Note: Answer (5) questions only, 10 marks for each.

Q1: - Define the following:---

(1) object-oriented model       (2) data dictionary
(3) super key                     (4) specialized users
(5) mapping cardinalities

Q2: - A) construct an E-R diagram for a car insurance company with a set of customers with attributes (name, ss#, address), each of whom owns a number of cars with attributes (year, model, license), each car has a number of recorded accidents, the accidents has the attributes (date, driver, damage amount), a log of various accidents associated with each car?

B) explain the concept of aggregation, give an example of it?

Q3: transform the E-R diagram of figure(1) to a data-structure diagram assuming that the data model is:

a-Network

b-DBTG.

Figure(1)
Q4: What are the differences between the following:

1. Procedural DMLs & Nonprocedural DMLs
2. Instance & Scheme
3. Relational model & Network model

Q5: A) Explain with example the steps of normalization with in relational model?
B) Discuss the meaning of the DBTG-set?

Q6: A) For the data-structure diagram corresponding to the E-R diagram of figure 2, construct the following DBTG queries:

1. Find the sum of all the account balances that belong to the customer "Ahmad".
2. Print customer name of all customers in branch 'Basra'.
3. Add new customer with data ('Suha', 'plastain street', 'baghdad')

B) What are the advantages of the hierarchical model?
Q1: Define

1- object-oriented model:

It is based on a collection of objects. An object contain values stored in instance variables, within object these values are themselves objects. Objects also contain bodies of codes that operate on the object these bodies called methods.

2- data dictionary: It is a file that stores metadata about the structure of the database. This file is consulted before actual data is read or modified in the database system.

3- Superkey: is a set of one or more of attributes which allow to identify uniquely an entity in the entity set.

4- Specialized users: some sophisticated users write specialized database applications. That among these applications
are computer-aided design system, knowledge-base and expert system.

5- Mapping cardinalities:
- It is one of the constraints which the contents of a database must confirm.
- It expresses the number of entities to which another entity can be associated via a relationship set.

Q2:

![Entity-Relationship Diagram]

- Customer
  - Name
  - SS#
  - Address

- Car
  - Model
  - License
  - Year
  - Owner
  - Driver
  - Claim

- Accidents
  - Log
A.2. B)

Aggregation is a one obstruction through which relationships are treated as higher level entities.

We regard the relationship set Work and the entity sets Employee and Project as a higher-level entity set called Work. Such an entity set is treated in the same manner as any other entity set.

E-R diagram with aggregation
a-

b-
1. Procedural PMLs require a user to specify what data is needed and how to get it, but non-procedural PMLs require a user to specify what data is needed without specifying how to get it, and it is easier to learn and use than procedural PMLs.

2. An instance is the collection of information stored in the database at a particular moment in time. It can be changed largely.

* Schema: It is the overall design of the database.
  - Schemes are changed infrequently if at all.
  - Database systems have several schemes.
3. Relational model & Network model

- Relational model represents data and relationships among data by a collection of tables, each of which has a number of columns with unique names.

- Network model: In this model, data are represented by collections of records (i.e., entities) and relationships among data are represented by links which can be viewed as pointers.

A5: A) Normalization

First normalization:

- Eliminate repeating subjects. Each subject leads to its own table.

Second normalization:

- Further eliminate dependencies from the subject to the subject's attributes. This step is called triadic normalization, and the process is repeated (third, fourth, etc.).
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لا سلطة الدم الله

كلمة السواد الأعظم

من الأسر السليمة في هلال تلميع زر الداخلية للبنية.

نهاية التزامات ببعض التوابل.

وقد نسأها بطرق مختلفة من بعض العلامات كنورك للتواصل في حالة التغلب.

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DBTG Set: A data structure diagram consisting of two record types that are linking together is referred to in the DBTG model as a DBTG Set. Each DBTG Set has one record type designated as the member of the set and the other record type designated as the member of the set. A DBTG Set can have any number of set occurrences.
1- \text{Sum} := 0; \\
\text{Customer.name} = \text{"Ahmad"}; \\
\text{Find any customer using name.} \\
\text{Find first account within CusAcc.} \\
\text{While DB-status = 0 do} \\
\quad \begin{align*} \\
\text{begin} & \\
\text{Get account;} & \\
\text{Sum} := \text{Sum} + \text{Account.balance.} & \\
\text{Find next account within CusAcc.} & \\
\text{end;} & \\
\text{Print (Sum);} & \\
\end{align*} \\

2- \text{Branch.name} = \text{"Basra"}; \\
\text{Find any branch using name.} \\
\text{Find first account within BranchAcc.} \\
\text{While DB-status = 0 do} \\
\quad \begin{align*} \\
\text{begin} & \\
\text{Find owner within CusAcc.} & \\
\text{Print (customer.name),} & \\
\text{Find next account within BranchAcc.} & \\
\text{end.} & \\
\end{align*}
- 3

3) customer name := "Sukh"

customer street := "Platam Street"

store customer := "Baghdad"