORE ADVANCED TYPES OF DATA ANALYTICS INCLUDE:

1) **Data Mining:** This involves sorting through large data sets to identify trends, patterns and relationships;
2) **Predictive Analytics:** It seeks to predict customer behaviour, equipment failures and other future events; and
3) **Machine Learning:** It is an artificial intelligence technique that uses automated algorithms to churn through data sets more quickly than data scientists can do via conventional analytical modelling.
4) **Text mining** provides a means of analysing documents, emails and other text-based content
5) Big Data Analytics applies data mining, predictive analytics and machine learning tools to sets of big data that often contain unstructured and semi-structured data.

Q.No.17. Write about some application areas of data analytics Applications. (A)

SOME APPLICATION AREAS OF DATA ANALYTICS ARE AS FOLLOWS:

1) Data Analytics initiatives support a wide variety of business uses. For example, banks and credit card companies analyse withdrawal and spending patterns to prevent fraud and identity theft.
2) E-commerce companies and marketing services providers do clickstream analysis to identify website visitors who are more likely to buy a product or service based on navigation and page-viewing patterns.
3) Mobile network operators examine customer data to forecast so they can take steps to prevent defections to business rivals; to boost customer relationship management efforts.
4) Other companies also engage in CRM analytics to segment customers for marketing campaigns and equip call centre workers with up-to-date information about callers.
5) Healthcare organizations mine patient data to evaluate the effectiveness of treatment for cancer and other diseases.

Similar question:

1. **There are several applications of data analytics, and businesses are actively using such data analytics applications to keep themselves in the competition. Not only businesses but even civic bodies are using data analysis for several reasons, like monitoring crime. In this context list out various data analytics applications.**

A. Refer above answer.

Q.No.18. What are the steps involved Inside Data Analytics Process? (B)

1) The analytics process starts with **data collection**, in which data scientists identify the information they need and work with data engineers and IT staff to assemble it for use.
2) Data from different source systems may need to be **combined via data integration routines**, transformed into a common format and loaded into an analytics system, such as a Hadoop cluster, NoSQL database or data warehouse.
3) The next step is to **find and fix data quality problems**. That includes running data profiling and data cleansing jobs to make sure that the information in a data set is consistent.
4) Additional data preparation work is then done to **manipulate and organize the data** for the planned analytics use. Data governance policies are applied to ensure that the data hews (=chopped data) are matched to **corporate standards** and is being used properly.
5) A data scientist builds an analytical model, using predictive modeling tools or other analytics software and programming languages such as Python, Scala, R and SQL.
6) The model is initially run against a partial data **set to test** its accuracy; finally, the model is run in real mode against the full data set.
7) The last step in the data analytics process is **communicating** the results generated by analytical models to business executives and other end users to aid in their decision-making.

Q.No.19. Write about Business Intelligence. (MTP2-M18,M19) (A)

1) **Business Intelligence (BI)** is a technology-driven process for analyzing data and presenting actionable information.
2) It helps to make more informed business decisions.
3) BI encompasses a wide variety of tools, applications and methodologies to collect data from internal systems and external sources, and prepare it for analysis, develop and run queries.
4) BI creates reports, dashboards and data visualizations to make the analytical results available to decision makers as well as operational workers.

SIMILAR QUESTIONS:

1. **More people than ever are recognizing the importance of different business intelligence technologies and business intelligence tools, which can be defined as the ability to glean value from big data - from the tools and techniques to discover, gather, and analyze digital data. For decision makers who want to improve business intelligence, what business intelligence technologies are to be considered in producing actionable Business Intelligence?**

A. **Refer above answer.**

2. **Analyze the statement "The potential benefits of Business Intelligence (BI) programs include accelerating and improving decision making; optimizing internal business processes; increasing operational efficiency; driving new revenues; and gaining competitive advantages over business rivals." Determine its justification.**

A. **Refer above answer.**

Q.No.20. What are the reasons for business organizations to adopt Business Intelligence tools? (B)

REASONS FOR BUSINESS ORGANIZATIONS TO ADOPT BUSINESS INTELLIGENCE TOOLS:

1) BI enables organizations to make well-informed business decisions and thus can be the source of competitive advantages.
2) Once business intelligence is gathered effectively and used proactively, we can make decisions that benefit our organization before the competition does.
3) The ultimate objective of business intelligence is to improve the timeliness and quality of information.

   Business intelligence reveals to us -

   a) The position of the firm in comparison to its competitors
   b) Changes in customer behaviour and spending patterns
   c) The capabilities of the firm
   d) Market conditions, future trends, demographic and economic information
   e) The social, regulatory, and political environment
   f) What the other firms in the market are doing

SIMILAR QUESTIONS:

1. **Gone are the days when businesses were assumed to be like gambling. In those days, there were no other options than making 'the perfect guess.' But now, as you know, when it comes to a company's future, this is no longer an appropriate method to arrive at a strategy. With the help of Business Intelligence software, one can have accurate data, real time updates, and means for forecasting and even to predict conditions such as 'what will happen if.' Thus, the need for guessing has gone. In this context explore the reasons why business organizations adopting Business Intelligence tools?**

A. **Refer above answer.**

Q.No.21. What are the benefits of Business Intelligence? (B)

Business Intelligence (BI) is a technology-driven process for analyzing data and presenting actionable information.

BI improves the overall performance of the company using it.

THE POTENTIAL BENEFITS OF BUSINESS INTELLIGENCE PROGRAMS INCLUDE:

1) Accelerating and improving decision making
2) Optimizing internal business processes
3) Enhancing communication among departments while coordinating activities
4) Increasing operational efficiency
5) Driving new revenues
6) Gaining competitive advantages over business rivals
7) BI systems can also help companies identify market trends and spot business problems that need to be addressed.
8) BI systems help in enhancing customer experience, allowing for the timely and appropriate response to customer problems and priorities.

SIMILAR QUESTIONS:

1. **There are many reasons why organizations adopt business intelligence and analytics tools, and many ways these solutions are put to work to benefit the organization. All projects, however, have the common goal to use business intelligence software to turn data into insights and action. If this is the case, then elucidate the benefits of business intelligence?**

A. **Refer above answer**

Q.No.22. Write about business intelligence technology. (B)

BUSINESS INTELLIGENCE TECHNOLOGY:

1) Business Intelligence combines a broad set of data analysis applications, including adhoc analysis and querying, enterprise reporting, Online Analytical Processing (OLAP), mobile BI, real-time BI, operational BI, cloud and software as a service BI etc.
2) BI technology also includes data visualization software for designing charts and other info-graphics, as well as tools for building BI dashboards and performance scorecards that display visualized data on business metrics and key performance indicators in an easy-to-grasp way.
3) BI applications can be bought separately from different vendors or as part of a unified BI platform from a single vendor.
4) BI programs can also incorporate forms of advanced analytics, such as data mining, predictive analytics, text mining, statistical analysis and big data analytics.
5) Business Intelligence data typically is stored in a data warehouse or smaller data marts that hold subsets of a company's information.

   In addition, Hadoop systems are increasingly being used within BI architectures as repositories or landing pads for BI and analytics data, especially for unstructured data, log files, sensor data and other types of big data.

SIMILAR QUESTIONS:

1. **More people than ever are recognizing the importance of different business intelligence technologies and business intelligence tools, which can be defined as the ability to glean value from big data - from the tools and techniques to discover, gather, and analyze digital data. For decision makers who want to improve business intelligence, what business intelligence technologies are to be considered in producing actionable Business Intelligence?**

A. **Refer above answer.**

THE END