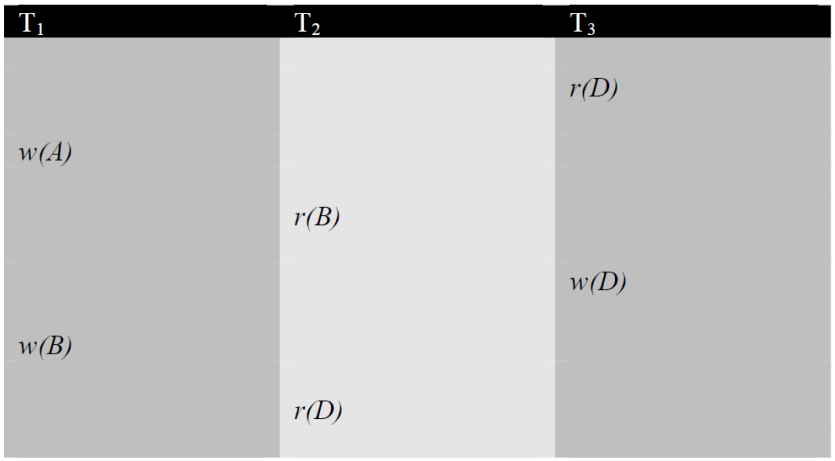
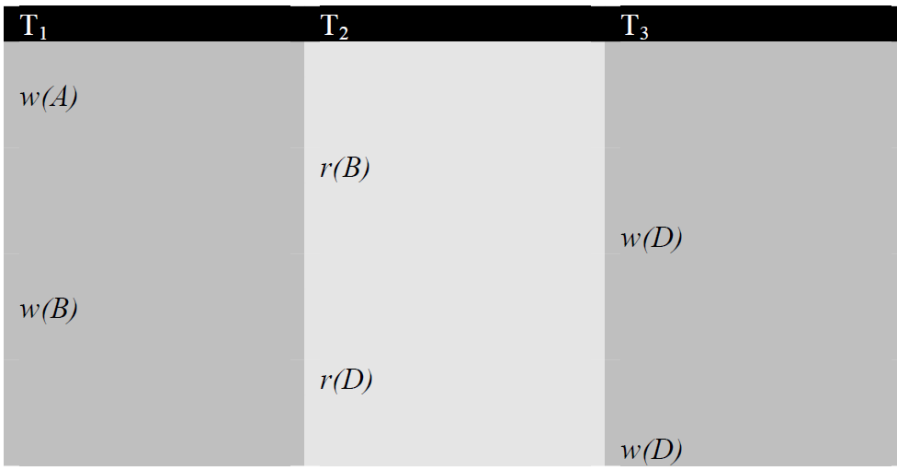
CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

Fourth Semester of B. Tech. (CE) Examination
March - April 2021

CE246 - Database Management System

Q-1		**Marks**
	Work through the RSA encryption algorithm with p=17, q=13, e=5 and m (message) = 7 to find cipher-text and plaintext. Define all steps.	6
Q-2		
	Construct a B+ Tree for the following set of key values: (1, 4, 7, 9, 13, 22, 31, 25, 19, 20, 27, 47) Values are added in given order only. Construct B+-tree for cases where number of pointers are four in one node and perform following: (1) Delete Search key 1 and then delete search key 27s.	6
Q-3		
	'Express Transport Services' is a transport company involved in transportation service. Company has number of branches all over India and has head-quarter in Bombay. Customers make booking for sending their parcels through these branches. In Booking request each customer is supposed to mention the destination, on other hand each branch is connected in certain routes. If the destination of customer's parcel falls under the routes offered, then the booking request will be accepted charges are based on the location of destination from a branch and weight of the parcel, and for that each branch has defined rate table. Company has 500 trucks and each truck is assigned a specific route. For above mentioned specifications, develop complete Entity-Relationship Model.	6
Q-4		
	For each one of the following schedules decide whether • they are serializable • they can be produced by a Two Phase Lock (2PL) scheduler Justify your answers in a concrete way 	6



Q-5

Consider the relation R={A,B,C,D,E,F,G,H,I,J} and the set of functional dependencies F={AB → C, A → DE, B → F, F → GH, D → IJ} 6

Decompose the relation such that the decomposed relations are in BCNF. Show that they are in BCNF.

Q-6

Consider the following relation schemas in a relational database: 6

SalesRecord(transactionID, salesName, transactionAmount, month, customerName)
EmployeeInfo(name, department, baseSalary, homeAddress)
CustomerInfo(name, address, telephone)

Note that {salesName} is a foreign key in SalesRecord targeting to {name} in its home relation EmployeeInfo and {customerName} is a foreign key in SalesRecord targeting to {name} in its home relation CustomerInfo.

Write relational algebra expressions for the following given queries:

- Find the names and home addresses of all employees in the “sales" department who have done any transactions of amount greater than $10,000 with the customer “Chris".
- Find the names of all employees in the “sales" department who have not done any transactions in August

Q-7

Let relation *r* (Matrimony) contain the following tuples: 6

Gender	Surname	First Name	Occupation	Birthdate	City	Cast
M	Shah	Hemil	Job	5/6/1990	Pune	Hindu
F	Patel	Rakhi		16/12/1980	Mumbai	Kadva patel
F	Vasa	Shruti	Student	23/2/1996	Dhule	Budhdhist
F	Parekh	Ruchita		17/2/1993	vadodra	hindu

Consider V is a range variable that ranges over *r* , find the truth value for the following given expression

	1 Forall V(is_unk(V.Gender) and is_unk(V.Surname) and is_unk(V.First Name) and is_unk(V.Occupation) and is_unk(V.Birthdate) and is_unk(V.City) and is_unk(V.Cast)) 2 Exists V(V.gender='F' and V.Birthdate>"1/6/1990") **Note**: Show proper way to fine truth values.	
Q-8	Using mathematical notations to describe the PROJECTION operator of the relational algebra. Explain how Domain Relational Calculus differs from Tuple Relational Calculus.	6
Q-9	List the steps involved in Query Processing with diagram. Explain each step in brief	6