



# **Disciplinary**

## **Database Management System**

### **CS3003**

#### Assignment 1

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## ❖ Problem Statement:

Designing of Entity Relation model and Relational Schema for Hospital management system post COVID-19).

## ❖ Requirements:

In a report released by the Indian Department of Health and Human Services (HHS), hospitals faced the most severe challenges during the COVID-19 pandemic. Here I am focusing mainly on the simplification of Hospital Management system with the help of databases. The following were the requirements post COVID-19: -

- 1) The hospital consists of many departments. Each department is identified by a unique department ID and is assigned some name and treatment type.
- 2) Doctors are identified by unique id. Other details like name, D.O.B, address, shift, designation and department assigned must be recorded.
- 3) A Doctor could work in any department in which he is specialised or has experience.
- 4) Nurse is also identified unique id. Other details like experience, D.O.B, salary and department must be recorded.
- 5) Every patient has a name, unique id, age, mobile number, address and patient details.
- 6) The patients are admitted to a particular ward/room based on the room capacity, type and bed availability.
- 7) Each room has a unique room id associated with it and prices are different for different rooms.
- 8) The Ambulances are having unique id and number with different capacities. Each ambulance is associated with a driver having name, unique driver id, phone number, salary, and address associated with him.
- 9) The test has a unique test name and also the date and time along with the test fees is recorded.
- 10) Government is providing supplies like food packets and other equipment's daily to support the hospital and maximum two time a day.
- 11) The different type of supplies is being provided by the government and their quantity, date, time are being recorded.

12) The hospital has to submit a daily report to the government about the total test, positive number, death number and date.

### ❖ Steps of forming Entity-Relation:

#### Step1) Identifying Entities.

1) Department	5) Patient	9) Test
2) Employee	6) Room	10) Government
3) Doctor	7) Ambulance	11) Supplied_items
4) Nurse	8) Driver	12) Report /Analytics

#### Step2) Identifying Attributes and primary keys.

- 1) Department (dept\_name, dept\_id, treatment\_type)
- 2) Employee (emp\_id, emp\_name, salary, emp\_dob, emp\_ad., emp\_ph\_N, age)
- 3) Doctor (shift, designation, type)
- 4) Nurse (experience)
- 5) Patient (p\_id, p\_name, p\_age, p\_details, p\_ph\_N)
- 6) Room (room\_num, room\_cap, room\_type, room\_cost, bed\_availability/(bed\_av))
- 7) Ambulance (amb\_num, amb\_id, amb\_cap)
- 8) Driver (type)
- 9) Test (test\_name, date, time, fees)
- 10) Government (cont\_details, body\_type)
- 11) Supplied\_items (type, date, quantity)
- 12) Report /Analytics (date, total\_test, +ve\_num, death\_num)






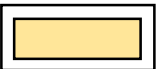




**Step4) Identifying relationship and cardinality among entities.**

Entities involved	Relationship name	Attributes	Cardinality
Doctor & Department	Works in	emp_id, dept_id	Many to Many (M-M)
Doctor & Patient	Treats	emp_id, p_id	One to One (1-1)
Room & Nurse	Allocate	emp_id, room_num	Many to Many (M-M)
Patient & Room	Admitted to	p_id, room_num	One to One (1-1)
Patient & test	Undergoes	emp_id, test_name	Many to Many (M-M)
Government & Supplied_items	Supplies	Body_type, time	One to Many (1-M)
Employee & Report	Generates	emp_id, date	One to One (1-1)
Employee & Government	Contacts	emp_id, body_type	One to One (1-1)
Driver & Ambulance	Drives	emp_id, amb_id	One to One (1-1)
Report & Government	Given to	date, Body_type	Many to One (M-1)

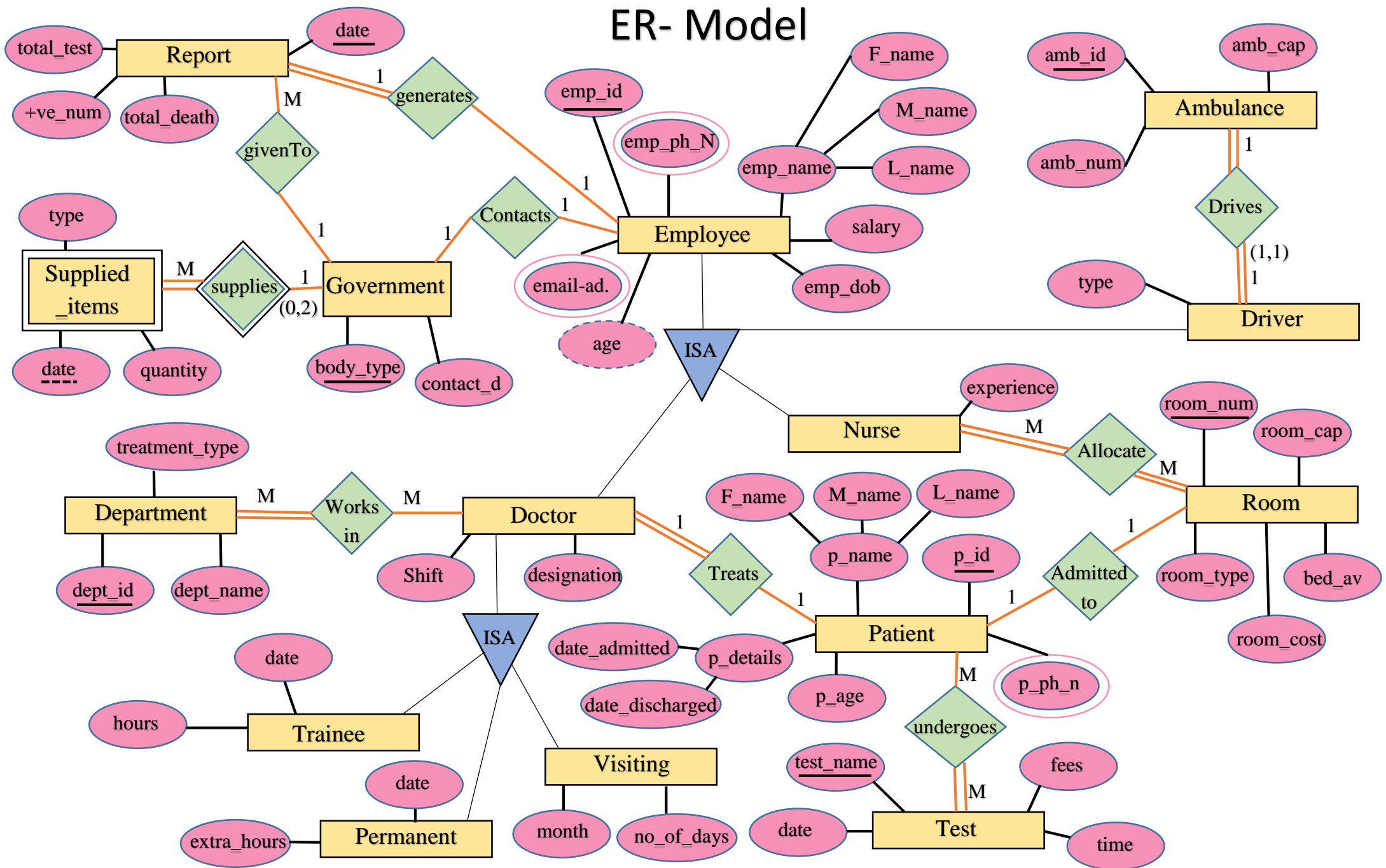
**Step5) Participation Constraints:**

- 1) A driver can driver max of one ambulance.
- 2) Government providing items minimum 0 times and maximum 2 times.

**❖ Sign conventions used in ER-Model.**

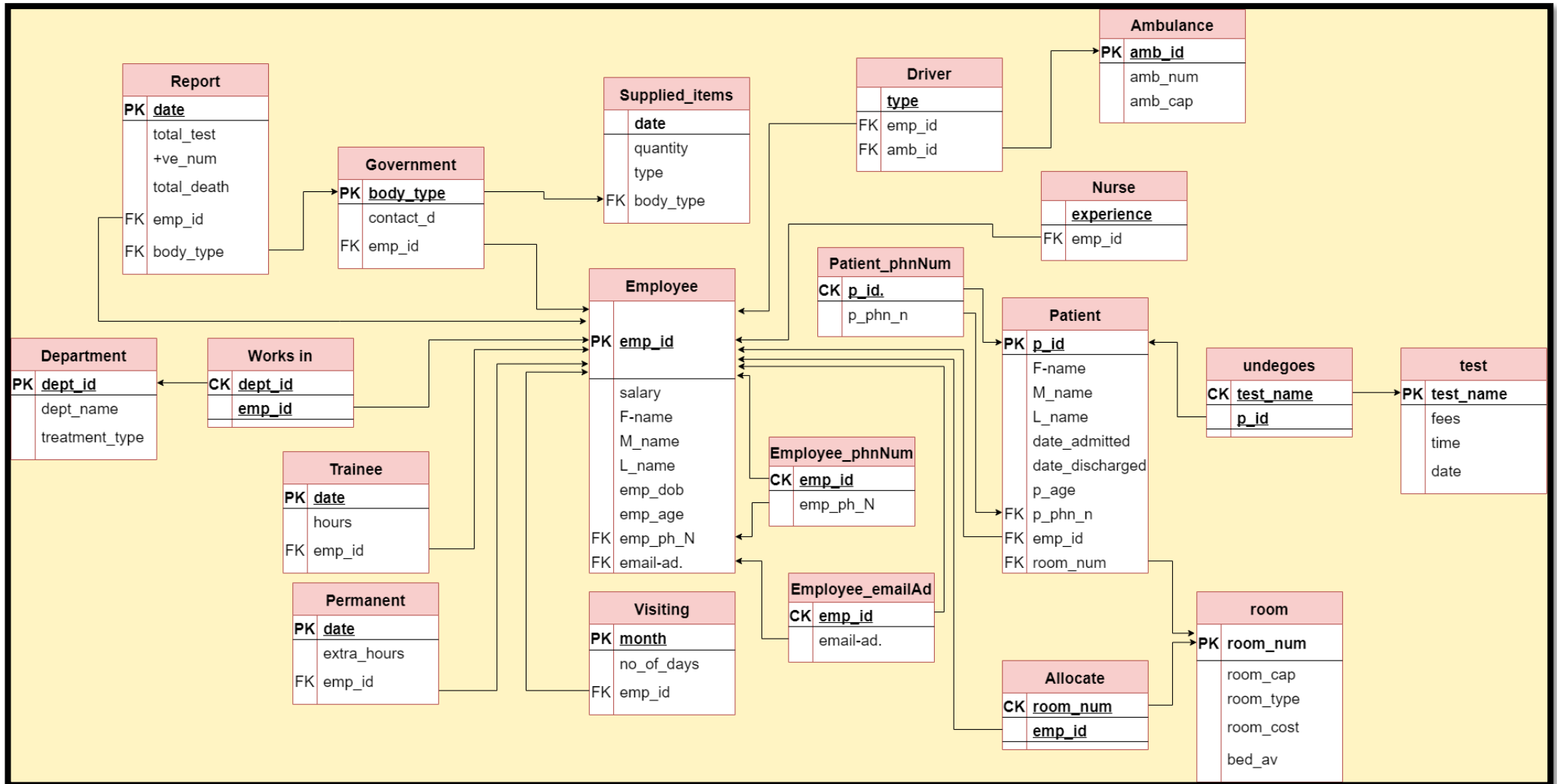
1) Entity		6) Specialisation	
2) Attribute		7) Relationship	
3) Partial-Participation		8) Weak Entity	
4) Total Participation		9) Derived Attribute	
5) Key Attribute		10) Multivalued Attribute	

# ER- Model



# Relational Schema

PK	Primary key
FK	Foreign key
CK	Composite key
FK/CK → PK	Showing Reference



## ❖ Rules to map ER-model to Relational Schema.

### 1) Strong Entity:

- Create a table for each strong entity and its attribute becomes its field.
- Declare primary key and foreign key (if any).

### 2) Weak Entity:

- Create table for each weak entity set and add its attributes as field
- Create separate tables for all leaf entities (which doesn't have further ISA) with its attributes as fields and add primary key of upper order entity in them, which will act as foreign key here.

### 3) Relations:

- For one-one type of participation, add primary key of the 1<sup>st</sup> table to the second one – it becomes foreign key in the second table.
- Any extra attribute tied to relation becomes its attribute too.
- For one-many type of participation, add primary key of the table on “one side” to the table present on “many side” – it becomes foreign key in “many side” table.
- Any extra attribute tied to relation becomes its attribute too.
- For many-many type of participation, create a separate new table for relationship set with composite key as combination of primary keys of two table present in relationship.
- Any extra attribute tied to relation becomes its attribute too.
- For each multivalued attribute, create a new separate table and add primary key of original table as its attribute along with the other attribute. They both will combine to become composite key of this table.
- For composite attribute add the branched attributes directly to the main table, ignore the attribute from which branches are coming out.

## ❖ Conclusion:

The ER-diagram made by me has two major advantages that except one entity all are having 2 degree of participation and covers almost all data related to hospital management system. Extra features include the resolving of data issues which emerged during COVID-19 and their handling with easy ER-model.



## ❖ Paper work and initial plan:

# REQUIREMENTS :-

- 1) The hospital consist of many departments. Each department is identified by a unique department ID and is assigned some name and treatment type.
- 2) There are three major employees working in the hospital i.e. doctors, nurses and drivers.
- 3) The people working in the hospital are doctors, nurses, drivers and other staff members.
- 4) Doctors are identified by their unique doc ID. Each doctor has name, DOB, address, shift and designation assigned.
- 5) A doctor could work for the department in which he is specialised or his experience.
- 6) A Nurse is identified by unique nurse id, experience, DOB, salary, dept and shift.
- 7) For each Medicines, the medicine name and its unique trade name along with other info like company, manufacturing date and expiry date and quantity available must be checked.
- 8) Every patient has a unique id, also the patient name, DOB, Patient details and mobile number must be recorded.
- 9) The patient are admitted to a particular ward/room based on the room cap, level and type.
- 10) Each room has unique room id associated with it, and for diff prices are different for different rooms.
- 11) There are many Ambulance with unique Amb- num and ID with different capacity and for carrying patients.

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- 12) Different drivers are associated with a particular ambulance. Each driver has unique driver id, driver name, mobile no, salary, shift and address associated with him.
- 13) The test ~~are generated~~ took in the hospital have a unique test name and also the date and time along with test fees is recorded.
- 14) The government is providing ~~and~~ supplies like food and ~~other~~ equipment daily to ~~the~~ hospital support.
- 15) The supply ~~type~~ provided by the government has some type, quantity, date and time associated.
- 16) The Hospital has to submit a ~~daily~~ report to the government about the total test, positive num, death - num and date.

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Requirements :-

What I did :-  
→ Create a Hospital Management (COVID)

Why I have to do :-  
→ To make database simplified and fast.

How I will do :-  
→ Using ER Model and Relation schema.

What COVID19 contributed to Change the Management.

Normal.

- Doctors (doc id, salary, name, DOB, dept, address, exp)
- Patients
- Rooms
- Nurses
- Staff
- Ambulance
- Medicines
- DEPARTMENT
- TEST

In COVID

- Doctors
- Patient
- Rooms
- Nurses
- Staff (kind boy, doctor, prod etc)
- Ambulance
- Medicines
- Department
- TEST
- DEPENDENT / Patient
- GOVERNMENT
- Report (weekly)
- DRIVERS
- Equipment
- Food - products

② Attributes

- Doctors (doc ID, salary, name, DOB, dept, address, (Ph-no))
- Patients (Pat ID, Pat name, Pat DOB, Room ID, Room type, Room cost)
- Rooms (Room ID, Room name, Room cap, Room type, Room cost)
- Nurses (Nurse ID, experience, DOB, Salary, (M-shift))
- Staff (staff ID, designation name, (Ph-no), address, DOB, salary, dept, shift)
- Ambulance (Amb-num, Amb-id, Am-cap)
- Medicines (Mden-id, Mden-name, company, manufacturing, expiry date, Price, quantity)

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② Department :- (Dep ID, Dept name)

③ TEST :- (Test name, date, fees, time)

④ Dependents :- (Dep ID, name, no)

⑤ Government :-

⑥ Supplies :- (Type, quantity, date, time)

⑦ REPORT :- (Date, total-test, positive-num, death-num)

⑧ DRIVERS :- (Dr. id, Dr. name, (Mob), salary, (Shift), Address)

# Participation:

Entity Name	Relationship Name	Attributes	Cardinality
Department & Doctor	works in	Emp id, dept id	1-M
Employee & Department	works in	Emp id, dept id	1-M
Department & Department	works in	Emp id, dept id	1-M
Patient → Doctor	Treats	Emp id, Pat ID	1-M
Patient → Nurse	assist	Emp id, Pat ID	1-M
Patient → Room	admitted to	Room ID, Pat ID	1-1
Patient → Ambulance	Ambulance service	Pat ID, Amb ID	1-1
Patient → test	Undergoes	test name, Pat ID	1-M
Doctor → Medicines	Prescribes	Med ID, Emp id	1-M
Gov → Food	supplies	kind, body type	1-M
Doctor → Reports	generates	Emp id, date	1-1
Driver → Ambulance	drives	Emp id, Amb ID	1-1

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