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CIA-1 Examination –April/May/Nov/Dec 2025

Register No.: 212223040207 Branch & Sem.: BE-CSE, 4th sem

Date: 07/04/25 Sign of the Invigilator: 7/4/25

Subject Code & Subject Name: 19CS404 - Database management system and its applications

(1)

Part-B

6)

B) Define data abstraction, Illustrate the levels in abstraction in dbms with example. (physical level, Logic level, view level).

7)

b) Explain first normal form, second normal form, third normal form and BCNF with an example.

Part-C

8)

b) A hospital wants to develop a database to manage patients records, doctor assignment and treatment details. Design an ER diagram for the system with appropriate entities, attributes, relationship and constraints. Ensure that your design includes patient details, doctor specialization, appointments and treatment history.

Part-B

6)

B) Data abstraction and levels of abstraction in DBMS

Data base system consists of complex structures in order to make system in efficient in terms of retrieval of data, usability in terms of users and developers use abstraction (its hide relevent details from the user)

Levels of abstraction in DBMS:

* Physical level or Internal level
* Logic level or conceptual level
* view level or External level

Physical level:

Physical level is the lowest level in data abstraction. It explain how the data is actually stored in DBMS. It can access methods like sequential or random access method and file organization methods like Bt trees and

(3)

hashing are same, usability, count the Number of times the records go to factor while designing the database.

Example:

If we construct employee database, a block of storage and amount of memory are created for this purpose but are kept hidden from user.

Logic Level:

Logical level comprises information that actually stored in database in form of tables. It also store relationship among data entities in relatively simple structures. Thus logic level explain the entire database in small number of structures. The implementation of structures in logical level may involve complex but Logical level user no need to worry for complexity. It also refer physical level data Independence.

View level:

View level or External level is the highest level in data abstraction. The only part of data base is actually seen by user. User can view table in forms of rows and column, table and relationship are used to store data. User can view the table and intract with database storage and implementation are kept hidden from user.

Exp Examples:

Physical level:

Physical level contain block of storge (bytes)

Logical level:

attributes of data It contains fields and

View level:

It works with CLI and GUI data base.

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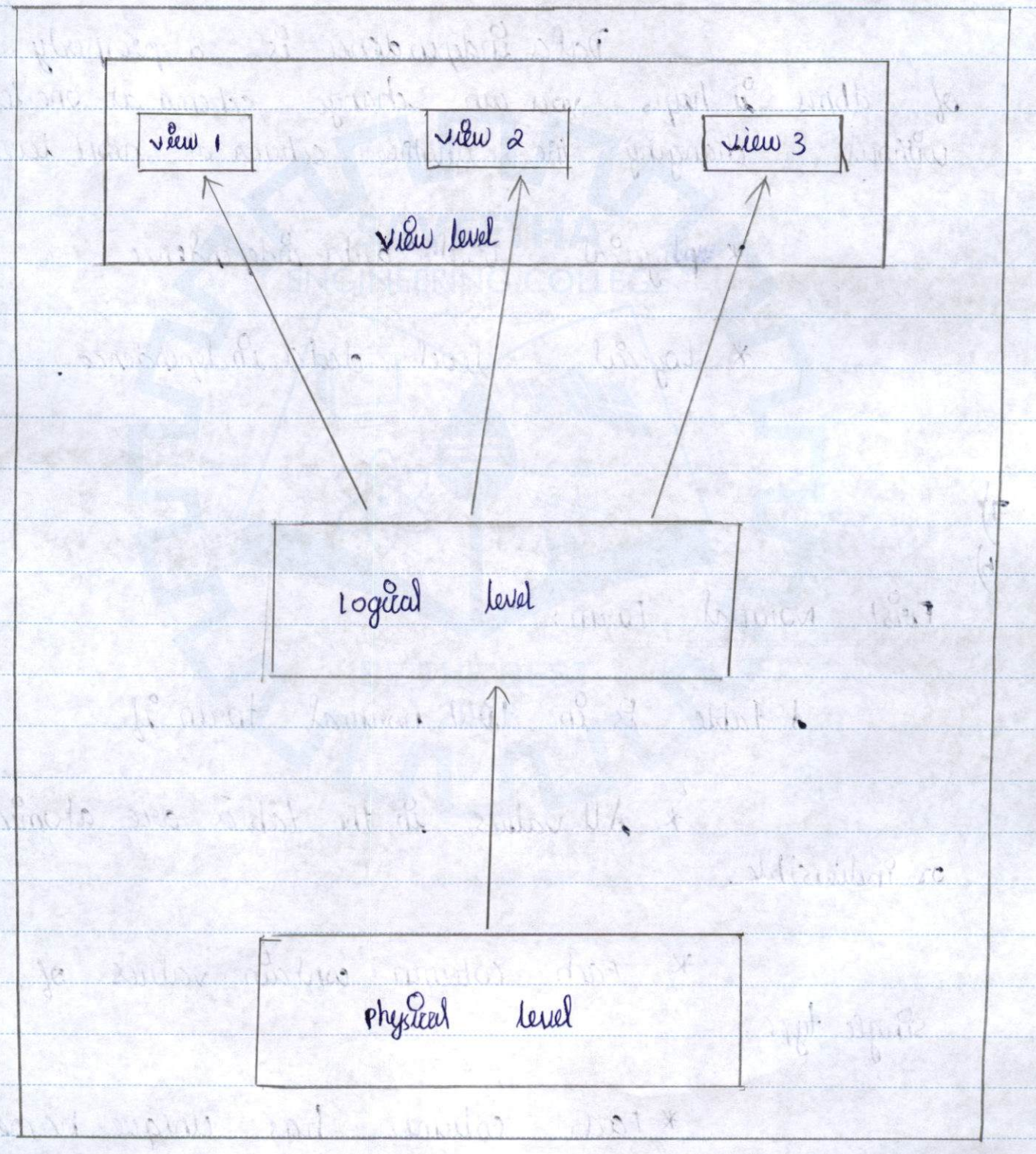
Level of abstraction in DBMS (5)



The main purpose of data abstraction is to achieve data independence when a data require more cost or time during modified.

Data Independence:

Data independence is a property of dbms it helps you can change schema at one level without changing the another schema at next level.

* physical level data independence
* Logical level data independence.

---

7)
b)

First Normal Form:

A table is in first normal form if

* All values in the tables are atomic or indivisible.
* Each column contain values of single type.
* Each column has unique name.

(7)

A order in which the data is stored is does not matter.

Example :

Unnormilized table :

Student_id	Student_name	course
1	Bharath	math, science
2	Kavin	science

Normalized table of INF

student_id	student_name	course
1	Bharath	math
1	Bharath	science
2	Kavin	Science

Second Normal form:

A table is in second normal form if

* it is already in INF
* All non prime attributes are fully functionaly dependent to whole primary key.

Example:

Unnormalized or INF table

Student_Id	Course	Instructor
1	Bharath Math	~~math~~ Prof. A
2	Bharath Science	Prof. B
2	Science	Prof. B

Normalized 2NF

Student - course table

Student_ID	Course
1	Math
* 2	Science
2	Science

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Course - Instructor table:

Course	Instructor
Math	Prof. A
science	Prof. B

Third & Normal form:

A table in 3NF if

=> It is ~~are~~ already in 2NF

=> There is no transition dependencies.

2NF table:

Course	Instructor	Department
Math	Prof. A	Science
Science	Prof. B	Science

Normalized 3NF

Course - Instructor table:

Course	Instructor
Math	Prof. A
Science	prof. B

Instructor - Department table:

Instructor	Department
Prof. A	Science
Prof. B	Science

BCNF:

Full form: Boyce codd Normal form

A table is in BCNF if

=> It is already in ~~BCNF~~ 3NF

=> All functional dependencies of $X \rightarrow Yx$ to $Yx \rightarrow y$ and xxx is superkey.

Example: (11)

3NF table:

Student_id	course	Instructor
1	~~bharath~~ Math	prof. A
1	Science	Prof. B
2	science	prof. B.

Normalized BCNF:

Student, course table:

Student-id	Course
1	Math
2	Science
2	Science

Course - Instructor table :

Course	Instructor
Math	Prof. A
Science	Prof. B

Part - C

8)

B) Hospital System Database

Hospital wants a data base to manage

* patient records
* Doctor - assignments
* appointment
* treatment.

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ER diagram Explanation :

ER means Entity relationship diagram is represented as a visual representation of entity refer the relation between them. For a hospital management system we need to identify main entity, attributes, relationship and constrains.

Patient :

=> Patient_ID (primary key)

=> Patient_Name

=> Patient_DOB

=> Age

=> Phone number.

=> Gender

Doctor:

=> Doctor_ID (primary key

=> specialization

=> Name

=> phone Number

Appointment:

=> AppointmentID (primary key

=> Appointment_Data

=> Appointment_time

=> Patient_Id (Foreign_Key)

=> Doctor_Id (Foreign key).

Treatment:

=> Medicines

=> Treatment_data

=> Diagonisis

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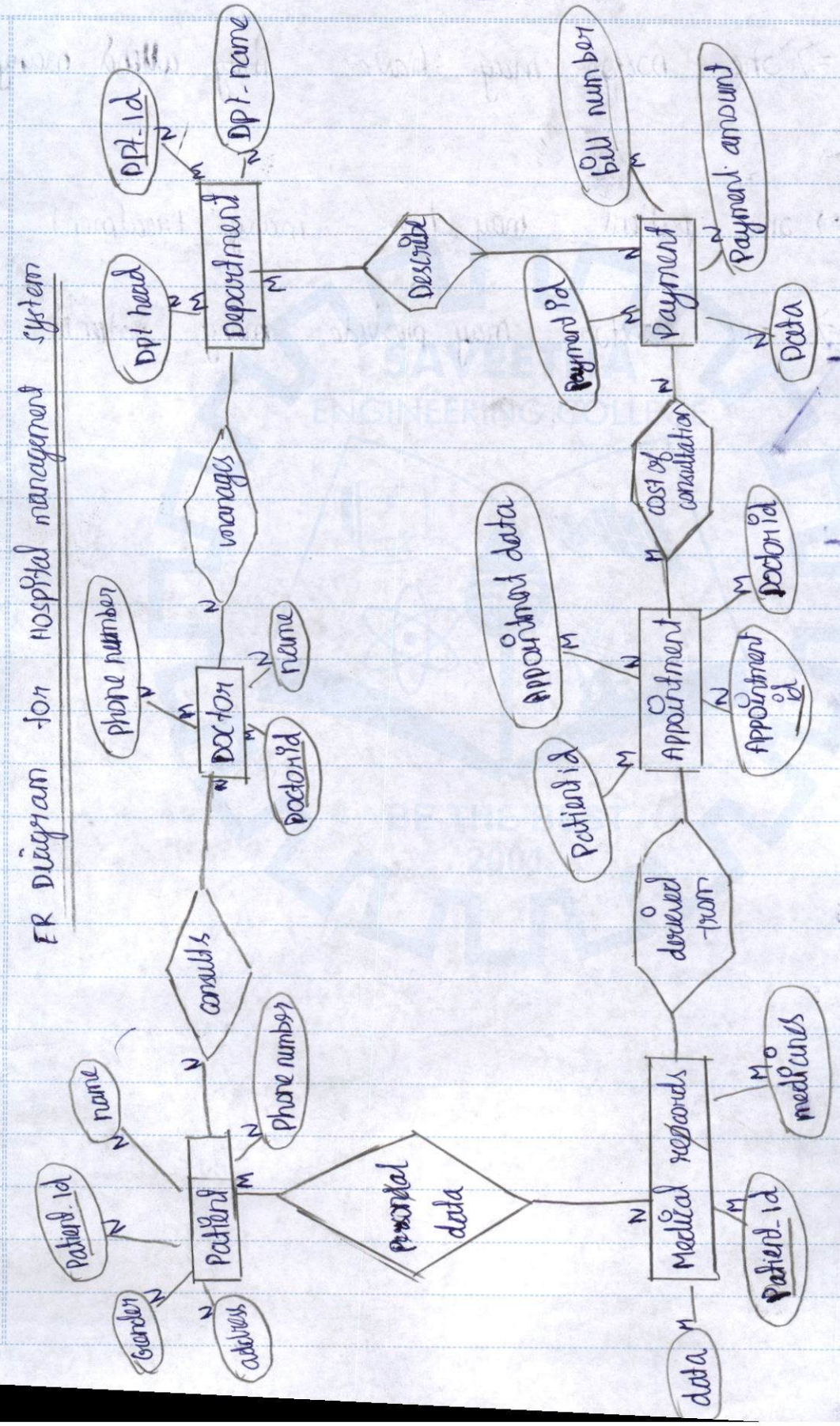
ER Diagram for Hospital management system



Relationship:

=> One patient may have many appointment

=> one doctor may have may attend many patient

=> one patient may have many treatment

=> one doctor may provide many patients treatment