SLOT: B2+TB2

REG. NO.:

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

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2024-2025

Programme Name & Branch : B.Tech (IT)
Course Code : BITE302L
Course Name : Database Systems
Faculty Name(s) : Prof(s): Bimal Kumar Ray, Tapan Kumar Das, Tamil Priya D
Class Number(s) : VL2024250502774/ 2795/2780
Date of Examination : 17-March-2025
Exam Duration : 90 minutes
Maximum Marks: 50

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 Statements:
  CO. 3: Convert high-level conceptual model to relational data model and to improve a database design by normalization.

Q. No	Questions	M	CO	BL
1.	(a) Consider the following six relations for an order-processing database application in a company: **CUSTOMER**(Cust_no, Cname, City) **ORDER**(Order_no, Odate, Cust_no, Ord_amt) **ORDER_ITEM**(Order_no, Item_no, Qty) **ITEM**(Item_no, Unit_price) **SHIPMENT**(Order_no, Warehouse_no, Ship_date) **WAREHOUSE**(Warehouse_no, City) Here, Ord_amt refers to the total dollar amount of an order; Odate is the date the order was placed; and Ship_date is the date an order (or part of an order) is shipped from the warehouse. Assume that an order can be shipped from several warehouses. Specify the foreign keys for this schema, stating any assumptions you make.	5	CO3	BL2
	(b) Referring to the above relational database schema, write down the type of constraints that may be violated while entering data into CUSTOMER relation, deleting data from ORDER relation and modifying data of the ORDER_ITEM relation.	5		
2.	Consider the AIRLINE relational database schema shown below. **AIRPORT**(Airport_code, Name, City, State) **FLIGHT**(Flight_number, Airline, Weekdays) **FLIGHT_LEG**(Flight_number, Leg_Number, Depature_airport_code, Schedule_depature_time, Arrival_airport_code, Scheduled_arrival_time) **LEG_INSTANCE**(Flight_number, Leg_number, Date, Airplane_id, Number_of_available_seats, Depature_airport_code, Depature_time, Arrival_airport_code, Arrival_time) **FARE**(Flight_number, Fare_code, Amount, Restrictions) Specify the following queries in relational algebra. (i) For each flight, list the flight number, the departure airport for the first leg of the flight, and the arrival airport for the last leg of the flight. (ii) List the flight numbers and weekdays of all flights or flight legs that depart from Houston Intercontinental Airport (airport code 'iah') and arrive in Los Angeles International Airport (airport code 'lax'). (iii) List the flight number, departure airport code, scheduled departure time, arrival airport code, scheduled arrival time, and weekdays of all flights or flight	10	CO3	BL3

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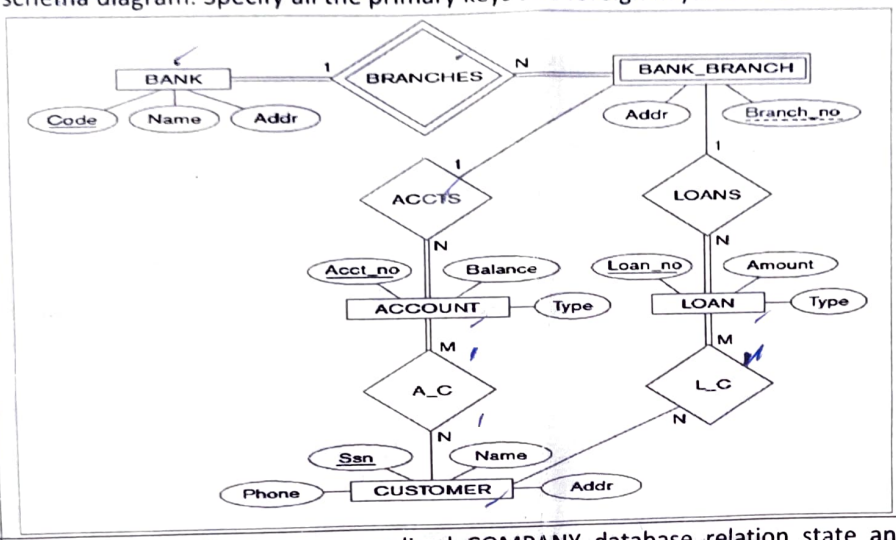
	legs that depart from some airport in the city of Houston and arrive at some airport in the city of Los Angeles. (iv) List all fare information for flight number 'co197'.			
3.	Convert the following Entity Relationship diagram into a relational database schema diagram. Specify all the primary keys and foreign keys on the schema.  	10	CO3	BL6
4.	Consider the following unnormalized COMPANY database relation state and answer the questions that follow:	10	CO3	BL3

Project Code	Project Name	Project Manager	Project Budget	Employee No.	Employee Name	Department No.	Department Name	Hourly Rate
PC010	Reservation System	Mr. Ajay	120500	S100	Mohan	D03	Database	21.00
PC010	Reservation System	Mr. Ajay	120500	S101	Vipul	D02	Testing	16.50
PC010	Reservation System	Mr. Ajay	120500	S102	Riyaz	D01	IT	22.00
PC011	HR System	Mrs. Charu	500500	S103	Pavan	D03	Database	18.50
PC011	HR System	Mrs. Charu	500500	S104	Jitendra	D02	Testing	17.00
PC011	HR System	Mrs. Charu	500500	S315	Pooja	D01	IT	23.50
PC012	Attendance System	Mr. Rajesh	710700	S137	Rahul	D03	Database	21.50
PC012	Attendance System	Mr. Rajesh	710700	S218	Avneesh	D02	Testing	15.50
PC012	Attendance System	Mr. Rajesh	710700	S109	Vikas	D01	IT	20.50

Determine the key(s) of the above relation. Identify the functional dependencies that may hold on the relation. Apply normalization until you cannot decompose the relations further. State the reasons behind each decomposition.

5.	(a) Let us take an example to show the relationship between two FD sets. A relation R2 (A, B, C, D) having two FD sets FD1 = {A->B, B->C, A->C} and FD2 = {A->B, B->C, A->D}. Find whether the two sets of functional dependencies are equivalent.	5	CO3	BL3
	(b) Let's suppose we have a set of attributes as R: {A, B, C, D, E, F, G, H} and functional dependencies are: A → BC E → A B → CFH CH → G F → EG Find out a key of the relation R using the above functional dependencies.	5		

********** All the Best **********