Module (Course Syllabus) Catalogue

2024-2025

College/ Institute	Khabat Technical Institute	
Department	Information Technology	
Module Name	Database Concept	
Module Code	DAT304	
Degree	Technical Diploma ■ Bachle☐ High Diploma ☐ Master ☐ PhD ☐	
Semester	Third	
Credits	6	
Module type	Prerequisite ☐ Core ■ Assist. ☐	
Weekly hours	4 hrs.	
Weekly hours (Theory)	(2)hr Class	(2)hr Workload
Weekly hours (Practical)	(2)hr Class	(2)hr Workload
Lecturer (Theory)	Sozan Sulaiman Maghdid	
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Course Book

Course Description	This course offers lecture, laboratory, and online interaction to provide a foundation in database concepts and database systems. It includes representing information with the relational database model, manipulating data with an interactive query language (SQL) and database programming, database development including internet applications, and database security, integrity and privacy issues On the other hand students recognize the need for continuing professional development and impart an understanding of professional, ethical, legal, security and social. Students planning to enrol for this course should have mastered the fundamentals of programming and basic data structures.
Course objectives	The objective of the course is to present an introduction to database concept and database systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DB. 1. To learn various NoSQL systems and their features 2. To build projects that use NoSQL databases 3. To compare NoSQL databases with each other and relational systems 4. To practice development skills critical for employers

	5. To have fun experimenting and learning
Student's obligation	The student has to prove its presence in the lecture and that by taking the percentage of attendance by me and be prepared in every lecture for a short test on the cuisse and the form of attending a report at the end of the chapter on relevant lesson and lectures taken the students subject and in the end are the students exam by exams monthly and final exam.
Required Learning Materials	The use of the following methods in the teaching process: 1. Data Show 2. Presentation 3. Course book 4. Lecturer Bound 5. Patient Magic
Assessment scheme	25% Mid Term (Theory and practical) 8% Quiz 27% Assignment (report, paper, homework, seminar..) 25% final practical 15% final theory
Specific learning outcome:	1. Install, configure, and interact with a relational database management system Describe, 2. define and apply the major components of the relational database model to database design 3. Learn and apply the Structured Query Language (SQL) for database definition and manipulation 4. Utilize a database modelling technique for a single entity class, a one-to-one (1:1) relationship between entity classes, a one-to-many (1:M) relationship between entity classes, a many-to-many (M:M) relationship between entity classes, and recursive relationships 5. Define, develop and process single entity, 1:1, 1:M, and M:M database tables 6. Learn and implement the principles and concepts of information integrity, security and confidentiality 7. Apply ethical computing concepts and practices to database design and implementation.

	8. Describe the fundamental elements of relational database management systems 9. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. 10. Design ER-models to represent simple database application scenarios 11. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data. 12. Improve the database design by normalization. 13. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing
Course References:	**Key references:** 1. Murach, Joel. Murach's MySQL. Mike Murach & Associates, 2012. ISBN:978-1-890774-68-4. 2. 2. MySQL is installed on servers and on individual computers in the computer lab. This software (and associated documentation) is free for academic use and may be downloaded from mysql.com 3. Silberschatz, Korth, "Data base System Concepts", 4th ed., McGraw hill, 2006. 4. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2003. 5. Peter Rob and Carlos Coronel, Database Systesm-Design, Implementation and Management (7/e), Cengage Learning, 2007. **Useful references**: 1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems (5/e), Pearson Education, 2008 2. Microsoft Office System, online training solution, Inc. KortiesFraee, 2003 Edition. 3. Computer & Internet , Dr.MuhamadBelal , Musa Abdulla Hamdan, 2009, Jordan

Course topics (Theory)	**Week**	**Learning Outcome**
Why Study Databases. Foundation Data Concepts	1	What are Database

What is Database? , What is Database File? Databases Advantages and disadvantages of Database.		system
Database Systems Concept of Database Data- information – system Database Users	2	Overview and Motivation
Different Types of Databases Entities and Attributes	3	Entities and Attributes
How do I create a project database? Database Management What the DBMS does	4	Basic set concepts
Data Dictionary - Metadata Database architecture Data Abstraction DDL and DML QBE	5	What are these objects
Normalization form	6	
Evolution Of Data Models, View of Data Keys, Types of Keys DB Lifecycle: Designer's Perspective	7	
STEPS IN DESIGNING A DATABASE	8	
Data Models File Systems	9	
Concepts of Tables, Types of data Data Conversion	10	
Database Schema and SQL	11	
Relationships, Types of Relationships Report, FORM, Query	12	
Practical Topics	**Week**	**Learning Outcome**
Design a simple database	1-2	
Build a new database with related tables Manage the data in a table Import table	3	
Link table Datasheet view Table wizard	4	
Query a database using different methods Simple Query wizard Parameter Queries	5-6	

Crosstab Query Delete Query Update Query Append Query Make table Query SQL Query	7-8	
Design a Form Auto Forms Form wizard Design view Chart wizard Form control properties Toolbox Sort, Retrieve , Analyse Data	9-10	
Generate a Report Auto Report Report wizard Design view Work with report	10	
Macro Module	11	
Data page Project	12	

SQL Query Language

In DBMS the SQL query language has DML, DDL, DCL, and TCL.

- DML is data manipulation language and is used for selecting, retrieving, storing, modifying, deleting, inserting and updating entries in the database. SELECT, UPDATE, INSERT, DELETE are some of the DML query statements

eg: SELECT *; this statement will select all the values and tuple from the database and display them as an output of this query

- DDL is data definition language and is useful for defining the schema and structure of the database. Commands like DROP, CREATE, ALTER, TRUNCATE, COMMENT, and RENAME are used.

eg: DROP *table name*; this statement will delete the values as well as the structure of the database.

- DCL is data control language and is useful for granting and revoking rights to and from a user. The command like GRANT and REVOKE are used.

eg: GRANT SELECT to *username*; this statement will grant or allow the user to select the data from the database.

- TCL is transaction control language and is useful for managing the transaction in the database. Commands like COMMIT, ROLLBACK, SAVEPOINT and SET TRANSACTION are used.

Q1. _____commands in SQL allow controlling access to data within database.
a) Database
b) Data
c) Data control
d) All of the Mentioned

Answer: Data Control. Data control is used for the controlling the access to the

database. Therefore data control is the answer.

Q2. Which of the following is not included in DML (Data Manipulation Language)
a) INSERT
b) UPDATE
c) DELETE
d) CREATE

Answer: CREATE. The CREATE TABLE statement is used to create a table in a database. Tables are organized into rows and columns, and each table must have a name. Therefore CREATE is the answer.

Practice Questions

Q1.In SQL, which of the following is not a data Manipulation Language Commands?
a) Delete
b) Truncate
c) Update
d) Create

Answer: Truncate

Q2. In SQL, which command(s) is(are) used to change a table's storage characteristics?
a) ALTER TABLE
b) MODIFY TABLE
c) CHANGE TABLE
d) All of the Mentioned
Answer: ALTER TABLE

Q3. What represents a 'tuple' in a relational database?
a) Table

b) Row
c) Column
d) Object

Answer: Row

Q4. The transaction completes its execution is said to be
a) Committed
b) Aborted
c) Rolled back
d) Failed

Answer: Committed

Database Management System Practice Questions

Part A

Q1: What is the overall term for creating, editing, formatting, storing, retrieving a text document? [I B P S P. O. 2012]

A) Word processing B) Spreadsheet design C) Web design D) Database management E) Presentation generation

Q2: Which of the following constrains information about a single 'entity' in the database like a person, place, event or thing? [S B I P. O. 2010]

A) Query B) Form C) Record D) Table E) None of the above

Q3: A program that generally has more user-friendly interface than a D B M S is called a? [S B I P. O. 2010]

A) front end B) repository C) back end D) form E) None of the above

Q4: The smallest unit of information about a record in a database is called a? [Allahbad Bank Clerk, 2008]

A) cell B) field C) record D) query E) None of the above

Q5: A collection of conceptual tools for describing data, relationships, semantics and constraints is referred to as? [I B P S Clerk 2012]

A) E R mode B) Database C) Data model D) D B M S E) None of these

Find Your Answers Here

Q1: D), Q2: C), Q3: D), Q4: B), Q5: C)

Part B

Q1: Dr E F Codd represented …….. rules that a database must obey if it has to be considered truly relational. [I B P S Clerk, 2012]

A) 10 B) 8 C) 12 D) 6 E) 5

Q2: …… is one reason for problems of data integrity. [I B P S Clerk, 2012]

A) Data availability constraints B) Data inconsistency

C) Security constraints D) Unauthorised access of data E) Data redundancy

Q3: …….. provides total solutions to reduce data redundancy, inconsistency, dependence and unauthorized access of data. [I B P S Clerk 2012]

A) D B M S B) Tables C) Database D) Protection passwords E) Centralisation of data

Q4: The database stores information in? [S B I P. O. 2010]

A) rows and columns B) blocks C) tracks and sectors D) All of the above E) None of the above

Q5: The database administrator's function in an organization is? [S B I P. O. 2010]

A) to be responsible for the technical aspects of managing the information contained in organizational databases.

B) to be responsible for the executive level aspects of decision regarding the information management.

C) to show the relationship among entity classes in a data warehouse.

D) to define which data mining tools must be used to extract data.

E) None of the above.

Q6: The particular field of a record that uniquely identifies each record is called the? [S B I P. O. 2012]

A) key field B) primary field C) master field D) order field E) None of the above.

Find Your Answers Here

Q1: C), Q2: A), Q3: D), Q4: A), Q5:A), Q6: A)

Part C

Q1: ……. are distinct items that don't have much meaning to you in a given context. [S B I P. O. 2012]

A) Fields B) Data C) Queries D) Properties E) None of the above

Q2: A logical schema…. [S B I P. O. 2011]

A) is the entire database. B) is a standard way of organizing information into the accessible part.

C) describes how data is actually stored on disk D) All of the above E) None of the above

Q3: In the relational modes, cardinality is termed as? [I B P S Clerk 2011]

A) number of tuples B) number of attributes

C) number of tables D) number of constraints E) None of the above

Q4: To locate a data item for storage is? [I B P S P. O. 2012]

A) field B) feed C) database D) fetch E) None of these

Q5: An E R diagram is a graphical method of presenting? [I B P S Clerk 2011]

A) primary keys and their relationships B) primary keys and their relationships to instances.

C) entity classes and their relationships D) entity classes and their relationships to primary keys. E) None of the above

Q6: A computer checks the …… of username and password for a match before granting access. [S B I Clerk 2011]

A) website B) network C) backup file D) database E) None of these.

Q7: An entity set that does not have sufficient attributes to form a primary key, is a? [I B P S Clerk 2011]

A) strong entity set B) weak entity set C) simple entity set D) primary entity set E) None of these

Find Your Answers Here

Q1: A), Q2: B), Q3: A), Q4: D), Q5: C), Q6: D), Q7: B)

Solved Questions

Q1. The hierarchical model is also called

a. Tree structure
b. Plex Structure
c. Normalize Structure
d. Table Structure

Answer: Tree Structure

Q2. The hierarchical database model uses the hierarchic sequence that always starts at

a. the right side of the tree
b. the left side of the tree
c. the top of the tree
d. the bottom of the tree

Answer: the left side of the tree, The hierarchical database model uses the sequence that always starts from the left of the tree. Therefore the left side of the tree is the answer.

Q3. A relational database consists of a collection of

a. A. Tables
b. B. Fields
c. C. Records
d. D. Keys

Answer: Tables, Fields are the column of the relation or tables. Records are each row in the relation. Keys are the constraints in a relation. Therefore Table is the answer.

Q4.For each attribute of a relation, there is a set of permitted values, called the _____ of that attribute.

a. A. Domain
b. B. Relation
c. C. Set
d. D. Schema

Answer: Domain, The values of the attribute should be present in the domain. The domain is a set of values permitted. Therefore Domain is the answer.

Q5. Database _____ _, which is the logical design of the database, and the database _____, which is a snapshot of the data in the database at a given instant in time.

a. Instance, Schema
b. Relation, Schema
c. Relation, Domain
d. Schema, Instance

Answer: Instance, Schema. An instance is an instance of time and schema is a representation. Hence Instance, Schema is the answer.

Practice Questions

Q1. The tuples of the relations can be of _____ order.

a. Any
b. Same
c. Sorted
d. Constant

Answer: Any

Q2.Relational Algebra is a _____ query language that takes two relations as input and produces another relation as the output of the query.

a. Relational
b. Structural
c. Procedural
d. Fundamental

Answer: Procedural

2. Which of the following is a fundamental operation in relational algebra?

a. Set intersection
b. Natural join
c. Assignment
d. None of the mentioned

Answer: None of the mentioned

Q3. Which of the following is used to denote the selection operation in relational algebra?

a. Pi (Greek)
b. Sigma (Greek)
c. Lambda (Greek)
d. Omega (Greek)

Answer: Pi

Q4. For select operation the _____ appear in the subscript and the _____ argument appears in the parenthesis after the sigma.

a. Predicates, relation
b. Relation, Predicates

c. Operation, Predicates

d. Relation, Operation

Answer: Predicates, relation.

Practice Question

Q 1: Which of the following statements are not correct?

A) The data is the collection of information.

B) Data isolation is one of the main advantages of DBMS

C) Concurrent access and Crash recovery are one of the advantages of DBMS.

D) Both B) and C).

Ans: B) Data isolation is one of the main advantages of DBMS.

Different Types of Databases

1. Single-user:

Supports only one user at a time

1. Desktop:

Single-user database running on a personal computer

1. Multi-user:

Supports multiple users at the same time

1. Workgroup:

Multi-user database that supports a small group of users or a single department

1. Enterprise:

Multi-user database that supports a large group of users or an entire organization

Can be classified by location:

Centralized:

Supports data located at a single site

Distributed:

Supports data distributed across several sites

Can be classified by use:

- Transactional (or production):انتاج
  - Supports a company's day-to-day operations
- Data warehouse: مستودع
  - Stores data used to generate information required to make tactical or strategic decisions
  - Often used to store historical data
  - Structure is quite different
- **A database system consists of**
  - Data (the database)
  - Software
  - Hardware
  - Users
- We focus mainly on the software
- **Database systems allow users to**
  - Store
  - Update
  - Retrieve

- Organise
- Protect

Their data.

Database Users

™ End users

- Use the database system to achieve some goal

™ Application developers

- Write software to allow end users to interface with the database system

™ Database Administrator (DBA)

- Designs & manages the database system

™ Database systems programmer

- Writes the database software itself

™ ***Functional units of business organizations:***

- production
- sales/marketing
- finance/accounting
- human resources

→ maximize profit by producing goods and/or servicesr

y Technology – the means by which data is transformed and organized for business use:

- Hardware
- Software

- Database
- Telecommunication

<u>Systems Analysis & Design</u>

™ Systems Analysis

- Problem analysis (what)
- Information gathering (where & why)
- Decision making (how)
    1. Establish objectives وضع الهدف
    2. Determine feasibility تحديد الجدوى
    3. Choose best solution

™ Systems Design (Input, Process, Output, Procedures, Control)

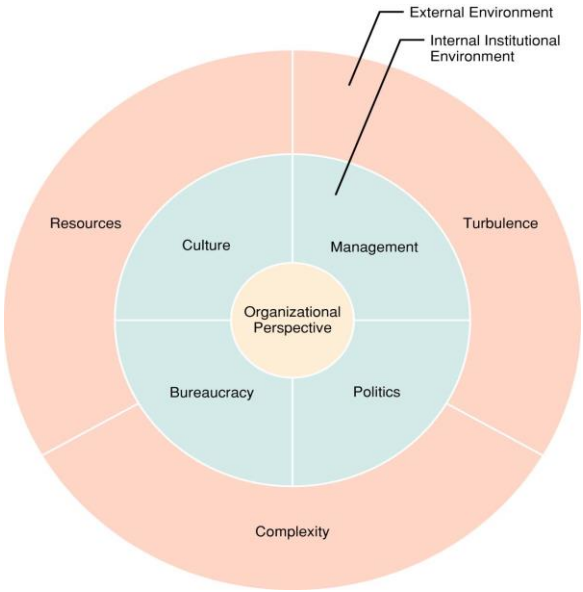
™ Systems Design

- Logical design (what will the system do?)
    1. Input: content, format, source, volume, frequency, timing
    2. Process: rule, model, formula, timing
    3. Output: content, format, organization, volume, freq., timing
    4. Storage: data, format, organization, relationship, volume
    5. Procedure: manual activities, rule, sequence, timing, location
    6. Control: security, accuracy, validity, supervision
- Physical design (how the system will work?)
    1. Input: keyboard, voice, scanner
    2. Process: PC, operating system, software
    3. Output: print-outs, files, audio

4. Storage: tape, CD
5. Procedure: batching, backup, auditing, data entry
6. Control: batch control, password, audit logs

- Implementation (coding, testing, training)

™ ***Organizational perspective to problem solving المنظور التنظيمي***



File Types

(a) An executable file (b) An archive

File Structure

™ Three kinds of files (each one has different structure and logic. Each one has different properties of speed, flexibility, security, size)

1. byte sequence
2. record sequence
3. tree

File Access

™ Sequential access

- read all bytes/records from the beginning
- cannot jump around, could rewind or back up
- convenient when medium was mag tape

™ Random access

- bytes/records read in any order
- essential for data base systems
- read can be …
  - move file marker (seek), then read or …
  - read and then move file marker

File name issues

™ Length

™ Distinguish between upper and lower case

™ Characters allowed

File Operations

1. Create
2. Delete
3. Open
4. Close
5. Read
6. Write
7. Seek
8. Append

9. Get attributes
10. Set Attributes
11. Rename

What is a DBMS

™ DBMS (database management system): software package designed to store and manage databases.

- Collection of programs that manages database structure and controls access to data
- Possible to share data among multiple applications or users
- Makes data management more efficient and effective
- A database management system (DBMS) is the software than controls that information
- **Examples:**
- Oracle
- DB2 (IBM)
- MS SQL Server
- MS Access
- Ingres
- PostgreSQL
- MySQL
-

What the DBMS does

™ Provides users with

- Data definition language (DDL)

- Data manipulation language (DML)
- Data control language (DCL)

™ Often these are all the same language

™ **DBMS provides**

1. Persistence
2. Concurrency
3. Integrity
4. Security
5. Data independence
6. Data Dictionary
7. Describes the database itself

™ ***Why Use a DBMS?***

1. Data independence and efficient access.
2. Data integrity and security.
3. Uniform data administration.
4. Concurrent access, recovery from crashes.
5. Replication control
6. Reduced application development time.

™

™ **Use a DBMS when this is important**

1. persistent storage of data
2. centralized control of data
3. control of redundancy

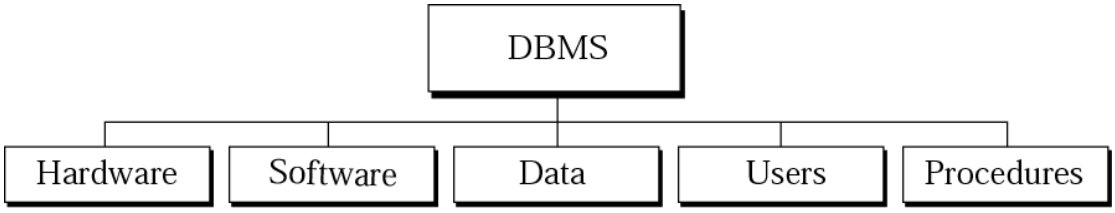
4. control of consistency and integrity
5. multiple user support
6. sharing of data
7. data documentation
8. data independence
9. control of access and security
10. backup and recovery

™ **Do not use a DBMS when**

1. The initial investment in hardware, software, and training is too high
2. The generality a DBMS provides is not needed
3. The overhead for security, concurrency control, and recovery is too high
4. Data and applications are simple and stable
5. Real-time requirements cannot be met by it
6. Multiple user access is not needed

™ **DBMS Components**

™



SQL Interview Questions

There is given sql interview questions and answers that has been asked in many companies. For PL/SQL interview questions, visit our next page.

1) What is SQL?

SQL stands for the Structured Query Language. SQL is a standard query

language used for maintaining the relational database and perform many different operations of data manipulation on the data. SQL initially was invented in 1970. It is a database language used for database creation, deletion, fetching rows and modifying rows, etc. sometimes it is pronounced as 'sequel.'

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2) When SQL appeared?

It appeared in 1974. SQL is one of the often used languages for maintaining the relational database. SQL. In 1986 SQL become the standard of American National Standards Institute (ANSI) and ISO(International Organization for Standardization) in 1987.

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3) What are the usages of SQL?

- SQL is responsible for maintaining the relational data and the data structures present in the database.
- To execute queries against a database
- To retrieve data from a database
- To inserts records in a database
- To updates records in a database
- To delete records from a database
- To create new databases
- To create new tables in a database
- To create views in a database
- To perform complex operations on the database.

Sample Database Design Project Outline

Time needed: 2 minutes.

Database Design Project Example Outline

1. **Title Page**

   In the title page, you have to write your desired title for your project. Example:

   Sales and Inventory System

2. **Table of contents**

   In this section, You have to write the outline for your table of contents.

3. **System Description**

   For system description, you have to write at least a minimum of 200 words.

4. **Data Dictionaries**

   For Data Dictionaries, you have to write the descriptive details of each field in every table.

5. **Entity Relationship Diagram**

   You have to draw an ER diagram that supports your system.

Q1/ Multiple-Choice **(choose correct option)**

1. …….. is a persistent, logically coherent collection of inherently meaningful data
   a. Database b.DA c. Database system d. Restrictive
2. ……. Is Advantage of Database
   a. Data b. Data consistency c. system d. Normalization
3. Complexity is ……
   a. Information b. Desktop c. Disadvantages d. Normal
4. …… Multi-user database that supports a small group of users or a single department
   a. Programmer b. Programmed c. Cokes d. Workgroup
5. ……. Supports data located at a single site
   a. Enterprise b. Centralized c. Bus d. Single-user

Q2/ Define

1. Instance 2. Schema Diagram 3.Entities 4. Normalization 5. Schema Construct

Q3/ Answer the following briefly

1. Type of Major Steps in Database Design
2. Diagram *of a Database Schema*
3. Component of DBMS Environment
4. *People perspective to problem solving*

Q4/A- what is the difference between

1. Database Schema Vs. Database State
2. *Data and Database Administrator*

B- Write T (True) if it is completely correct, otherwise write F (False).

1. A database is a collection of related data.
2. A DBMS catalog stores the meta-data describing the structure of the database.
3. A DBMS is responsible for enforcing all the constraints of a data model.
4. Data is Data processed to reveal meaning.
5. Technology is the means by which data is transformed and organized for business.
6. Organization is a collection of functional units working together to achieve a common goal.
7. Systems Design (Input, Process, Output, Procedures, Control).
8. DBMS is software package designed to store and manage databases.
9. Database Schema is the actual data stored in a database at a particular moment in time.
10. A schema lets the user have access to different areas of applications in which the user designed.

/ Complete the following blanks with the correct words

…….. are person, place, object or event, **…….** characteristic of an …… , **…….**
ollection of fields, DBA , DDL , and DML refers to **…… , …… ,**
……, Main Characteristics of the Database Approach **…… , …… ,**
…… . A database system consists of ……, ……, …… , ……
Database systems allow users to ……. , ……. , ……. , ……..,
…… .Database Users …… , ……. , …… , ……. .
teps of Database Design ……. , ……

- a/ Write T (True) if it is completely correct, otherwise write F (False).

1. Degree is the number of entities that participate in the relationship.
2. A DB catalog stores the meta-data describing the structure of the database.
3. Data type is a property of an attribute that defines what values an attribute
4. Data is Data processed to reveal meaning.
5. Technology is the means by which data is transformed and organized for business.

b/ **Why study Database ?**

/ Complete the following blanks with the correct words

Steps of Database Design (**Before we look at how to create and use a database we'll look at how to design one, Need to consider, Conceptual design , Logical design, Physical design**) . Long-term Information Storage (Must store large amounts of data, Information stored must survive the termination of the process using it, Multiple processes must be able to access the information concurrently), A ……**…** DBMS..**…** is specialized software which is responsible for efficient storage and retrieval of large amounts of data in a database, allowing it to persist over long periods of time. Develop applications using the database …… Application programmers …, A … **File** .. System is a technique of arranging the files in a storage medium like a hard disk, pen drive, DVD, etc. A …… ***data file***…. is a collection of related records stored on a storage medium such as a hard disk or optical disc. A … **Database** … is a collection of data organized in a manner that allows access, retrieval, and use of that data……..DBMS…….. are Instructions and rules that should be applied to the design and use of the database. *Normalization* is a process that …… **improves**….a database design by generating relations that are of higher normal forms. The *objective* of normalization *to create relations where every dependency is (on the key, the whole key, and nothing but the key") . a relation in 3NF is also in ……2NF……., a relation in ……2NF…. s also in 1NF, in 1NF Remove ……Redonancy (duplication) group, 3NF Remove …* ***transitive dependencies*** *… dependencies,* File Processing Data is …… **organized** ., .. **stored** .., and …… processed ….in independent files of data…records ….. , **… Data Redundancy ...** duplicate data requires update to files.

- a/ Write T (True) if it is completely correct, otherwise write F (False).

1. Organization is a collection of functional units working together true
2. Systems Design (Input, Process, Output, Procedures, Control). True
3. DB is software package designed to store and manage databases. True
4. Data Design is the process of identifying and formalizing the relationships true
5. Physical level: describes how a record (e.g. customer) is stored. True

b/ List at least 3 different types of information that a university would maintain.

Answer:

• Information about people who are employees of the university but who are not instructors.

• Library information, including books in the library, and who has issued books.

• Accounting information including fee payment, scholarships, salaries, and all other kinds of receipts and payments of the university.

/ Complete the following blanks with the correct words

A…**Entity** …. are person, place, object or event,**…Attribute…..** Characteristic of an …**entity**… , **……Record …..** Collection of fields, DBA , DDL , and DML refers to **(Database administrator, Data definition language**

(DDL),Data manipulation language (DML)) , Main Characteristics of the Database Approach **(Self-describing nature of a database system. , Insulation between programs and data, Data Abstraction, Support of multiple views of the data, Sharing of data and multiuser transaction processing).** A database system consists of (**Data, Software, Hardware, Users**), Database systems allow users to(**Store, Update, Retrieve, Organise , Protect, their data**), Database Users (**End users , Application developers , Database Administrator (DBA), Database systems programmer)**, Steps of Database Design (…**Before we look at how to create and use a database we'll look at how to design one, Need to consider, Conceptual design, Logical design, Physical design) Designer's Perspective DB Lifecycle are (Planning, Analysis, conceptual design, Implementation, Maintenance)**

- a/ Write T (True) if it is completely correct, otherwise write F (False).

11. Degree is the number of entities that participate in the relationship. TRUE
12. A DB catalog stores the meta-data describing the structure of the database. TRUE
13. Data type is a property of an attribute that defines what values an attribute FALSE
14. Data is Data processed to reveal meaning. FALSE
15. Technology is the means by which data is transformed and organized for business. TRUE

b/ **Why Database ?**

- Databases have incredible value to businesses.
  - Very important technology for supporting operations.
- Vastly superior to file processing systems
- Businesses cannot survive without quality data about their
  - internal operations and
  - external environment
- Databases are useful
  - Many computing applications deal with large amounts of information
  - Database systems give a set of tools for storing, searching and managing this information

1. Redundancy can be reduced
2. Inconsistency can be avoided
3. The data can be shared
4. Standards can be enforced
5. Security restrictions can be applied
6. Integrity can be maintained
7. Provision of data independence

Q1/ Multiple-Choice **(choose correct option)**

6. …….. Designs & manages the database system
   b. Database Schema b. DBA c. Database system d. Restrictive
7. ……. Is NON-Disadvantage of Database
   b. Information b. Data consistency c. information system d. Normalization form
8. ……..is Data processed to reveal meaning.
   b. Information b. Desktop c. Disadvantages d. Normal
9. …… Multi-user database that supports a small group of users or a single department
   a. Programmer b. Programmed c. Cokes d. Workgroup
10. …… is used to control how information is stored and retrieved.
    a. Enterprise b. Centralized c. file system d. Single-user

Q2/ Define

2. End User 2. Schema 3.Entities 4. Conceptual Level 5. Data Definition Language

Q3/ Answer the following briefly

5. Roles in the Database Environment
6. Types of Database Models
7. Levels of Abstraction
8. *People perspective to problem solving*
9. *Types of Schemas*

Q4/ *what does mean*

3. *Metadata*
4. *Data Dictionary*
5. *Functions of DBA*
6. Levels of Normalization
7. *Data Abstraction*

Typical Answer 2

Q1/

1. b. DBA
2. b. Data consistency
3. a. Information
4. d. Workgroup
11. c. file system

Q2/

1. End User: Use the database system to achieve some goal.
2. Schema Diagram: A diagrammatic display of (some aspects of) a database schema.
3. Entities: represent objects or things of interest Physical things like students, lecturers, employees,

products More abstract things like modules, orders, courses, projects

4. **Conceptual Level:** (1) Define the logical view of the data. (2) Define the data model. (3) Contain the main functions of the DBMS (4) Intermediary level that free users from dealing with internal level
5. **Data Definition Language**: A data definition or data description language is a syntax similar to a computer programming language for defining data structures, especially database schemas. DDL statements create, modify, and remove database objects such as tables, indexes, and users. Common DDL statements are CREATE, ALTER, and DROP

Q3/

1.
   a. **Data Administrator** (**DA**)
   b. **Database Administrator (DBA)**
   c. **Database Designers (Logical and Physical)**
   d. **Application Programmers**
   e. **End Users (naive and sophisticated)**

2.

- Hierarchical Database Management Systems
- Network Database Management :system
- Relational Database Management systems

3.

- Physical level: describes how a record (e.g. customer) is stored.
- Logical level: describes data stored in database, and the relationships among the data.
- View level: application programs hide details of data types. Views can also hide information (e.g. salary) for security purposes.

4. *People perspective to problem solving*

5. ***Certain patterns*** : have developed in designing database schema.
   The widely used star schema : is also the simplest. In it, one or more fact tables are linked to any number of dimensional tables.

The related snowflake schema: is also used to represent a multidimensional database.

Q4/

1. *Metadata*

- Metadata is data about data. In other words, it is data that is used to describe another item's content.
- The term metadata is often used in the context of Web pages, where it describes page content for a search engine.

Common metadata used by most search engines includes:

1. Description: This meta element describes the type of content found on a Web page. For example, the description for this page tells this search engine that the page contains a definition of the term metadata.
2. Title: This provides a title for the content on the page, which is shown by search engines in results. For this page, it is: What is Metadata? - Definition from Techopedia.com.
3. Keywords: This provides the search engine with additional keywords that are related to the content that's on the page. Whether search engines still use this data is a matter of debate.

2. *Data Dictionary*

A **data dictionary** is a file or a set of files that contains a **database's** metadata. The **data dictionary** contains records about other objects in the **database**, such as **data ownership**, **data** relationships to other objects, and other **data**.

3. *Functions of DBA*

- *Schema Definition*
- *Storage Structure and Access Method Definition*
- *Assisting Application Programmers*
- *Physical Organization Modification*
- *Approving Data Access*
- *Monitoring Performance*
- *Backup and Recovery*

4. Levels of Normalization

Levels of normalization based on the amount of redundancy in the database.

Various levels of normalization are:

a. First Normal Form (1NF)
b. Second Normal Form (2NF)
c. Third Normal Form (3NF)
d. Boyce-Codd Normal Form (BCNF)
e. Fourth Normal Form (4NF)
f. Fifth Normal Form (5NF)
g. Domain Key Normal Form (DKNF)

5. *Data Abstraction*

- Data abstraction is the reduction of a particular body of data to a simplified representation of the whole.

- Data abstraction is usually the first step in database design.

Extra notes:

Essay Quiz

1. Let's say that you were the one hired by Sink Swim Pools in this chapter instead of Lauren. If a co-worker asked you to explain yourself after you used the phrase network of computers, what would you say to her? Elaborate so that a novice would understand completely.
2. Chaos is happening within your network. Security was discussed when you started working at your current job, but not much emphasis was placed on it at first. Now, confidential company information is appearing in competitors' planning sessions. You remember the warning you were given by your supervisor about devising a plan. Fully discuss the concept that a hierarchy of data must be established.
3. Assume that you are a member of the TEACH organization's training department. Make out a purchase order requesting that a new training lab in the TEACH training center be joined to the network. Fully explain on your purchase order why it is necessary to join this new lab to the network and what existing components the lab will rely upon once it is connected.
4. Explain the concept of a network client and, after analysing the TEACH organizational chart once again, determine the maximum number of network clients you would expect to have on that company's entire network.
5. Ricky is still out there helping Lauren enlist the cooperation of the Sink Swim Pools workers by having them become network users. Help him come up with convincing arguments that will make those workers want to join their new workstations to the network as soon as they take delivery. Remember, they are computer novices and do not yet have access to their computers, and don't forget to be convincing.

External Evaluator