Question 1 : Create an object oriented database for the following UML diagram.Make assumptions about your attributes and functions.   (10 marks)

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                        Student


        Full Time                        Part Time



  Ph. D. Students        Master Student
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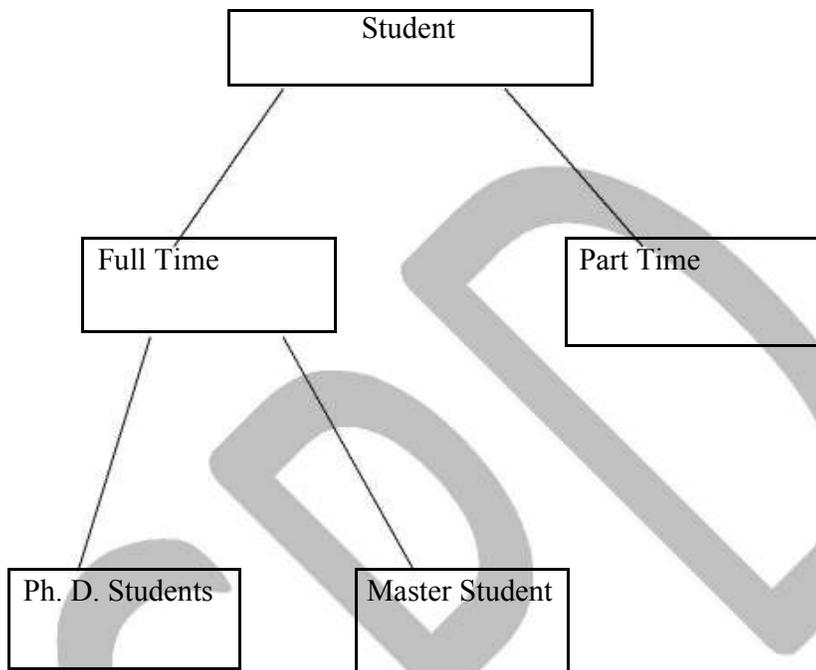
How is object oriented database different from RDBMS? Explain

**UML Class Diagrams and Database Design**

To begin with, let us first recollect what we have learnt about class diagrams. The class diagrams sometimes may be considered as an alternative notation to E-R diagram. In UML class diagram contains:

• 'Class' – is displayed as a box. It has three sections:

"Top Section" – Class Name

"Middle Section" – Attributes

"Last Section" – Operations

• Associations: Relationship Types are called Associations.

• Links: Relationship instances are called Links.

• Binary Association: Represented as a line connecting the participating classes.

• Linked Attribute: Connected to the Association's line by dashed line.

• Multiplicities: The (Minimum and Maximum) constraints.

• Reflexive Association: A Recursive Relationship.

• Aggregation: To represent a relationship between a whole object and its component parts.

• Different unidirectional and bi-directional Associations.
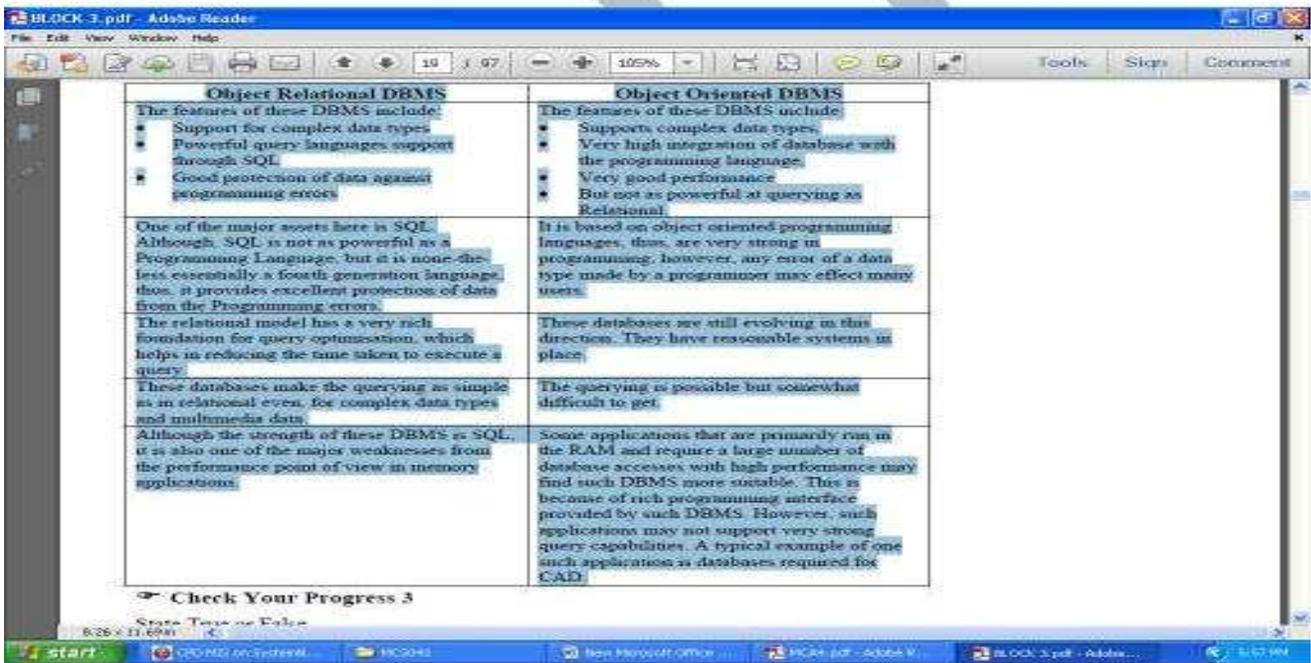
Question 2 : (ii) How are assertions different from views? Explain assertions and views with the help of examples (5 marks)

Assertions

Assertions are constraints that are normally of general nature. For example, the age of the student in a hypothetical University should not be more than 25 years or the minimum age of the teacher of that

University should be 30 years. Such general constraints can be implemented with the help of an assertion statement. The syntax for creating assertion is:

Syntax

CREATE ASSERTION <Name>
CHECK (<Condition>);
Thus, the assertion on age for the University as above can be implemented as:
CREATE ASSERTION age-constraint
CHECK (NOT EXISTS (
SELECT *
FROM STUDENT s
WHERE s.age > 25
OR s.age > (
SELECT MIN
(f.age) FROM
FACULTY f));

A view is a virtual table, which does not actually store data. But if it does not store any data

A view actually is a query and thus has a SELECT FROM WHERE ….. clause which works on physical table which stores the data. Thus, the view is a collection of relevant information for a specific entity.

Q.3 (i) What are semantic database? Explain the process of searching the knowledge in any semantic database with the help of a block diagram. (5 marks)

Knowledge Discovery in Databases (KDD) Process
The different steps of KDD are as follows:
• **Extraction:** Obtains data from various data sources.
• **Preprocessing:** It includes cleansing the data which has already been extracted by the above step.
• **Transformation:** The data is converted in to a common format, by applying some technique.
• **Data Mining:** Automatically extracts the information/patterns/knowledge.
• **Interpretation/Evaluation:** Presents the results obtained through data mining to the users, in easily understandable and meaningful format.

Tasks in Knowledge Discovery in Databases (KDD) Process
The different tasks in KDD are as follows:
• **Obtains information on application domain**: It gathers knowledge from the domain relevant to the user.
• **Extracting data set**: It includes extracting required data which will later, be used for analysis.
• **Data cleansing process**: It involves basic operations such as, the removal of noise, collecting necessary information to from noisy data, such as, deciding on strategies for handling missing data fields.
• **Data reduction and projection**: Using dimensionality reduction or transformation methods it reduces the effective number of dimensions under consideration.
• **Selecting data mining task**: In this stage we decide what the objective of the KDD process is. Whether it is classification, clustering, association rules etc.

• **Selecting data mining method**: In this stage, we decide the methods and the parameter to be used for searching for desired patterns in the data.

(ii) With the help of an example, explain the implementation of Cursors and Triggers.(5 marks)

Cursors and Embedded SQL

Let us first define the terminate 'cursor'. The Cursor can be defined as a pointer to the current tuple. It can also be defined as a portion of RAM allocated for the internal processing that has been set aside by the database server for database interactions. This portion may be used for query processing using SQL. But, what size of memory is to be allotted for the cursor? Ideally, the size allotted for the cursor should be equal to the memory required to hold the tuples that result from a query. However, the available memory puts a constraint on this size. Whenever a query results in a number of tuples, we can use a cursor to process the currently available tuples one by one. How? Let us explain the use of the cursor with the help of an example: Since most of the commercial RDBMS architectures are client-server architectures, on execution of an embedded SQL query, the resulting tuples are cached in the cursor.

This operation is performed on the server. Sometimes the cursor is opened by RDBMS itself – these are called **implicit** cursors.

However, in embedded SQL you need to declare these cursors explicitly – these are called **explicit cursors.** Any cursor needs to have the following operations defined on them:

DECLARE – to declare the cursor

OPEN AND CLOSE - to open and close the cursor

FETCH – get the current records one by one till end of tuples. In addition, cursors have some attributes through which we can determine the state of the cursor.

These may be:

ISOPEN – It is true if cursor is OPEN, otherwise false.

FOUND/NOT FOUND – It is true if a row is fetched successfully/not successfully.

ROWCOUNT – It determines the number of tuples in the cursor.

Q.4 (i) What is multivalued dependency? Explain through an example how is 4NF related to multivalued dependency.