



VIT[®]

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

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

CAT – I Fall Semester 2018 -2019

CSE 2004 – Database Management Systems

Course Name: B. Tech

Slot: D2

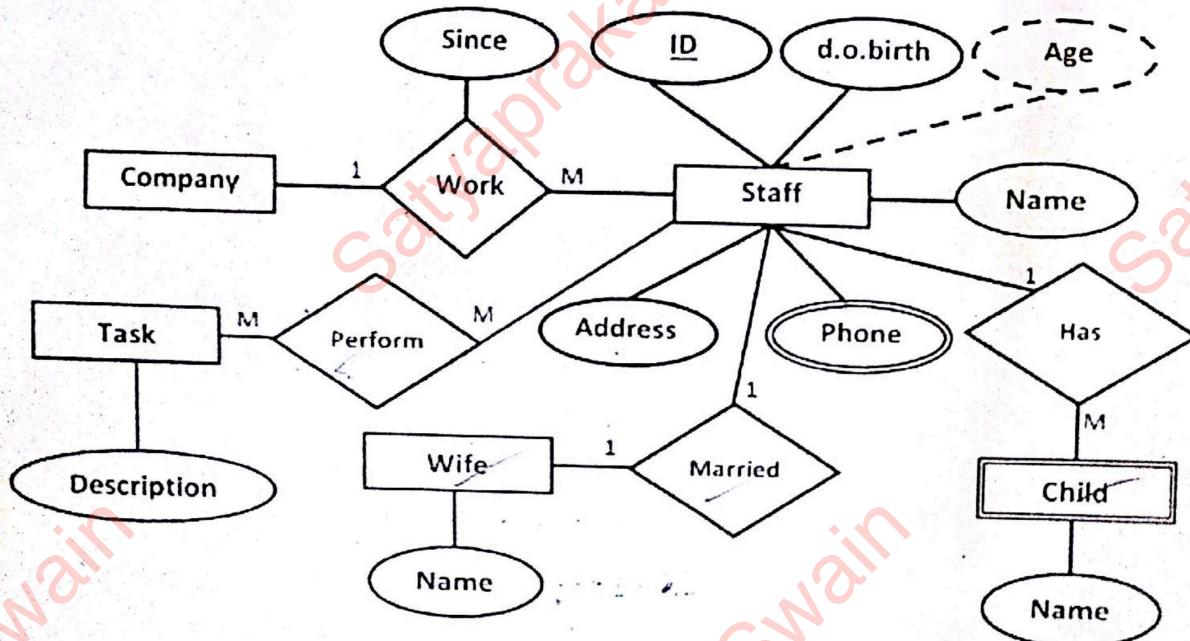
Max. Marks: 50

Answer ALL Questions (5 * 10 = 50)

- 1 a. Brief about the advantages of Database Management System? [5]
b. Describe the three levels of data abstraction with a neat diagram [5]

- 2 a. Why do we need mapping between schema levels in three schema architecture? [4]
b. Explain the functionalities of the following terms: [6]
 - i. DDL Compiler
 - ii. Query Compiler
 - iii. DML Compiler
 - iv. Host Language Compiler
 - v. Runtime Database Processor
 - vi. Stored Data Manager

- 3 a. Convert the below given ER diagram to relational schema. [6]



- b. In a bank, each customer is given a unique identification number, cid. All the current account holders have different (Firstname, Lastname) pair. (Some of them may have same first names, or same lastnames.) As per the RBI regulations, the bank also collects everyone's Adhaar Card number. The company's database stores the following fields: (cid, firstname, lastname, age, adhaar) [4]

Which of the following row in the given table do not contain wrong information?

No.	Candidate Keys	Super Keys	Primary Keys
1	(cid), (adhaar)	(cid), (adhaar, age) (cid, adhaar)	(cid), (adhaar)
2	(adhaar)	(cid), (firstname, lastname)	(cid)
3	(cid), (adhaar)	(cid, firstname), (adhaar, firstname)	(adhaar)
4	(firstname, lastname), (adhaar)	(cid, adhaar), (adhaar, firstname, lastname)	(cid)

Note:

- Each key is a tuple, enclosed by round brackets.
- Each cell may contain multiple keys, but does not list all possible values.

4 a. Describe how strong entity is different from weak entity with a suitable example [4]

b. Compare and explain with a suitable example

i. Composite attribute and complex attribute.

ii. Entity integrity constraint and domain constraint. [3] [3]

5. Compare primary key, candidate key, super key, alternate key and minimal super key. From the below tables identify primary key, candidate key, super key, alternate key and minimal super key and justify. [10]

STUDENT

STUD_NO	STUD_NAME	STUD_PHONE	STUD_STATE	STUD_COUNTRY	STUD_AGE
1	RAM	9716271721	Haryana	India	20
2	RAM	9898291281	Punjab	India	19
3	SUJIT	7898291981	Rajasthan	India	18
4	SURESH		Punjab	India	21

Table 1

STUDENT_COURSE

STUD_NO	COURSE_NO	COURSE_NAME
1	C1	DBMS
2	C2	Computer Networks
1	C2	Computer Networks

Table 2

Q. No.	Sub-division	Question Text	Marks
Answer All Three Questions		Total Marks: 3 X 10 Mark	
1.	a)	(OR)	10
	b)	A database is to be designed for a reputed college for maintaining information about the students, employees, fees, payroll & expenditure. The details have to be maintained at a central database. The other factors to be stored in the central database also include course advertisements, placements offered and extra-curricular events organized by the college. With neat sketch, discuss the suitable architecture(s) to handle the two versions of the database for the College Information processing system.	10
	c)	(OR)	10
		A Movie reservation system operates in 2 versions: Theatre booking and an online portal. The Theatre booking handles in-person booking, provides the tickets according to the requirement and manages payment details at a central database. On the other hand, the online portal receives requests through online from the customers and manages booking confirmation details and then stores the booked information in the central database. With neat sketch, discuss the suitable architecture(s) to handle the two versions of the database for the Movie Booking system.	
2.	a)	A database is to be designed for maintaining details of all the hostel students in a School Hostel. Design an ER diagram to capture the below mentioned requirements of the database. Make sure cardinalities and primary keys are clearly depicted.	10
		<p>a) The following details of hostel students are stored: Name, ID (Register Number), date of birth, gender, phone number, class of study, address and blood group, parent details and guardian details.</p> <p>b) Provisions have to be provided to store as many guardian details as given by the student's parents. The guardian name, relation to the student and contact number are saved.</p> <p>c) Each student is monitored by many teachers as required. A teacher can also be approached by several students. Each teacher is given a unique ID and the following details of a teacher are to be tracked: name, email ID, phone and subject specialization. A teacher may be specialized in many areas.</p> <p>d) For each student, the subjects, marks, CGPA, class obtained is maintained along with the exam details.</p> <p>e) Each student occupies a room. A room may be visited by different teachers at different instants of time. The date and time in which a room is visited by a teacher is tracked. Also, the block in which the room is available, room number and the room type are stored.</p>	

(OR)

b) A database is to be designed for maintaining details of all the items in a supermarket. Design an ER diagram to capture the below mentioned requirements of the database. Make sure cardinalities and primary keys are clearly depicted.

- a) Each item is described by title, date of manufacturing, expiry date, price, quantity, manufacturer, and is uniquely identified using the code.
- b) The supermarket provides one or more quantity of each item and, each item is uniquely identified using a code, status indicating if the item is available or not in the supermarket, and the time period for arrival of the unavailable item.
- c) Supermarket employee can place an order of any item. The following details of each employee are stored: name, address, phone number and ID (unique identifier).
- d) A Supermarket employee can also remove the items from the database that are not frequently purchased.
- e) Purchase of items from vendors results in an increase in the respective items. Details of vendors from whom items are purchased include name, location and contact number. These details are not available unless items are purchased from the specific vendor.

(OR)

- c) A database is to be designed for maintaining details of all the flight details in an online airline ticket reservation system. Design an ER diagram to capture the below mentioned requirements of the database. Make sure cardinalities and primary keys are clearly depicted.
- a) The following details of each flight are stored: name of flight, ID (unique identifier), source, destination, duration, date, time, year, ticket fare and rating. Rating is computed based on users' input.
 - b) Users can give their feedback as comments and/or rating based on their travel experience. There is no limit on the number of comments given by a user for a travel. However, rating can be given only once.
 - c) Each user needs to login using an email ID and password to book a ticket. These credentials should be stored.
 - d) For different cities there are several flight services are provided. The details about the cities and the flight information like company, snacks menu have to be provided during ticket booking.
 - e) Users can also download the tickets that are booked online. Also offline ticket booking is allowed through counters. These details have to be incorporated. The date on which each ticket is booked by a user and its re-schedulable duration are stored.

- a) Consider the following two relations **Book** and **Department** in a library management system. The Book relation gives the information such as the book id, name of the book, author name and year of buying. The Department relation depicts the information about the number of copies of books available in each department. **B_ID** is the foreign key in the **Department** relation which referencing the **Book** relation. The number of digits allowed for **Book_ID** is three. Identify the different constraint violations present in the following relation state and justify each

Book

Book_ID	B_Name	Author_Name	Year
100	DBMS	Silberschatz	2000
110	OS	Silberschatz	2015
100	DBMS	Silberschatz	2000
111	ToC	Aho Ullman	2018
1223	Computer Networks	William Stallings	2001
112	DBMS	Nayathe	2019
NULL	Computer Communication Ntworks	Forouzan	1998
1323	DBMS	Raghu Ramakrishnan	2009

Department

Dept_ID	B_ID	No_of_copies
1	100	5
5	110	6
3	111	4
2	103	9

(OR)

- b) Consider the following two relations **Movie** and **Actor** in a Movie management system. The Movie relation gives the information such as the Movie id, name of the movie, actor name and year of release. The Actor relations depicts the information about the number of movies he has acted. **M_ID** is the foreign key in the **Actor** relation which referencing the **Movie** relation. The number of digits allowed for **Movie_ID** is three. Identify the different constraint violations present in the following relation state and justify each

10

Movie

Movie_ID	M_Name	Actor_Name	Year
200	Tinker Bell	Lucy	2000
110	Dora	Jack	2015
100	Cindrella	Jill	2000
11132	Sleeping Beauty	Charles	2018
124	Frozen	Elsa	2001
124	Frozen	Elsa	2019
NULL	Trolls	Poppy	1998
22323	Wonder Park	Josh	2009

Actor

Actor_ID	M_ID	No_of_movies
1	100	5
5	110	6
3	111	4
2	200	9

(OR)

- c) Consider the following two relations **Course** and **Student** in a Course Registration System. The Course relation gives the information such as the Course id, name of the course, Faculty name and Year. The Student relations depict the information about the number of course he has registered. **C_ID** is the foreign key in the **Student** relation which referencing the **Course** relation. The number of digits allowed for **Course_ID** is three. Identify the different constraint violations present in the following relation state and justify each

Course

Course_ID	C_Name	Faculty_Name	Year
200	DBMS	Lucy	2000
150	TOC	Jack	2015
130	C	Jill	2000
13132	OS	Charles	2018
104	Compiler	Elsa	2001
104	Networks	Elsa	2019
NULL	Maths	Poppy	1998
343d	PDC	Josh	2009

Student

Student_ID	C_ID	No_of_Courses
1	100	5
5	130	6
3	151	4
2	104	9

Q . A restaurant operates in 2 versions: cafeteria and an online portal. The cafeteria handles orders from customers, serves food according to the requirement and manages payment details at a central database. On the other hand, the online portal receives requests through online from the customers and manages delivery details with the help of a third party component and then stores the served information in the central database. With neat sketch, discuss the suitable architecture(s) to handle the two versions of the database for the restaurant's order processing system.



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Continuous Assessment Test I – May 2023

Programme	: B.Tech. (C.S.E)	Semester	: Fall Inter 2022
Course Title	: Database Systems	Code	: BCSE302L
Culture (s)	: 1. Dr.Renuka Devi 2. Dr.M.Sandhya 3. Dr.Maria Anu 4. Dr.M.Revathi 5. Dr.Sobitha Ahila 6. Dr.Abishi Chowdhury	Slot	: D2+TD2
Time	: 1 ½ Hours	Max. Marks	: 50

Answer All Questions

Q.No	Question Description	Marks
1.	Online ticket Booking System is in need of creating a database system for its customers. Mr. Raj is appointed as a database administrator for the organisation with different responsibilities. The database platform includes features that manages ticket availability, booking and cancellation, payment, sending ticket status to customers and billing information. State the responsibilities of each role with respect to different components of Online ticket Booking System.	10
2.	Suppose you are asked to construct an E-commerce Website (EW) for a retail company. Initially, the EW is responsible for maintaining minimal number of customer records which involves only two components. But later, the customers made a request that the EW system should contain business logic in order to carry out the online purchases securely. Make an appropriate selection of database management system architecture in order to accomplish the tasks.	10
3.	Consider the following relations for a database that keeps track of business trips of salespersons in a sales office. SALESPERSON (Aadhaar, Name, Start_year, Dept_no) TRIP (Aadhaar, From_city, To_city, Departure_date, Return_date, Trip_id) EXPENSE (Trip_id, AccountNo, Amount) Write SQL commands for the following 1. Create the table SALESPERSON, TRIP and EXPENSE with suitable data types (2 Marks) 2. Specify and update the key constraints for the already created table. (3 Marks)	

3. Populate each table with two records satisfying the constraints (3 Marks)

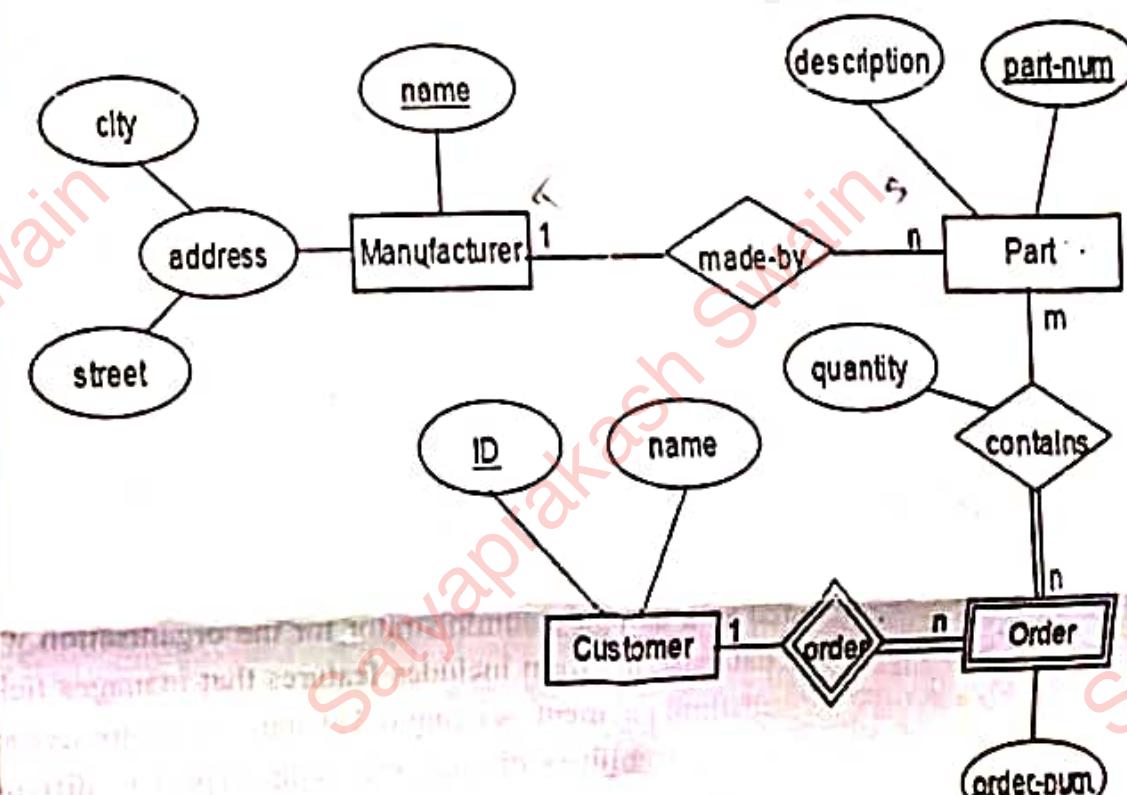
4. Delete the salespersons whose name starts with "S". (2 Marks)

10

Consider an airline management system that automates the process of storing customer, flight information and ticket reservation. The database must keep track of customers and their reservations, flights and their status, seat assignments on individual flights, and the schedule and routing of future flights. Draw an E-R diagram by identifying suitable entities, attributes and relationships along with mapping constraints and participation constraints.

10

Map the given ER diagram to a relational schema and state the steps in the mapping process.





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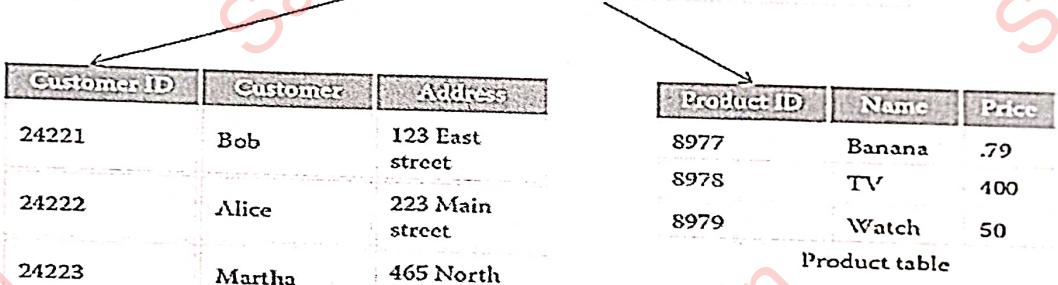
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Continuous Assessment Test (CAT) – I - February 2024

Programme	:	B.Tech (CSE)	Semester	:	Winter Semester 2023-2024
Course Code & Course Title	:	BCSE302L & Database Systems	Slot (s)	:	A1+TA1
Faculty	:	Dr. M. Premalatha Dr. Priyadarshini M Dr. Vijayakumar K P	Class Numbers	:	CH2023240502438 CH2023240502440 CH2023240502441
Duration	:	90 Mins	Max. Mark	:	50

Answer all questions

Q. No	Sub Sec.	Description	Marks
1	a)	<p>Construct an ER diagram for the given requirements.</p> <ul style="list-style-type: none"> Products identified with ProductID, Name, Price, QuantityAvailable Customers identified with CustomerID, Name, Email, Address Orders identified with OrderID, Date, TotalAmount A customer can place multiple orders and each order is associated with one customer. A product can be part of multiple orders and each order can have multiple products. Every order must be placed by a customer and every product must be included in an order. Consider adding a "Payment" entity as a weak entity, dependent on the "Order" entity. Each payment can have a unique transaction ID, payment method, and amount. Include a multivalued attribute like "Attributes" for products, capturing additional features that vary for each product. Break down the address of the customer name into first_name, middle_name and last_name. Introduce a derived attribute like "OrderStatus" for orders, based on the status of individual products within the order. Include a descriptive attribute like "Description" for products. In the relationship between a customer and an order, the customer can play the role of "Buyer," and the order can play the role of "Placed Order." Similarly, in the relationship between a product and an order, the product can play the role of "Ordered Product," and the order can play the role of "Order Items." 	8
	b)	<p>Describe the steps required in converting an ER diagram into relational schemas. Use the diagram you drew in section 1a, convert it into relational schemas, and then draw the corresponding schema diagram.</p>	7
2		<p>Let's consider a scenario for a library management system where we can demonstrate the concept of inheritance using EER model. Draw an ER diagram with extended features that meet the following requirements:</p> <ul style="list-style-type: none"> LibraryMember includes MemberID (Primary Key), Name, Address, Email Book includes ISBN (Primary Key), Title, Author, Genre, PublicationYear Transaction includes TransactionID (Primary Key), DateBorrowed, DateReturned Now, let's introduce the concept of inheritance by creating two specialized entities (Student, Faculty) that inherit from the LibraryMember entity. 	10

	<ul style="list-style-type: none"> Student includes StudentID (Primary Key), Grade, Major Faculty includes FacultyID (Primary Key), Department, OfficeNumber BorrowedBy has Many-to-Many relationship between LibraryMember and Book entities. Each library member can borrow multiple books, and each book can be borrowed by multiple members. Borrowed has One-to-Many relationship between Student and Transaction entities. Each student can have multiple transactions, but each transaction is associated with only one student. Borrowed has One-to-Many relationship between Faculty and Transaction entities. Each faculty member can have multiple transactions, but each transaction is associated with only one faculty member. 																																									
3	<p>Consider the following relational model</p> <p style="text-align: center;">Purchase table</p> <table border="1"> <thead> <tr> <th>Transaction ID</th> <th>Customer ID</th> <th>Product ID</th> <th>Purchase date</th> </tr> </thead> <tbody> <tr> <td>1112</td> <td>24221</td> <td>8977</td> <td>03-22-2010</td> </tr> <tr> <td>1113</td> <td>24222</td> <td>8978</td> <td>03-22-2010</td> </tr> <tr> <td>1114</td> <td>24223</td> <td>8979</td> <td>03-22-2010</td> </tr> </tbody> </table>  <p style="text-align: center;">Customer table</p> <table border="1"> <thead> <tr> <th>Customer ID</th> <th>Customer</th> <th>Address</th> </tr> </thead> <tbody> <tr> <td>24221</td> <td>Bob</td> <td>123 East street</td> </tr> <tr> <td>24222</td> <td>Alice</td> <td>223 Main street</td> </tr> <tr> <td>24223</td> <td>Martha</td> <td>465 North street</td> </tr> </tbody> </table> <p style="text-align: center;">Product table</p> <table border="1"> <thead> <tr> <th>Product ID</th> <th>Name</th> <th>Price</th> </tr> </thead> <tbody> <tr> <td>8977</td> <td>Banana</td> <td>.79</td> </tr> <tr> <td>8978</td> <td>TV</td> <td>400</td> </tr> <tr> <td>8979</td> <td>Watch</td> <td>50</td> </tr> </tbody> </table>	Transaction ID	Customer ID	Product ID	Purchase date	1112	24221	8977	03-22-2010	1113	24222	8978	03-22-2010	1114	24223	8979	03-22-2010	Customer ID	Customer	Address	24221	Bob	123 East street	24222	Alice	223 Main street	24223	Martha	465 North street	Product ID	Name	Price	8977	Banana	.79	8978	TV	400	8979	Watch	50	15
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4	<p>Write SQL queries for the following:</p> <ol style="list-style-type: none"> Create the purchase relation with key attributes and set the purchase date as not null [4 Marks] Add unique constraint to customer name [1 mark] Add default constraint to the purchase date [1 mark] Add check constraint to price and make sure that the value has to be greater than 0 always [2 marks] Add an attribute mobile number to the customer table that accepts only the values starting with '+91'. [3 marks] Drop the unique constraint from customer relation [1 mark] Drop the any primary key constraint. Elaborate the consequences of executing this statement based on the referential integrity you have established for this schema. [3 marks] <p>Consider that you are designing a web application for flight ticket reservation system. This website is built for searching the Availability of flights, Schedule, Availability of seats, Fare details and enables the passengers to book tickets.</p> <ul style="list-style-type: none"> Identify and discuss an appropriate schema architecture for the given scenario with suitable diagram [5 marks] Elaborate how the details are processed and retrieved across the various components using query in the Database System Architecture [5 marks] 	10																																								