Roll No: ..... Name .....

National Institute of Technology Calicut

Department of Computer Science & Engineering

CS3002 Database Management Systems

First MID Term Exam (Monsoon Semester 2016)

Max. Marks: 15 Time: 1hr

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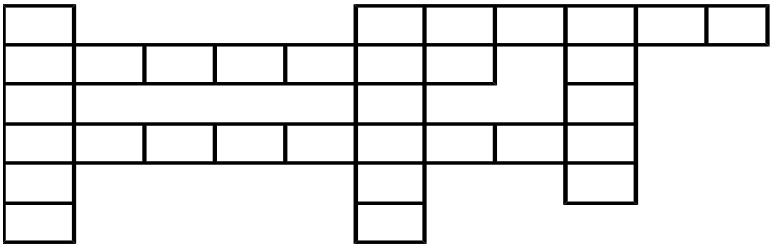
1. Solve the following [1.5]



Down: 1. The overall design of the database.

2. The set of all allowable values that attribute may assume.

3. A subset of a database that is generated from a query

Right: 2. Number of attributes in a relation

4. A directory of information about data sets, files, or a database

5. The data stored in database at a particular moment of time

2. Consider the following relations for a database that keeps track of business trips of salespersons in a salesoffice:

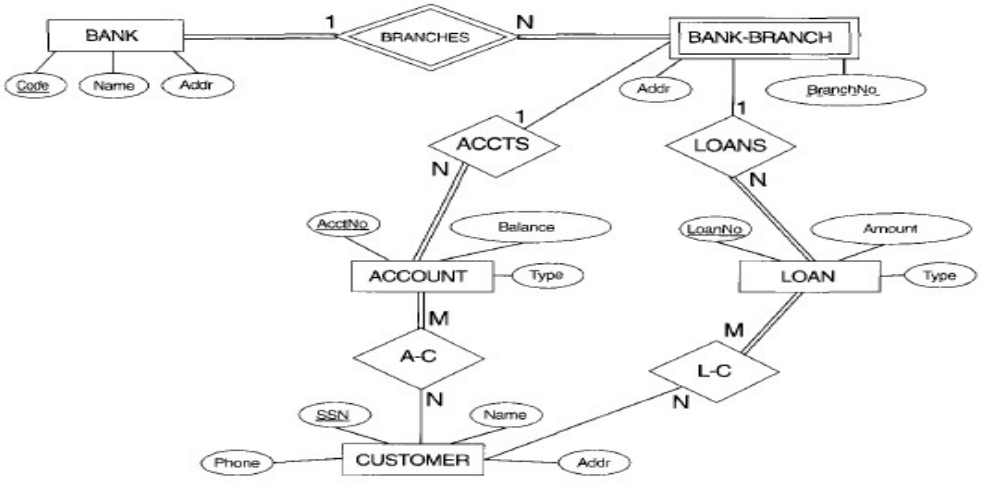
SALESPERSON (SSN, Name, Start_Year, Dept_No)

TRIP (SSN, From_City, To_City, Departure_Date, Return_Date, Trip_ID)

EXPENSE (Trip_ID, Account#, Amount)

Specify the foreign keys for this schema, stating any assumptions you make. [1]

3. Consider the ER diagram shown in Figure for part of a BANK database.



Each bank can have multiple branches, and each branch can have multiple accounts and loans.

a. List the (nonweak) entity types in the ER diagram. [.25]

b. Is there a weak entity type? If so, give its name, partial key, and identifying relationship. [.25]

c. What constraints do the partial key and the identifying relationship of the weak entity type specify in this diagram? [1]

d. List the names of all relationship types, and specify the (min, max) constraint on each participation of an entity type in a relationship type. Justify your choices. [1]

e. List concisely the user requirements that led to this ER schema design. [1]

4. Define DDL,DML,SDL and VDL [2]

5. Consider the following two aspects and Modify the BANK schema using ER and EER concepts of specialization and generalization. [2]

- There are three different kinds of ACCOUNTs namely SAVINGS_ACCTS, CHECKING_ACCTS, and TRUSTS. For each ACCOUNT we have to take care of its TRANSACTIONs. Each TRANSACTION has a *type*(such as 'deposit', 'withdrawal' or 'check'). Furthermore, each TRANSACTION has a *date/time*(consisting of date and time) and an *amount*.
- There are different kinds of LOANS, namely CAR_LOANS, HOME_LOANS, CREDIT_LINE and PERSONAL ones. For each LOAN we have to take care of its PAYMENTs. Each PAYMENT has a *type*, *date* and *amount*.

6. Consider the following schema: [2]

Suppliers(sid: integer, sname: string, address: string)

Parts(pid: integer, pname: string, color: string)

Catalog(sid: integer, pid: integer, cost: real)

State SQL queries correspond to the following queries

1. $(\pi_{sname}((\sigma_{color=red}\text{Parts}) \bowtie (\sigma_{cost<100}\text{Catalog}) \bowtie \text{Suppliers})) \cap (\pi_{sname}((\sigma_{color=green}\text{Parts}) \bowtie (\sigma_{cost<100}\text{Catalog}) \bowtie \text{Suppliers}))$
2. $\pi_{sname}((\pi_{sid,sname}((\sigma_{color=red}\text{Parts}) \bowtie (\sigma_{cost<100}\text{Catalog}) \bowtie \text{Suppliers})) \cap (\pi_{sid,sname}((\sigma_{color=green}\text{P arts}) \bowtie (\sigma_{cost<100}\text{Catalog}) \bowtie \text{Suppliers})))$

7. Consider the database. [3]

Flights(flno: integer, from: string, to: string,distance: integer, departs: time, arrives: time)

Aircraft(aid: integer, aname: string, cruisingrange: integer)

Certified(eid: integer, aid: integer)

Employees(eid: integer, ename: string, salary: integer)

Give an expression in the relational algebra for each of the following :

a. Find the aids of all aircraft that can be used on non-stop flights from Bonn to Madras.

b. Find the names of pilots who can operate some plane with a range greater than 3,000 miles but are not certified on any Boeing aircraft

c. Find the eids of employees who make the highest salary.