COMPUTER ENGINEERING DEPARTMENT

SUBJECT: DATABASE MANAGEMENT SYSTEM

COURSE: T.E. **Year: 2020-2021** **Semester: V**

DEPT: Computer Engineering

SUBJECT CODE: CSC502 **EXAMINATION DATE: 09/01/2021**

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DATABASE MANAGEMENT SYSTEM ANSWER SHEET

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Exam : SEMESTER V

Subject : DATABASE MANAGEMENT SYSTEM

Date : 09/01/2021

Day : SATURDAY

Student Signature: 

Q.2. A. Roles of DBA

Database Administrator :

- Coordinates all the activities of the database system. The database administrator has a good understanding of the enterprise's information resources and needs.
- Database Administrator's duties include:

(1) Schema definition
- The DBA creates the original database schema by executing a set of data definition statements in the DDL.

(2) Storage structure and access method definition

(3) Schema and physical organization modification
- The DBA carries out changes to the schema and physical organization to reflect the changing needs of the organization, or to alter the physical organization to improve performance.

(4) Granting User Authority to access the database
- By granting different types of authorization the DBA can regulate which parts of the database various users can access

(5) Specifying integrity constraints

(6) Monitoring Performance and responding to changes in requirements

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Q.2 B. Data Independence

Data Independence
- Data independence can be explained using the three schema architecture
- Data independence refers characteristics of being able to modify the schema at one level of the database system. without altering the schema at the next higher level.
- There are two types of data independence.
  1. Logical data independence
  2. Physical data indepence

1. Logical data independence
- Logical data independence refers characteristics of being able to change the conceptual schema without having to change the external schema
- Logical data independence is used to separate the external level from the conceptual view.
- If we do any changes the conceptual view of the data then the user view of the data would not be affected.
- Logical data independence occurs at the user interface level.

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(21) Physical Data Independence

- Physical data independence can be defined as the capacity to change the internal schema without having to change the conceptual schema.
- If we do any changes in the storage size of the database, system server, then the conceptual structure of database will not be affected.
- Physical data independence is used to separate conceptual levels from the internal levels.

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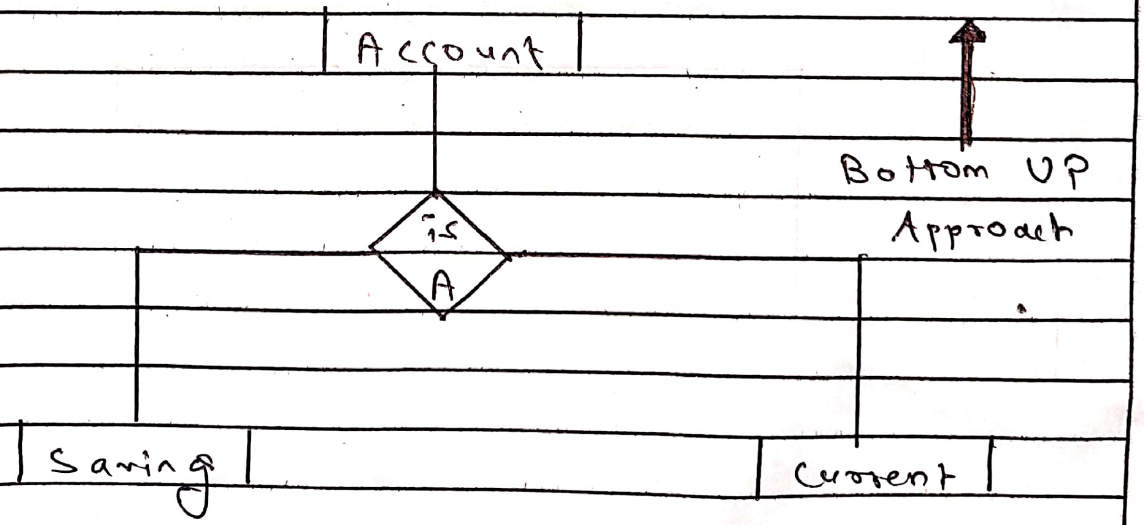
Q.2.C.

Generalization

- It is a bottom up approach. in which two lower level entities combine to form higer entity
- In generalization, the higer level entity can also combine with other lower level entities to make further higer level entity
- Generalization proceeds from the recognition that a number of entity sets share some common features. On the basis of commonalities, generalization synthesizes these entity sets into single higher level entity set.
- Generalization is used to emphasize the similarities among lower level entity sets and to hide the differences in the schema
- Example:



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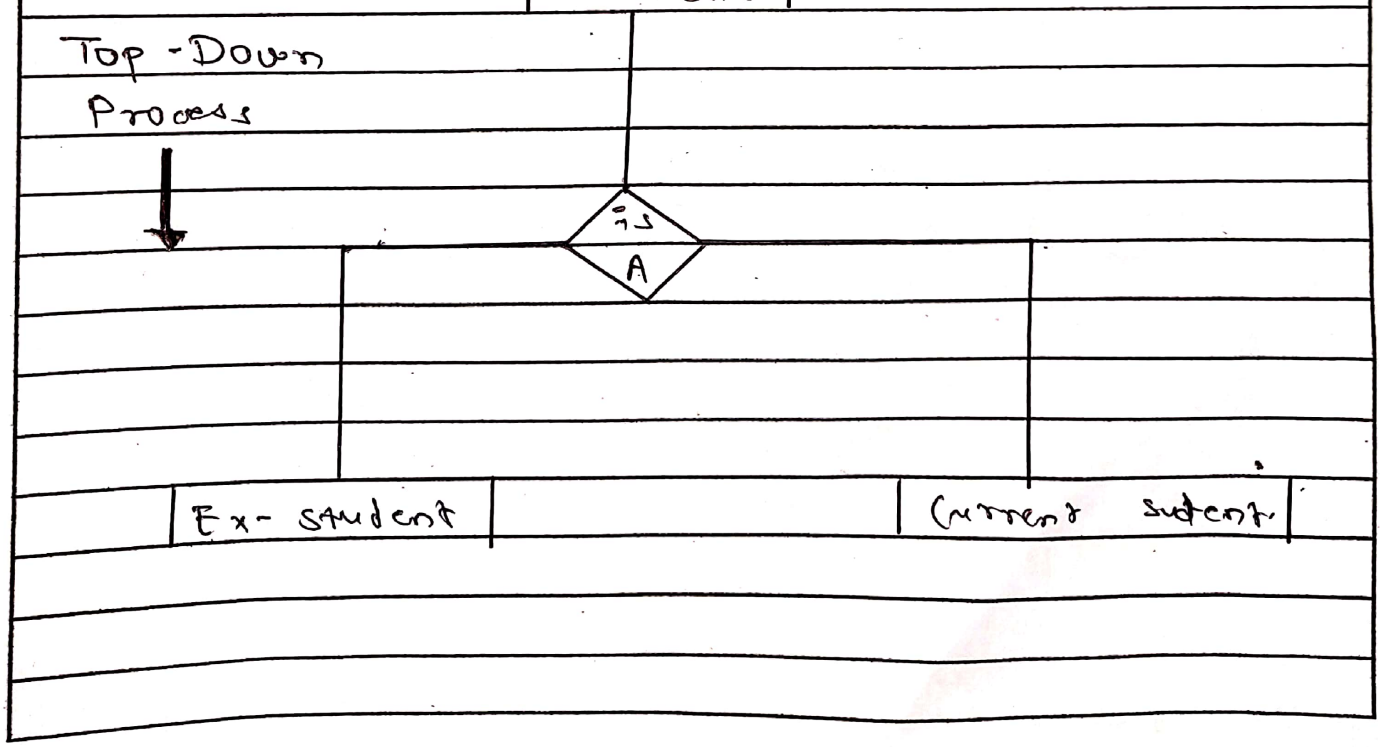
Q.2. C

Specialization

- It is opposite to generalization.
- It is a top down approach in which one higer level entity can be broken down into lower level entity.
- Example:
  The specialization of students allows us to distinguish among students according to whether they are Ex-student or Current student.
- Specialization can be repeatedly applied to refine a design schema



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Q.2. E. Normalization with 3NF

Normalization.

- Database normalization is a technique of organizing the data in the database
- Normalization of data can be considered a process of analyzing the given relation schemas based on their functional dependencies and primary keys to achieve the following properties:
  1. Minimizing redundancy
  2. Minimizing the insertion, deletion and update anamolies
  3. Ensuring data is stored in correct table
- It can be considered as a filtering process to make the design have successively better quality
- It is a multi step process that puts data into tabular form by removing duplicated data from the relation tables
- Without normalization it becomes difficult to handle and update database without facing data loss.

- Normalization is a process of organizing the data in database to avoid data redundancy, insertion anomaly, update anomaly and delete anomaly.

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Third Normal Form (3NF)

- A relation is said to be in 3NF, if it is already in 2NF and there exists no transitive dependency in that relation.
- If a table contains transitive dependency then it is not in 3NF and the table must be split to bring it into 3NF.
- Transitive Dependency:
  $A \rightarrow B$ [B depends on A] and
  $B \rightarrow C$ [C depends on B] Then
  $A \rightarrow C$ [C depends on A] can be derived
- Example:

Stud_ID	Stud_Name	City	Zip
100	Archit	Navi Mumbai	400001
200	Mega	Mumbai	400002

Stud_ID is the only primary key attribute. City can be identified by Stud_ID as well as Zip. Neither Zip is a superkey nor City is a prime attribute

Stud_ID → Zip → City so there exists transitive dependency

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Hence 3NF Table

Student_Detail

Stud_ID	Stud_Name	Zip
100	Archit	400001
200	Mega	400002

Zip_code

Zip	City
400001	Navi Mumbai
400002	Mumbai

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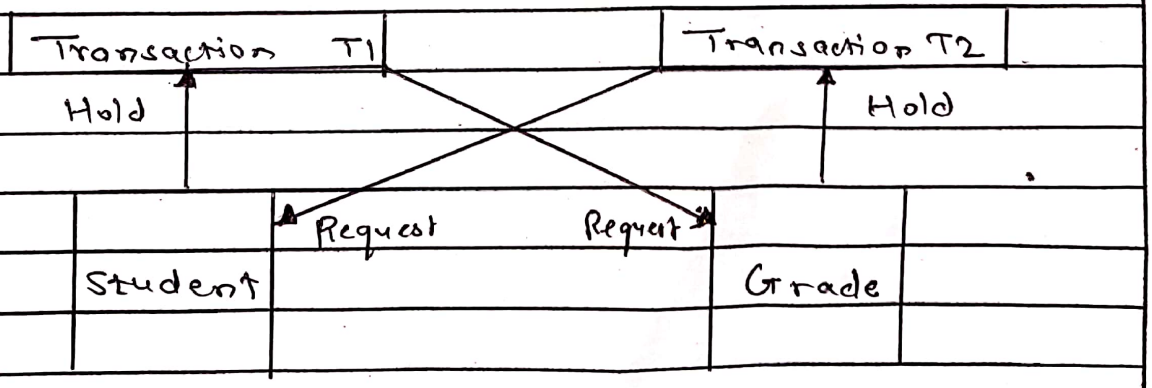
Q.2. F. Deadlock with wait for graph

Deadlock

- In a database, a deadlock is an unwanted situation in which two or more transactions are waiting indefinitely for one another to give up locks.
- Deadlock is said to be one of the most feared complications in DBMS as it brings the whole system to a halt.
- Example:
  → Suppose transaction T1 holds a lock on some rows in the student table and needs to update some rows in the grades table. Simultaneously, transaction T2 holds locks on those very rows (which T1 needs to update) in the grades table but needs to update the rows in the student table held by Transaction T1.
  → Now the problem is Transaction T1 will wait for Transaction T2 and similarly T2 will wait for T1 to give up locks. As a result, all activity comes to a halt and remains at a standstill forever.



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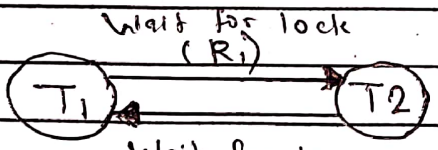
Deadlock Detection.

- When a transaction waits indefinately to obtain a lock, The DBMS should detect whether the transaction is involved in a deadlock or not.
- The basic idea is to check allocation against availability for all possible allocation sequence to determine if the system is deadlocked state.
- Once detected there needs to be ways to recovers.

⇒ Wait - for - graph:

- In this, graph is created based on the transactions and their lock. If the created graph has a cycle or closed loop then there is a deadlock.
- The wait for graph is maintained by the system for every transaction which is waiting for some data held by the others. The system keeps checking the graph if there is any cycle in the graph.



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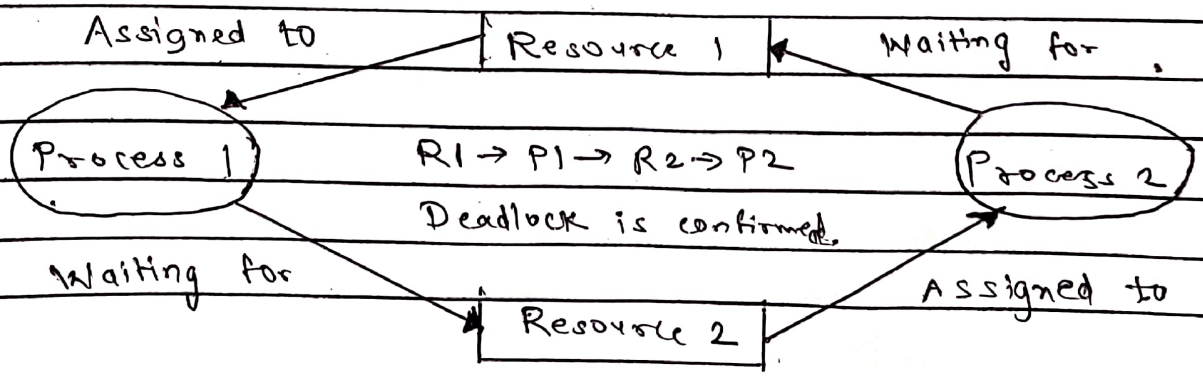

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