REG.NO.:

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: B1

Programme Name & Branch : **M.Tech Computer Science and Engineering(Integrated)**
Course Code and Course Name : **CSI1001 - Principles of Database Systems**
Faculty Name(s) : **Dr. Diviya M**
Class Number(s) : **VL2025260101640, VL2025260101634, VL2025260101637, VL2025260102027**
Date of Examination : **18.08.2025**
Exam Duration : **90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Course Outcomes

1.Comprehend the role of database management system in an organization and design the structure and operation of the relational data model.

2. Develop a database project depending on the business requirements, considering various design issues.

Q. No	Question	M	CO	BL
1.	(a)With suitable example discuss about the data models. Answer: Data Model: A set of concepts for describing data, relationships, constraints, and semantics of an organization's data. Types of Data Models: Hierarchical Model: Organizes data in a tree structure. Example: Library → Book → Author. Network Model: Records connected by links (many-to-many). Example: Students ↔ Courses. Relational Model: Data stored in tables with rows and columns. Example: STUDENT(StudentID, Name, Age). Entity-Relationship Model (ER): Graphical representation using entities and relationships. Example: CUSTOMER—places→ORDER. Object-Oriented Model: Combines object-oriented concepts with database (supports inheritance, polymorphism). (b)With your own example explain three tier schema.	5 5	CO1 CO1	2 2

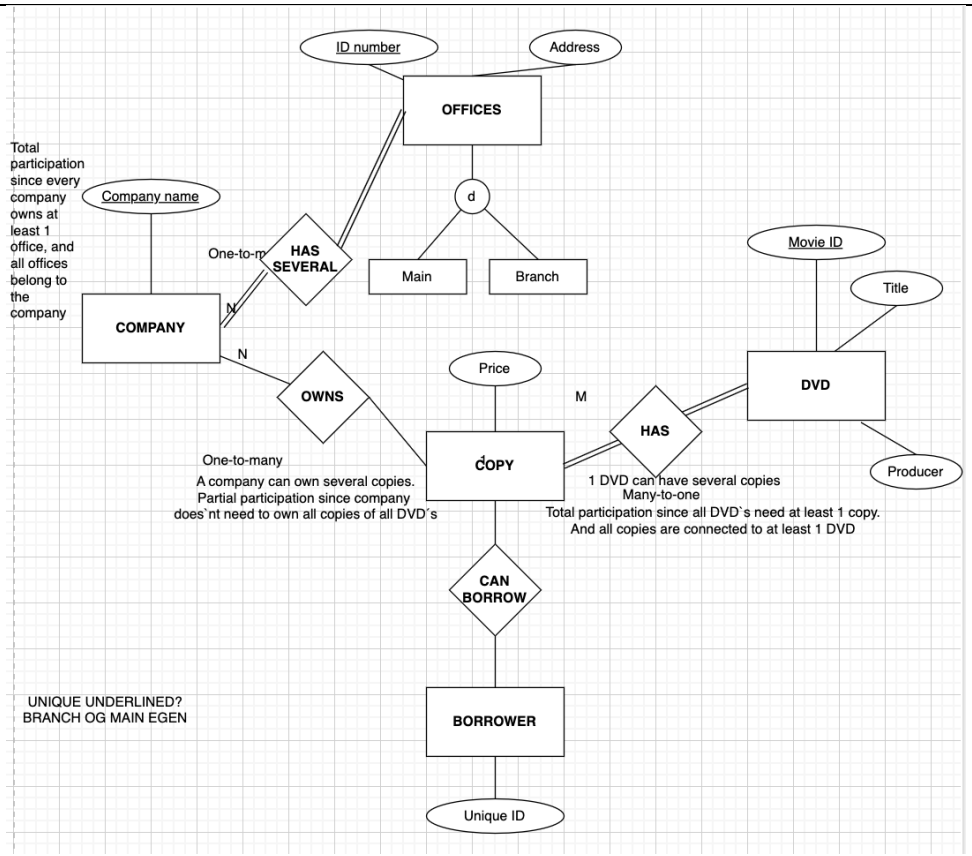
	Three-Schema Architecture (ANSI-SPARC): External Schema (View level): User-specific views of data. Example: A student sees only their marks. Conceptual Schema (Logical level): Logical structure of the entire database. Example: Defines STUDENT, COURSE, ENROLLMENT tables. Internal Schema (Physical level): Physical storage structure. Example: How records are stored on disk. Illustration Example (University DB): External: "Priya" sees her marks only. Conceptual: Defines entities STUDENT(StudentID, Name), COURSE(CourseID, Title). Internal: Data stored in B-Trees, indexes.			
2.	A University database management system handles student records, courses, and exam results. Explain the components of a Database Management System (DBMS) that fits with the scenario. Explain your answer with a neat sketch. Components of DBMS: Database Engine: Responsible for storage, retrieval, and updating of data. Data Definition Language (DDL): Defines schema, constraints. Data Manipulation Language (DML): Allows queries, updates. Query Processor: Optimizes and executes SQL queries. Transaction Manager: Ensures ACID properties. Concurrency Control Manager: Manages multiple users. Recovery Manager: Restores data after failures. Database Administrator (DBA): Controls access, security, and backups.	10	CO1	2
3.	Scenario: The DVD COMPANY has a unique name and manages several OFFICE, each with an address and a unique number. An office can be either a MAIN OFFICE or a BRANCH OFFICE. Each DVD is described by a unique code number, a title and a producer. A DVD has a COPY and the COMPANY may own one or more COPYIES. The price that was paid for each COPY is recorded in the database. A BORROWER who has a unique ID can borrow a COPY of a DVD. Based on the scenario answer the following questions. (a)Draw an ER diagram for the given scenario. (b)Explain the entity, relationship, cardinality, in your ER diagram. Entities & Attributes:	 7 3	 CO2 CO2	 3 3

REG.NO.:

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: B1



COMPANY(Name, CompanyID).
OFFICE(OfficeID, Address, Type).
DVD(Code, Title, Producer).
COPY(CopyID, Price).
BORROWER(BorrowerID, Name).

Relationships:
COMPANY → manages → OFFICE (1–M).
DVD → has → COPY (1–M).
BORROWER → borrows → COPY (1–M).

Cardinalities:

One company has many offices.
One DVD can have many copies.
One borrower can borrow many copies, but one copy belongs to only one borrower at a time.

REG.NO.:

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: B1

4.	Consider the following schema and write the SQL queries .	10	CO2	3

Column Name	Data Type	Constraint(s)
customer_id	NUMBER(5)	PRIMARY KEY
customer_name	VARCHAR2(30)	NOT NULL
email	VARCHAR2(50)	UNIQUE
age	NUMBER(3)	CHECK (age >= 18)
city	VARCHAR2(30)	
join_date	DATE	DEFAULT SYSDATE

a) Write DDL statement to enforce the following constraints. CUSTOMER with customer_id as Primary Key, email as UNIQUE, age with a CHECK constraint (≥ 18), and join_date with a DEFAULT value.

```
CREATE TABLE CUSTOMER (
   customer_id NUMBER(5) PRIMARY KEY,
   customer_name VARCHAR2(30) NOT NULL,
   email VARCHAR2(50) UNIQUE,
   age NUMBER(3) CHECK (age >= 18),
   city VARCHAR2(30),
   join_date DATE DEFAULT SYSDATE
);
```

b) Create an ORDER table with a Foreign Key referencing CUSTOMER(customer_id) and quantity with a CHECK constraint (> 0) and ORDER DATE.

```
CREATE TABLE ORDERS (
   order_id NUMBER(5) PRIMARY KEY,
   customer_id NUMBER(5),
   quantity NUMBER CHECK (quantity > 0),
   order_date DATE,
   FOREIGN KEY (customer_id) REFERENCES
CUSTOMER(customer_id)
);
```

c) Write a SQL query to Insert a customer named "Arjun" aged 30 from "Delhi" with an email arjun@mail.com. Assign customer ID to 201.

```
INSERT INTO CUSTOMER (customer_id, customer_name, email, age,
city)
VALUES (201, 'Arjun', 'arjun@mail.com', 30, 'Delhi');
```

d) Retrieve the orders placed today (use SYSDATE).

```
SELECT * FROM ORDERS
WHERE order_date = SYSDATE;
```

e) Show the names of customers who have placed at least one order.

```
SELECT DISTINCT c.customer_name
FROM CUSTOMER c
JOIN ORDERS o ON c.customer_id = o.customer_id;
```

5.	Consider for the following schema. **Patient Table** **Treatment Table**	10	CO1	3

REG.NO.:

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: B1

PatientID	Patient Name	Age	City
201	Arun	45	Chennai
202	Priya	30	Bangalore
203	Kiran	55	Delhi
204	Meena	40	Chennai

Patient ID	Disease	DoctorName
201	Diabetes	Dr. Sharma
202	Flu	Dr. Ahmed
201	Hypertension	Dr. Sharma
204	Asthma	Dr. Kapoor

Write the relational algebraic expression for the following queries,

a) Find patients who are from the city 'Chennai'.
$\sigma_{\text{City = 'Chennai'}}$ (Patient)

b) Find patients who have not taken any treatment.
$\pi_{\text{PatientID, PatientName}}$ (Patient)
$- \pi_{\text{PatientID, PatientName}} (\sigma_{\text{Patient.PatientID=Treatment.PatientID}}$ (Patient $\bowtie$ Treatment))

c) Rename the Patient table to P with attributes (Pid, Name, Age, City)
$\rho_{\text{P(Pid, Name, Age, City)}}$(Patient)

d) List the set of patient details from Chennai and Bangalore.
$\sigma_{\text{(City = 'Chennai' } \vee \text{ City = 'Bangalore')}}$ (Patient)

e) List patient names and diseases they are being treated for.
$\Pi_{\text{PatientName, Disease}} (\sigma_{\text{Patient.PatientID=Treatment.PatientID}}$ (Patient $\bowtie$ Treatment))

****