Programme Name & Branch	**: B.Tech IT**
Course Code and Course Name	**: BITE302L , Database Systems**
Faculty Name(s)	**: Dr. Lawanya Shri M, Dr. Bimal Kumar Ray, Dr. Tapan Kumar Das**
Class Number(s)	**: VL2024250502779, VL2024250502772, VL2024250502782**
Date of Examination	**: 17/3/25**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s):

Answer All Questions

- **CO – Course Outcome:**

2. Design conceptual models to represent simple database application scenarios
3. Convert high-level conceptual model to relational data model and to improve a database design by normalization

- **BL – Blooms Taxonomy Level:**

1 – Remember, 2 – Understand, 3 – Apply, 4- Analyze

Q. No	Question	M	CO	BL
1.	A) Consider the following relation. Identify and explain the type of constraints violated for the given operations. [5]	5	2	1

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

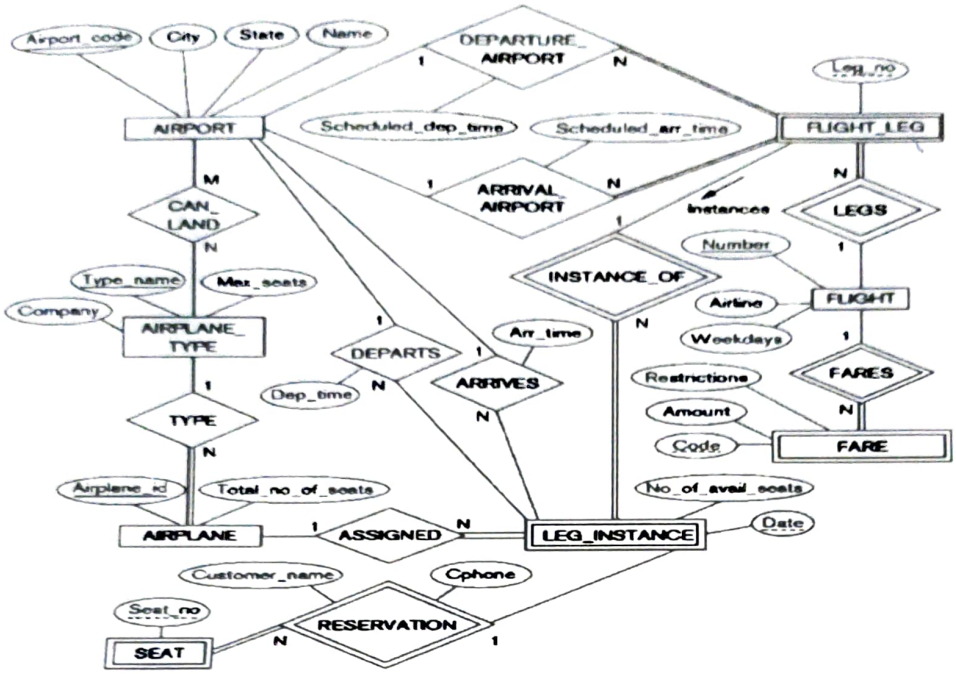
DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

a) Insert <'Alicia', 'J', 'Zelaya', '677678989', '1960-04-05', '6357 Windswept, Katy, TX', F, 28000, '987654322', 7> into EMPLOYEE
b) Update the Dno of the EMPLOYEE tuple with Ssn = '987654321' to 8.
c) Delete the EMPLOYEE tuple with Ssn = '888665555'.

B) Given the following relation, explain, with example, update anomaly, deletion anomaly and insertion anomaly that may be present in a state of the given table. [5] — 5

Student ID	Name	Age	Dept Name	Dept Code	Head of the Dept
1	Tom	19	Math	101	Kiani
2	Katie	19	Math	101	Kiani
3	Aleem	20	Math	101	Kiani
4	Nejati	18	Physics	102	Steve
5	John	21	Physics	102	Steve
6	Amer	19	Chemistry	103	Bill

2.	Map the given ER model to a relational schema. Identify and represent all the Constraints. 	10	3	2
3.	Consider the following schema: Write down the relational algebra expressions for the questions given below. **Suppliers(*sid:* integer, *sname:* string, *address:* string)** **Parts(*pid:* integer, *pname:* string, *color:* string)** **Catalog(*sid:* integer, *pid:* integer, *cost:* real)** a) Find the *sid*s of suppliers who supply every red or purple part. b) Find the supplier names of the suppliers who supply a red part that costs less than 100 dollars. c) Find the parts that are supplied by supplier with sid = 101. d) Find the list of all parts (pname) and their corresponding supplier names. e) Rename pid to part_id and pname to part_name in the parts relation.	10	2	3
4.	A) Consider the following relation and functional dependency. **R = {A, B, C, D, E, F}** **FD= {AB→D, B→C, AE→B, A → D, D → EF}** i) List all the candidate keys. [5] ii) Find a minimal cover for the given set of functional dependency. [5]	10	3	4
5.	Consider the Relation **R (A, B, C, D, E, F, G)** with the following set of functional dependency. **FD= {A→DF, B→E, AB→C, F→G}** i) Why is the given relation not in 2NF? ii) Describe and illustrate the process of normalizing the relation to Third normal form (3NF).	10	3	3

****