CSE-2101

Subject:

Date:

(1) what is database management system (DBMS) List and explain four reasons why DBMS is used instead of file processing system?

A Database Management System (DBMS) is software that enables users to store, retrieve, manage, and manipulate data efficiently. It provides an interface between the database and the end-users or application programs, ensuring data consistency, integrity, and security.

For reasons to use DBMS instead of file processing system:-

i) Reduced Data Redundancy: DBMS centralizes data storage, minimizing duplication across multiple files, which helps maintain consistency

ii) Enhanced Data Integrity: DBMS enforces data integrity constraints, ensuring that data remains accurate and consistent, whereas file systems may allow errors and anomalies.

Subject:
Date:

iii) Improved Data Access: DBMS supports complex queries and provides efficient data retrieval through languages like, SQL, while file processing systems require more manual coding.

iv) Stronger security: DBMS includes robust security features, such as user authentication and access controls, to protect sensitive data, in contrast to the limited security of file processing systems.

② What is the different between a candidate key, a primary key, a composite key, a super key, a Foreign key? What considerations might influence the choice of a primary key?

Key Type	Description	Example
candidate key	A set of attributes that can uniquely identify a record. Multiple candidate keys can exist.	EmployeeID, Email

Subject:
Date:

primary key	A selected candidate key that uniquely indentifies records. It must be unique and non-null.	Employee ID (chosen as primary)
composite key	A key that consists of two or more attributes used together to uniquely identify a record	(First Name, Last Name)
super key	A set one or more attributes that can uniquely identify records. It can include extra attributes.	(Employee ID, Email)
Foreign key	An attribute in one table that links to the primary key of another table, establishing a relationship	Department ID in Employee table linking to Department table.

considerations for choosing a primary key:-

i) uniqueness: must uniquely identify each record.

ii) stability: should not change frequently; stable values are preferable.

Subject:
Date:

iii) Simplicity: preferably a single attributes; simpler keys are easier to mange.

iv) Non-nullability: must not allow null values to ensure every record is identifiable.

③ How many attributes you can use a table? Is there any limitations? why you need to split the attributes in multiple tables?

The number of attributes (columns) that can be used in a table depends on the Database Management System (DBMS) being used. Each DBMS has its own limitations based on factors like performance, memory, and storage architecture.

The number of columns in a table varies by DBMS:
Oracle: Up to 1000 columns;
SQL Server: Up to 1024 columns;
PostgreSQL: Up to 1600 columns;
MySQL: Up to 4096 columns;
MongoDB: No column limit;

Limitations:

i) performance: more attributes can slow down queries and increase resource usage.

Subject:
Date:

ii) Complexity: Managing tables with ~~one~~ many attributes can become cumbersome and error-prone.

Reasons to split attributes into multiple tables:

i) Normalization: Reduces data redundancy and enhances data integrity.

ii) Manageability: Smaller tables are easier to understand, maintain, and query.

iii) Efficiency: Improves performance by reducing the amount of data processed during queries.

iv) Flexibility: Easier to manage changes and updates, especially in large datasets.

Extra:

Alternate Key	A unique identifier that is not the primary key	Email in an Employees table.

Subject:
Date:

(9) What are the function of DDL and DML in database Language? How they differ from each other?

Functions:

DDL (Data Definition Language):

i) Defines and modifies database structures (e.g., creating, alternating, or dropping tables).

ii) commands includes CREATE, ALTER, DROP, ~~TRUNCATE.~~

DML (Data manipulation Language):

i) Manges and Mainipulates data within those structures.

ii) commands includes ~~SELECT~~, INSERT, UPDATE, DELETE. TRUNCATE.

Differences:

i) purpose: DDL focuses on schema design, while DML focuses on data handling.

Subject:
Date:

ii) Impact: DDL changes the database structure, while DML changes the data within the structure.

* Extra:

DQL (Data query Language): SELECT.

TCL (Transaction control Language): COMMIT, Rollback.

DCL (Data control Language): Grant, Revoke.

⑤ keyword queries in web search are quite different from database queries. List key differences between the two, in terms of way the queries are specified, and in terms of what is the result of a query.

Aspect	Web search queries	Database queries
Specification	Natural language or key words; less structured.	structured language (e.g., SQL); precise syntax.

Subject:
Date:

Results	Ranked list of relevant web pages; often includes snippets and metadata.	Structured data (tables) with specific fields and records.
Flexibility	Allows for ambiguity and variations in ~~phar~~ phrasing.	Requires exact mateches or defined criteria.
~~context~~	contextual relevance based on algorithms (e.g., SEO)	Results based on defined relationships and data integrity.

(6) What is database trigger? Discuss the strengths and weakness of the trigger mechanism?

A database trigger is a predefined set of instructions that automatically executes in response to specific events (like insertions, updates, or deletions) on a table or view.

Subject:
Date:

Strengths:

i) Automation: Triggers automate repetitive tasks, reducing the need for manual intervation.

ii) Data Integrity: Enforce business rules and maintain data consistency at the database level.

iii) Auditing: Facilitate tracking changes and maintaining historical records for compliance.

Weaknesses:

i) complexity: Can complicate database architecture, making it harder to manage.

ii) Performance Impact: May introduced overhead, potentially slowing down operations.

iii) Debugging Difficulty: Issues can be challenging to identify and resolve since triggers run automatically in the background.

Subject:
Date:

key

Reg id	Sec	name	age	Email-id	phone no
100	A	Farhan	20		
101	A	Hossan	22		
102	B	Rabbi	20		
103	B	Hossan	21		
104	B	Rana	21		
105	A	Nayon	23		

① candidate key: এই key uniquely identity identify করে। null ভ্যালু থাকতে পারে। but same value থাকতে না। এটি minimal set.

Ex: Reg-id, Email-id, phone-no

(ii) super key: এটি single বা multiple keys- যে থাকে যেগুলো uniquely identify করে। candidate keys are a subset of super keys. multiple keys দিলেই করে যে candidate keys এর সমাহার তৈরি হয়।

Ex: Reg-id, Email-id, phone-no {Reg-id + Email-id},

Subject:
Date:

(Reg_id + Emai_id + phone_no), (Reg_id + sec), (Email_id + sec + name), (phone_no + sec + name, + age), etc.

(iii) primary key : এটি Not null and must be unique হয় হয়।

Example: Reg-id

(xx)
SK → CK → PK → FK

(iv) Alternate key : primary key বাদে বাকি সব candidate keys হলো Alternate key.

EX : Email_id, phone_no.

(v)

section-id	sec_name
1	A
2	B
3	C
4	A

ID	name	age	section-id
1	F	20	2
2	h	21	1
3	r	20	1
4	p	22	3

Foreign key : যে টি table এর primary key অন্য যেকোন table এর Reference key হিসেবে থাকলে তাকে Foreign key বলে। FK এর মান null এবং same থাকতে পারে।

Subject:
Date:

কিন্তু Foreign key এর values যেকোন table এ থাকতে হবে। তবে table এ foreign key থাকতে পারে।

Ex: section-id

(vi) composite key: যদি table টি দুই বা তোতধিক primary keys যুক্ত হয়ে composite key তৈরি করে। তবে composite-primary key বলা হয়

ID	Name	Roll
1	F	101
2	A	102
3	F	103

Ex: ID + Roll

(7) Let R = (A, B, C, D), if AB and BD can uniquely identify a tuple in a relation r(R) separately, how many super keys, candidate keys and primary keys are there?

R = (M, N, P, S, T), if MN and NS ⟶

Subject:
Date:

For R = (A, B, C, D):

i) superkeys : 8 multiple (AB, ABC, ABD, BD, BDC, BDA, ABCD)

ii) candidate keys : 2 (AB, BD)

iii) primary keys : 1 (can be either AB or BD)

For R = (M, N, P, S, T):

i) super keys : multiple (MN, MNP, MNS, MNT, MNPS, MNPT, MNSP, MNSPT, NS, NSP, NSM, NST, NSPT, NSMP, NSMT, NSMPT etc)

ii) candidate keys : 2 (MN, NS)

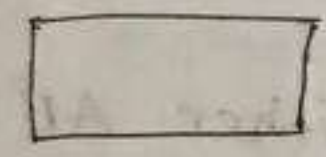
iii) Primary keys : 1 (can be either MN or NS)

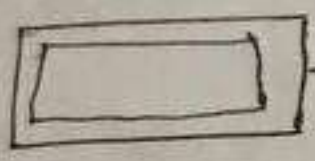
Subject:
Date:

Entity Relationship Diagram

E-R Diagram

Symbols of ER Diagram:

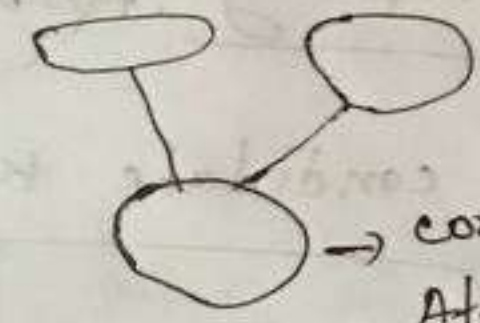

→ Entity


→ Weak Entity


→ Attributes


→ Multivalued Attributes


→ Relationship


→ composite Attributes


→ Derived attributes


→ Key. Attributes


→ Links to entity sets

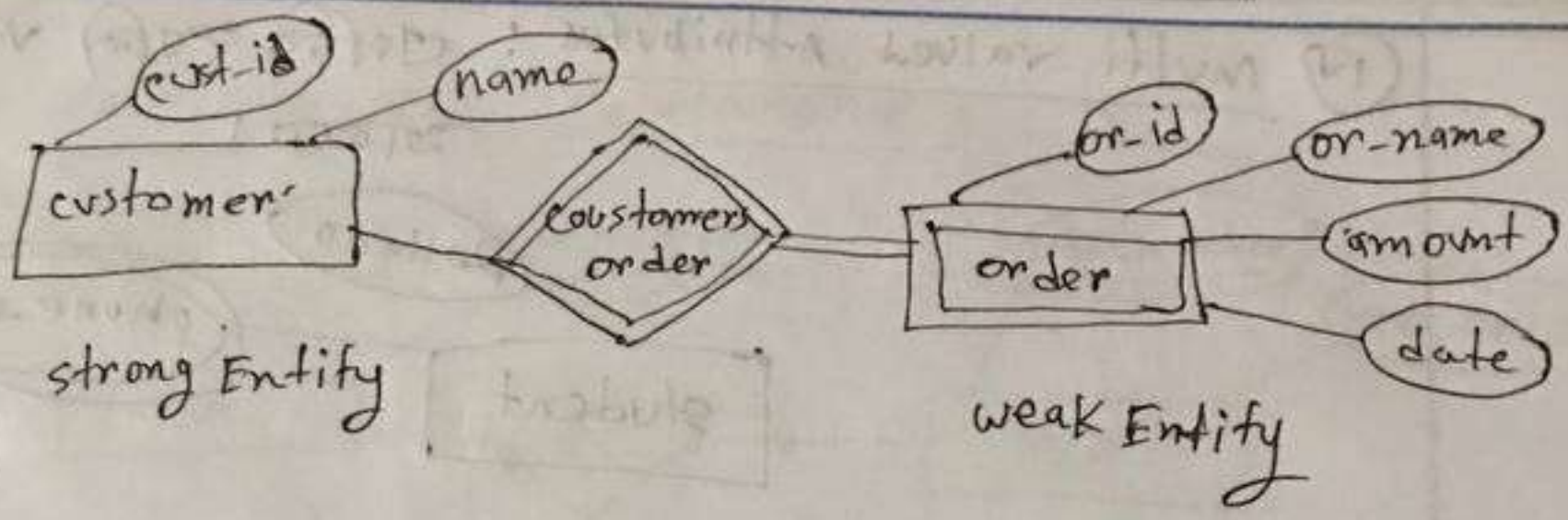

→ Total participation


→ weak Relationship

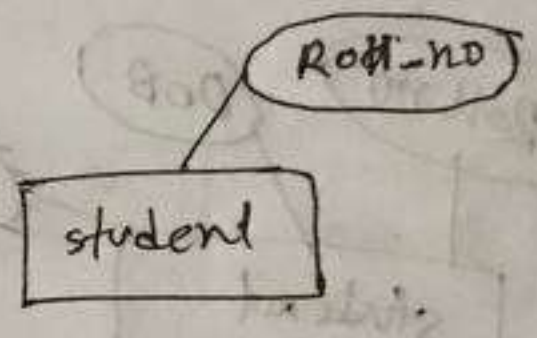
① strong Entity: primary key থাকবে।

weak Entity: primary key থাকবে না তবে। তা একটি Entity তার উপর নির্ভর করবে।

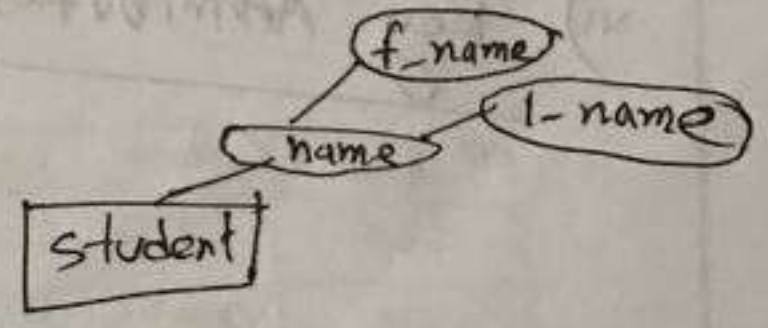
Subject:
Date:



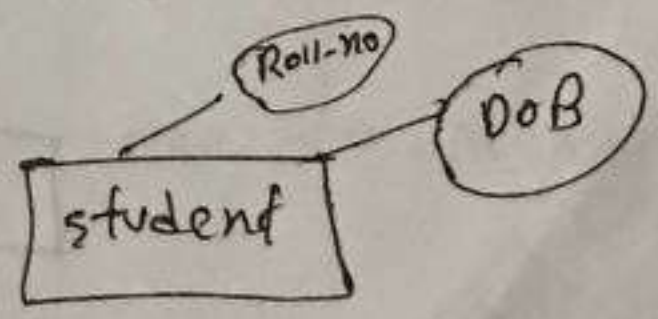
i) Simple Attributes : যে Attributes কে ভাঙলে আর আর Attributes পাওয়া যায় না তাকে simple Attributes বলে।



ii) Composite Attributes : আর Attributes পাওয়া যায়।

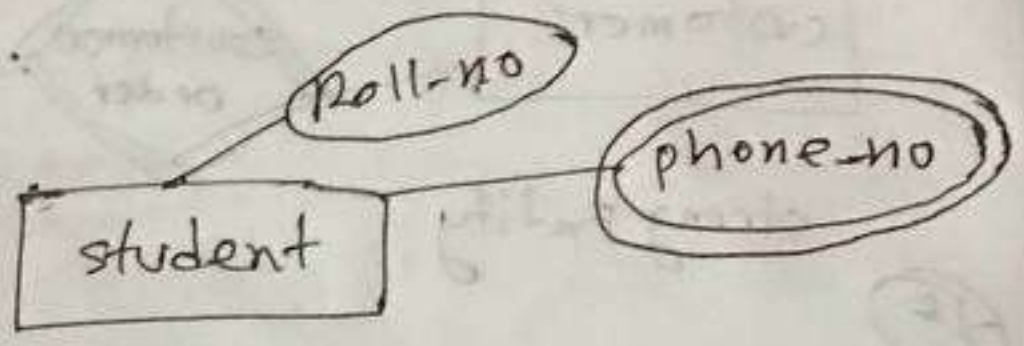


iii) single-valued Attributes: যে গুলোর কোনো value থাকতে না

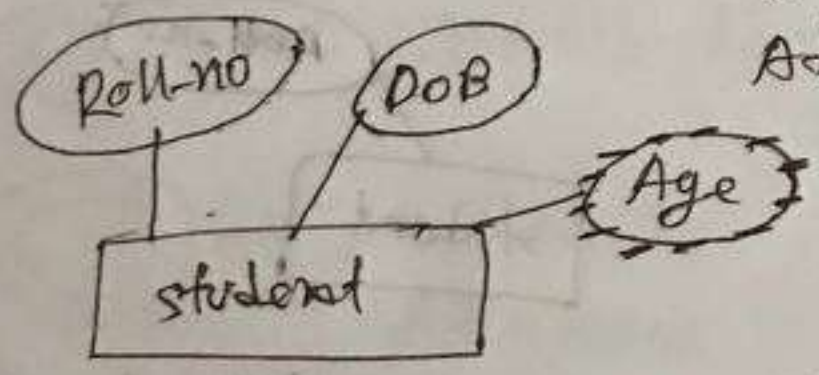


Subject:
Date:

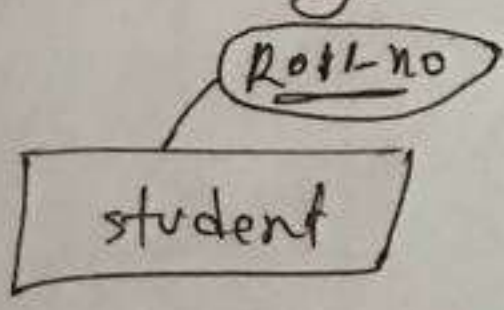
(iv) Multi-valued Attributes: একটির বেশি values থাকলে।



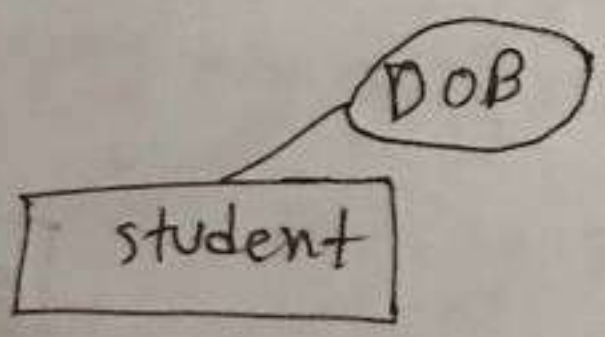
(v) Derived Attributes: যে Attributes এর value অন্য Attributes থেকে গুরুত্বপূর্ণ যায় সেগুলি Derived Attributes.



vi) Key Attributes: primary key.

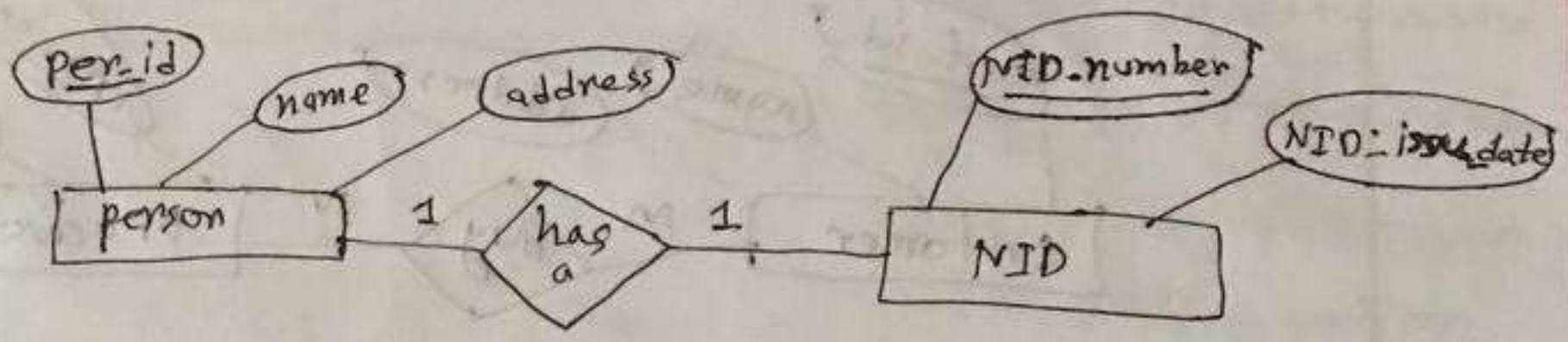


vii) Stored Attributes: যেগুলো fixed.



Subject:
Date:

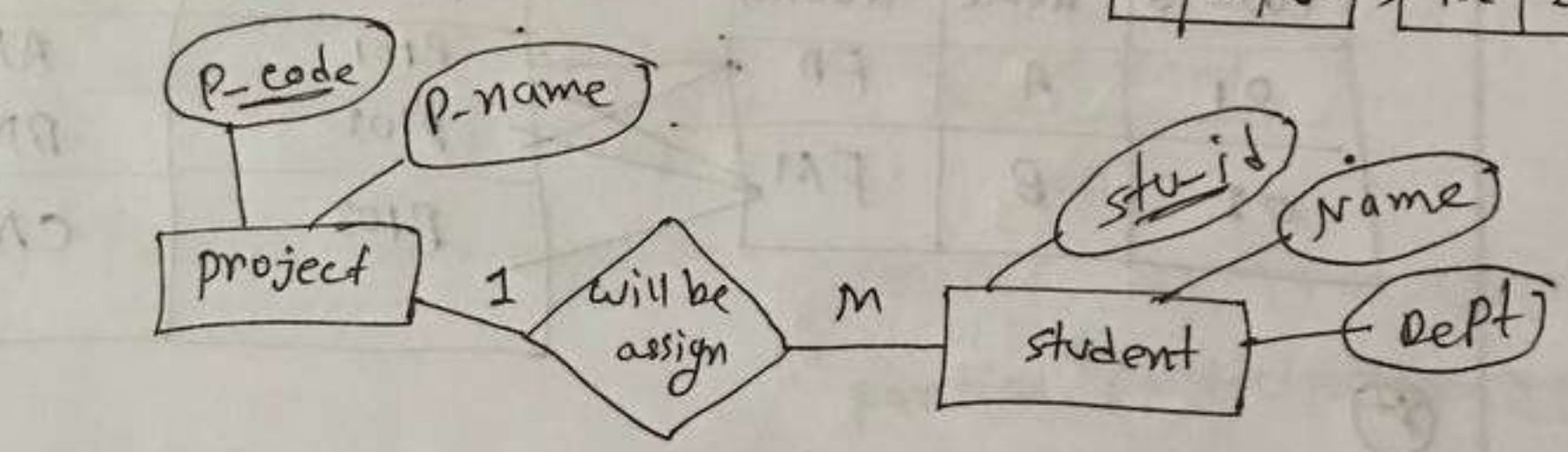
(i) one to one Relationship.



(ii) one to Many Relationship:

P_id	na	add
01	A	FA
02	B	FB

NID_n	NID_iss
101	25
102	26

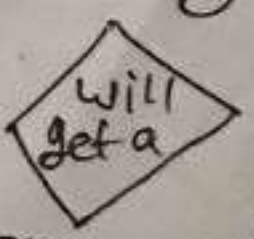


M এর জায়গায় N দিলেও সমস্যা নেই।

P_code	P_name
01	A
02	B

stu_id	Name	dept
101	FA	CSE
102	FB	EEE
103	Fc	ME
109	FD	CHE

(iii) Many to one : one to Many এর উল্টা।

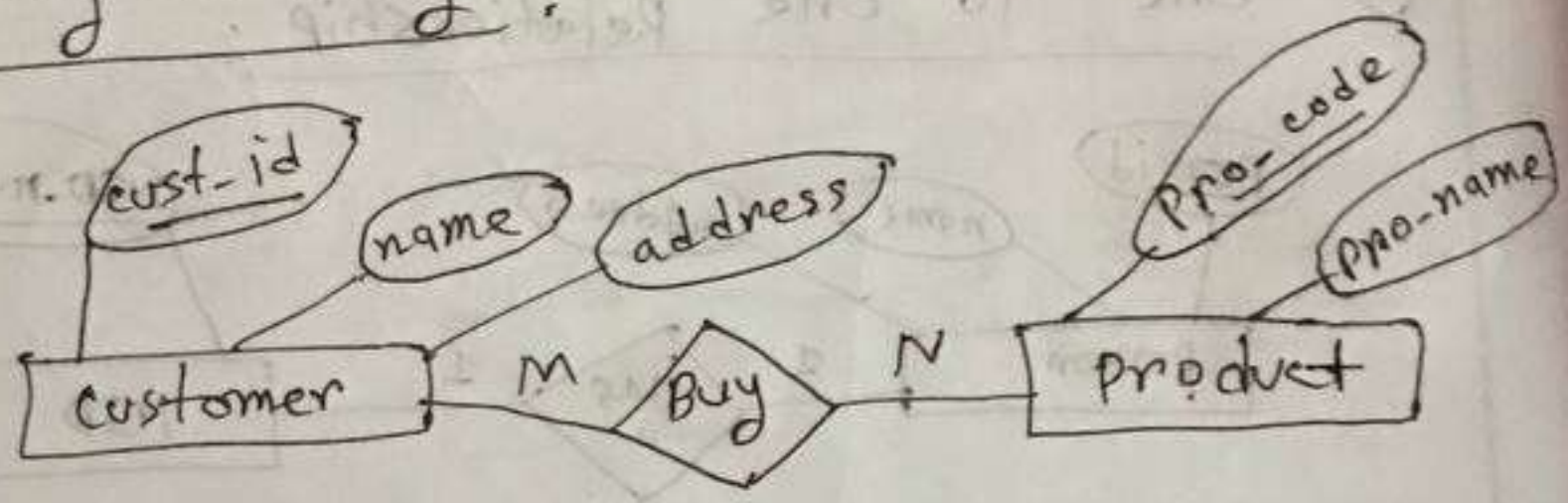


M এর জায়গায় N দিলেও সমস্যা নেই।

Subject:

Date:

(iv) many to many :



cust-id	name	address
01	A	FD
02	B	FM

pro-code	pro-name
P101	AM
P102	BM
P103	CN

(৪৭)

i) Unary : 1 টি Entity থাকবে। Degree 1.

ii) Binary : 2 " " " 2.

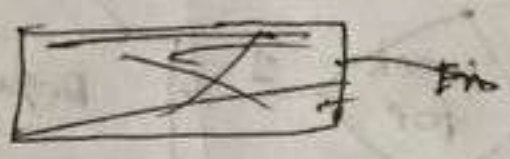
iii) Ternary : 3 " " " 3.

iv) N-ary : n " " " n.

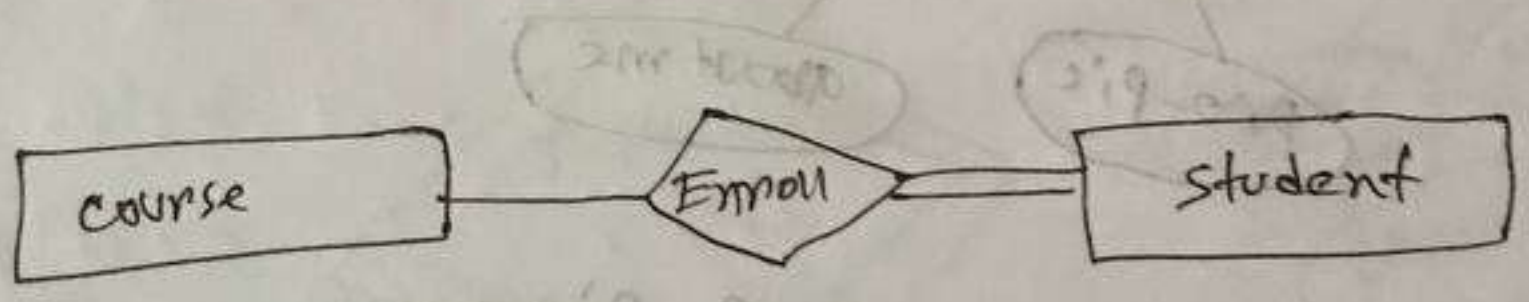
Subject:
Date:

(2nd)

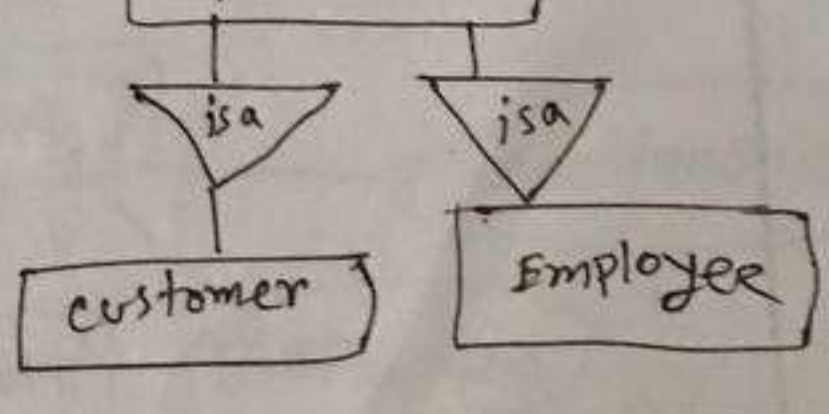
1) Total participation: student entity course entity ও ব্যবহার নির্দেশনা student ও কি কোন total participation আছে।



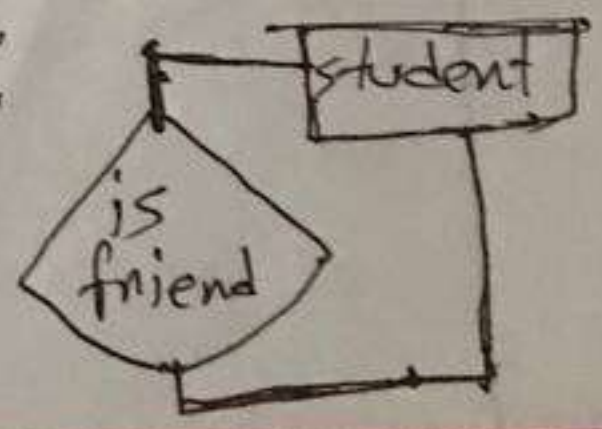
ii) Partial participation: course ও কি কোন partial participation আছে।



(*) In a relationship:

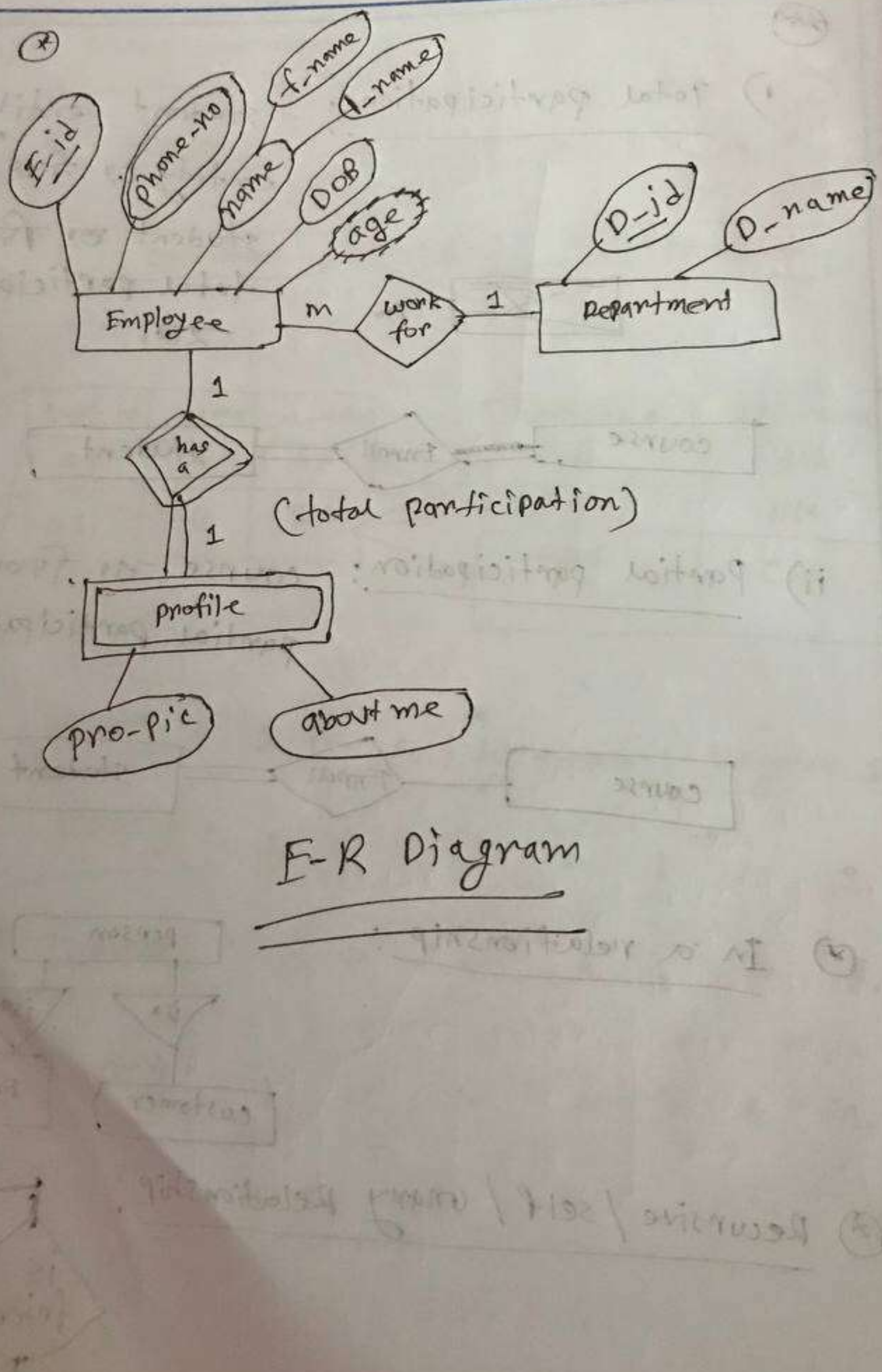


(*) Recursive / self / unary Relationship:



Subject:.....

Date :.....

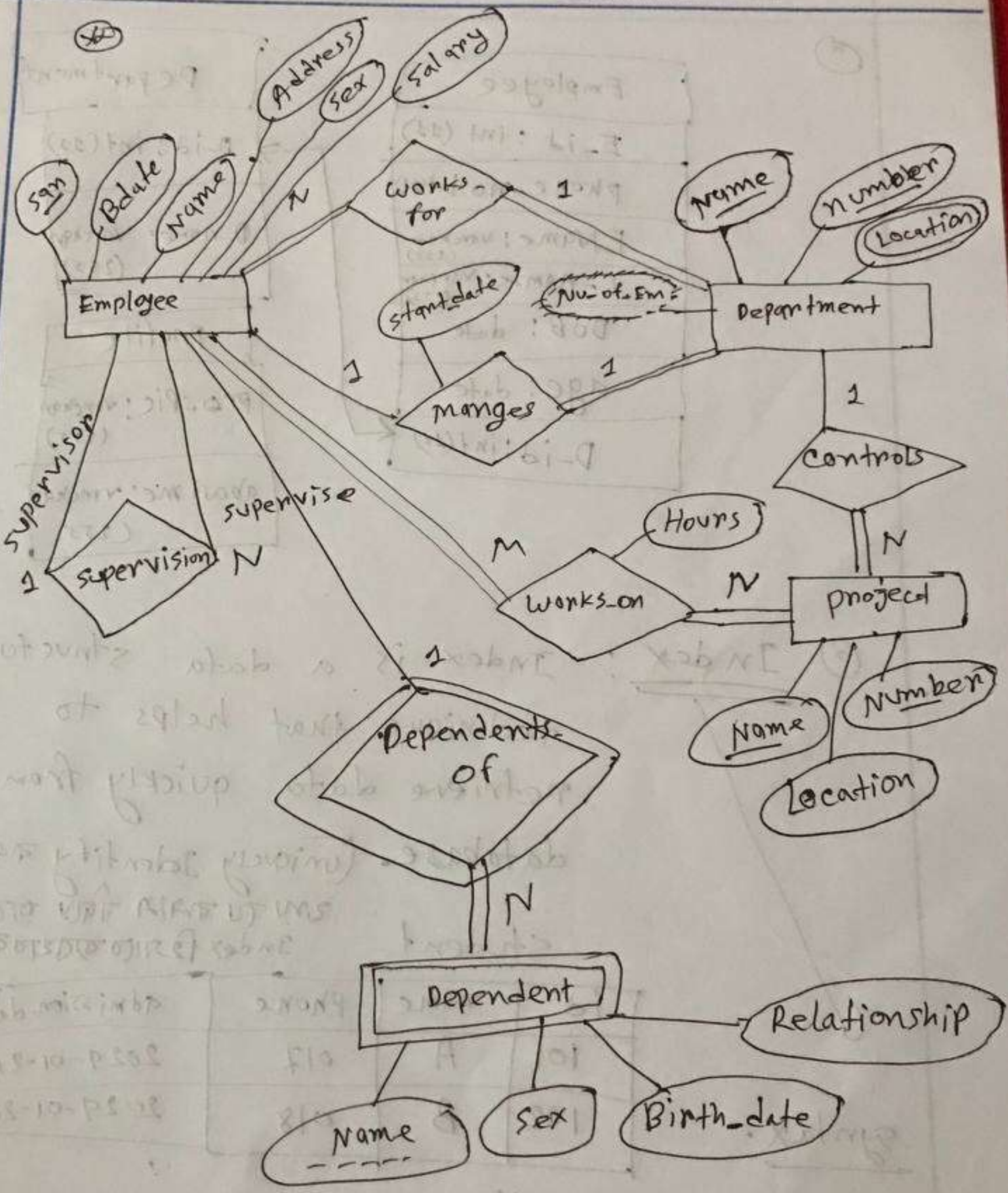


(total participation)

E-R Diagram

Subject:.....

Date :.....



ER Diagram