(1)

g) Which movies are longer than "Gone With the Wind"?

Select title from movie
where (length > "Gone with the Wind");

4. Which of the following are valid SQL statements (Please tick mark your answer): (1)

a) ALTER TABLE STUDENT ADD NoPoints INT DEFAULT 320;
b) ALTER TABLE GRADES ALTER Grade SET DEFAULT 'A';
c) ALTER TABLE GRADES DROP CONSTRAINT abc ;
d) ALTER TABLE GRADES ADD CONSTRAINT pqr FOREIGN KEY StdId REFERENCES STUDENT ON DELETE NO ACTION;
e) ALTER TABLE STUDENT DROP CONSTRAINT mnop CASCADE;

i) a, c, d, e ii) a, b, c, e iii) all the above iv) a, b, c, e v) a, b, d, e

5. Aggregate functions can be used only in the _____ and _____ clauses of an SQL query. (1)

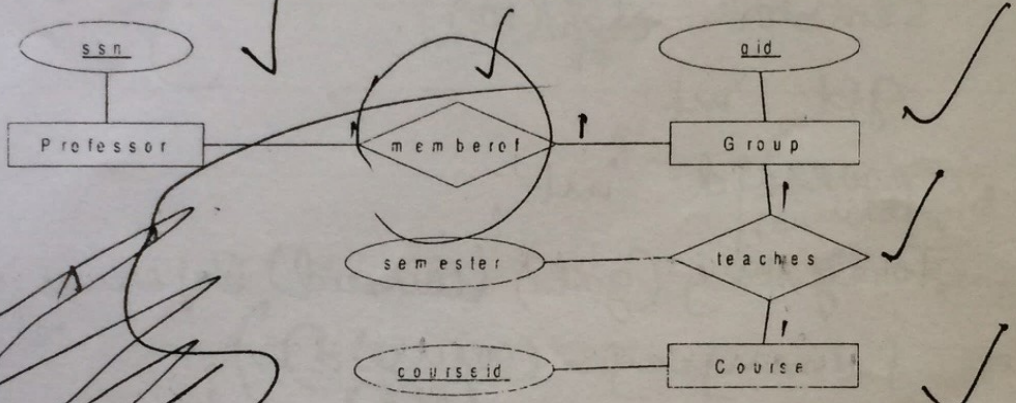
6. Suppose that we have a ternary relationship R between entity sets A, B, and C such that A has a key constraint and total participation and B has a key constraint; these are the only constraints. A has attributes a1 and a2, with a1 being the key; B and C are similar. R has no descriptive attributes. Write SQL statements that create tables corresponding to this information so as to capture as many of the constraints as possible. If you cannot capture some constraint, explain why. (2)

create table A (

7. Is it possible to insert values into a table from another table using the INSERT statement? If YES give an example also. (1)

No, its not possible to insert values into a table from another table in one statement. First, we have to fetch value from another table by select operation & then insert into table by modify or update operation.

8: Consider the following ER diagram. Write SQL statements to create the corresponding relations and capture as many of the constraints as possible. If you can not capture some constraints, explain why. (2)



~~Create table Professor (ssn char(9), gid int);~~

~~Create table Group (gid int);~~

~~Create table Course (courseid int, gid int, semester char(10));~~

~~Create table Memberof (SSN char(10), gid int);~~

Create table teaches (semester char(10), gid int, courseid int);

Aditya

National Institute of Technology Calicut
Department of Computer Science and Engineering
Midterm Test – I Monsoon 2014
CS3002 Database Management Systems

Time: 1 Hr **Max. Marks: 20**

Answer all questions.

1. Draw the three-schema architecture and label the diagram completely. What is the main goal of the three schema architecture? **[2+1=3 marks]**
2. Draw the logical three-tier client/server architecture. **[1 mark]**
3. Consider CAR relation schema: CAR (State, Reg#, SerialNo, Make, Model, Year). How many super keys are there for this schema? Which are they? Identify a super key, which is not a primary key. **[1+1+1=3 marks]**
4. Specify the additional functionality incorporated in n-tier architecture (n > 3)? **[1 mark]**
5. Suppose that each of the following Update operations is applied directly to the database state shown in Figure 3.6. Discuss *all* integrity constraints violated by each operation, if any, and the different ways of enforcing these constraints. **[4 marks]**

   a) Insert <'Production', 4, '943775543', '2007-10-01'> into DEPARTMENT.

   b) Insert <'ProductA', 4, 'Bellaire', 2> into PROJECT.

   c) Delete the EMPLOYEE tuple with Ssn = '987654321'.

   d) Modify the Super_ssn attribute of the EMPLOYEE tuple with Ssn = '999887777' to '943775543'.

6. Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course: **[2 marks]**

   STUDENT(Ssn, Name, Major, Bdate)
   COURSE(Course#, Cname, Dept)
   ENROLL(Ssn, Course#, Quarter, Grade)
   BOOK_ADOPTION(Course#, Quarter, Book_isbn)
   TEXT(Book_isbn, Book_title, Publisher, Author)

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

7. List the data types that are allowed for SQL attributes. **[1 mark]**
8. While creating a table using the CREATE TABLE command of SQL-99, it is specified that "PRIMARY KEY NOT NULL". Discuss the validity of this command? **[1 mark]**
9. Show the result of each query if it is applied to the COMPANY database in Figure 3.6.

   Retrieve the names of all employees in department 5 who work more than 10 hours per week on the ProductX project. **[2 marks]**

10. Consider the EMPLOYEE table's constraint EMPSUPERFK as specified as follows.

    CONSTRAINT EMPSUPERFK
    FOREIGN KEY (Super_ssn) REFERENCES EMPLOYEE(Ssn)
    ON DELETE CASCADE ON UPDATE CASCADE.

    Check the result when the following command is run on the database state shown in Figure 3.6?
    DELETE EMPLOYEE WHERE Lname = 'Borg' **[2 marks]**

6a

National Institute of Technology Calicut
Department of Computer Science and Engineering

CS3002 Database Management Systems
Mid Term 1 – 22nd August 2012

Time: 1Hour Max. Marks: 20

Roll Number: _____ Name: Answer Key

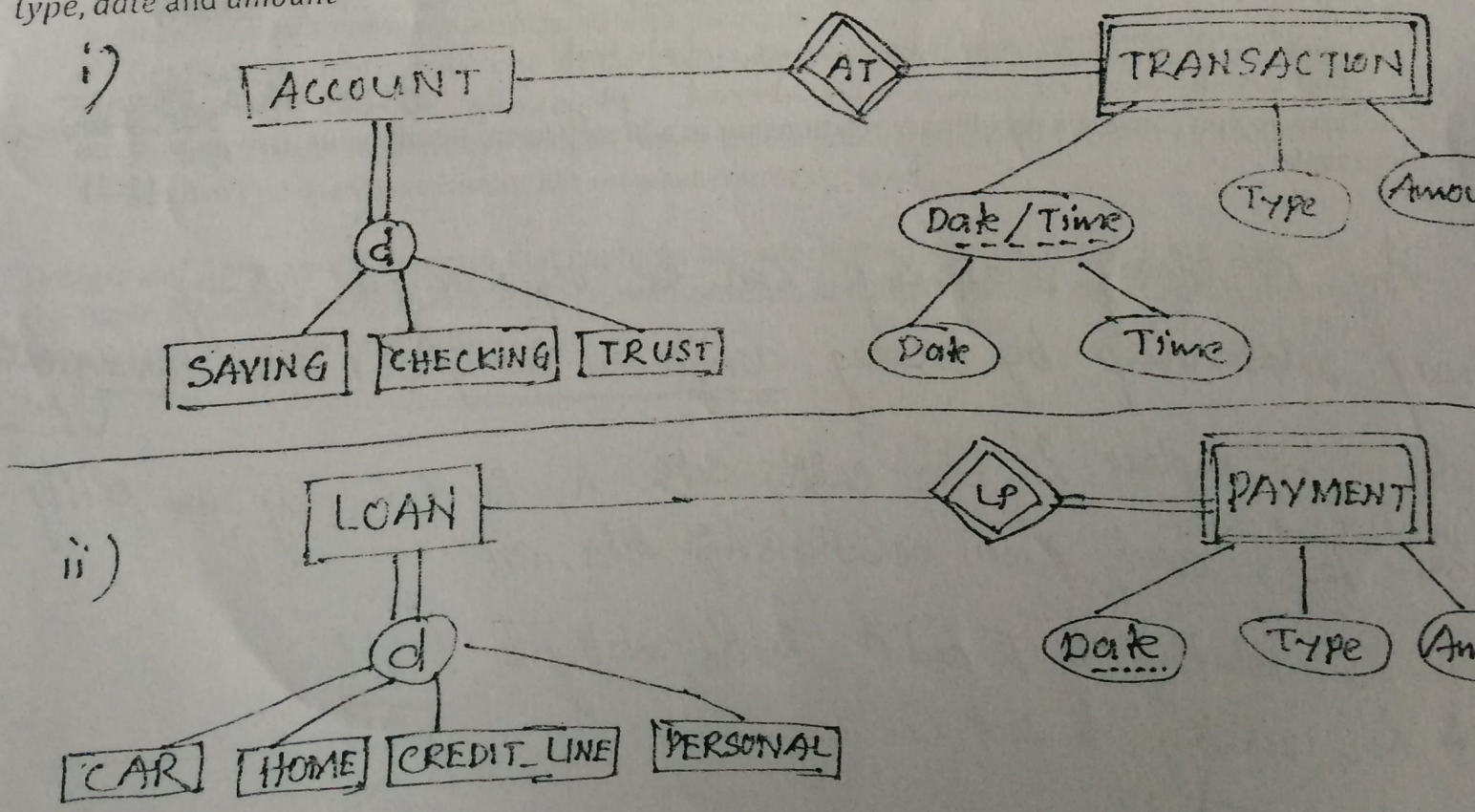
1: List four responsibilities of a DBA. (0.5x4=2)

i) Authorizing Access to database
ii) coordinating and monitoring its use
iii) Backing up and restoring database
iv) optimizing its Performance

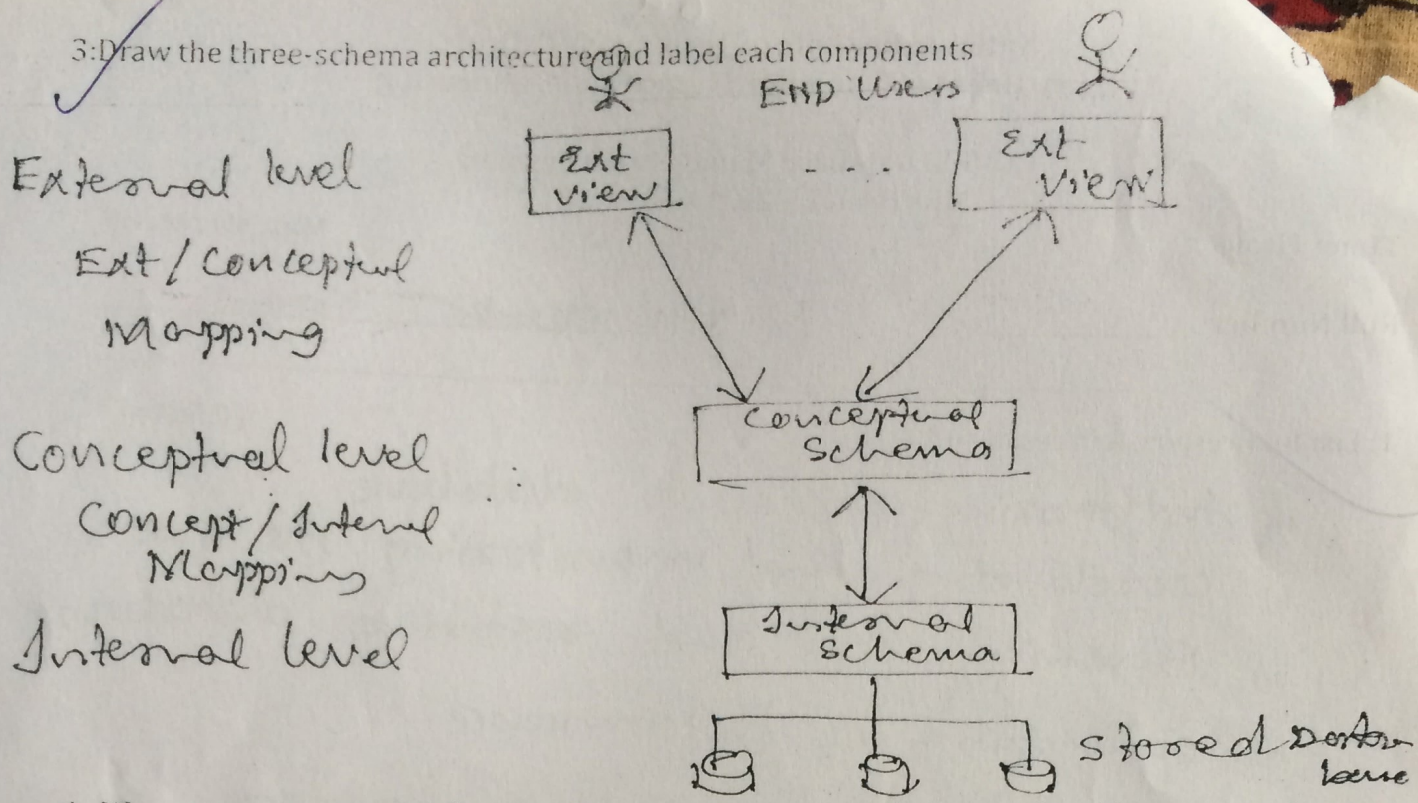
2: Consider a bank, and model the following two aspects using appropriate diagrams: (1.5 + 1.5=3)

i) 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 a *date* and a *time*) and an *amount*.

ii) 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*



3: Draw the three-schema architecture and label each components (3)



4: We can convert any weak entity set to a strong entity set by simply adding appropriate attributes. Then, why do we need weak entity sets? (2)

① To avoid data duplication and consequent possible inconsistencies.

② weak entity can represent logical existence of an entity being dependendent on another entity

③ weak entities can be deleted automatically when their strong entities are deleted

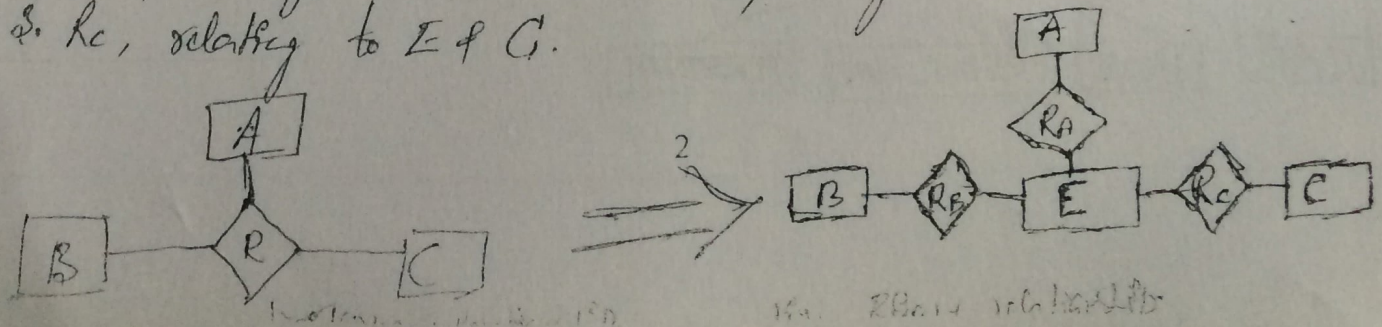
④ weak entities can be stored physically with their strong entities

5: How do you convert a non-binary relationship to a binary form. Justify your answer with an example. (1.5)

Any non binary relationship can be represented using binary relationship by creating artificial entity set (or) dummy entity set

Eg: → Replace 'R' b/w entity sets A, B & C by an entity set 'E', and three relationship sets are.

1. R_A, relating to E and A 2. R_B, relating to E & B
3. R_C, relating to E & C.



6b

i) The example of a bank teller checking account balances belongs to Naive or parametric end user.

ii) The example of a reservation clerk for airlines or hotels belongs to Naive or parametric end user.

(0.5x2=1)

7: The information such as the structure of each file, the type of storage format and various constraints on data are stored in Catalog and Meta data describs the structure of a primary database.

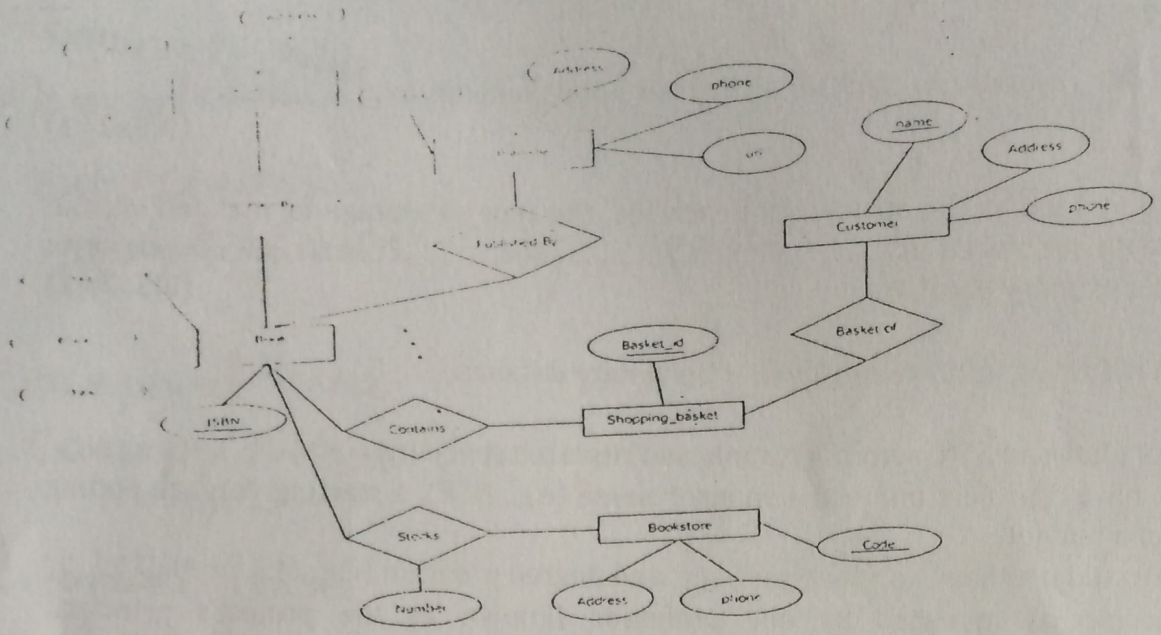
(0.5x2=1)

8: Consider the following information about a University database:

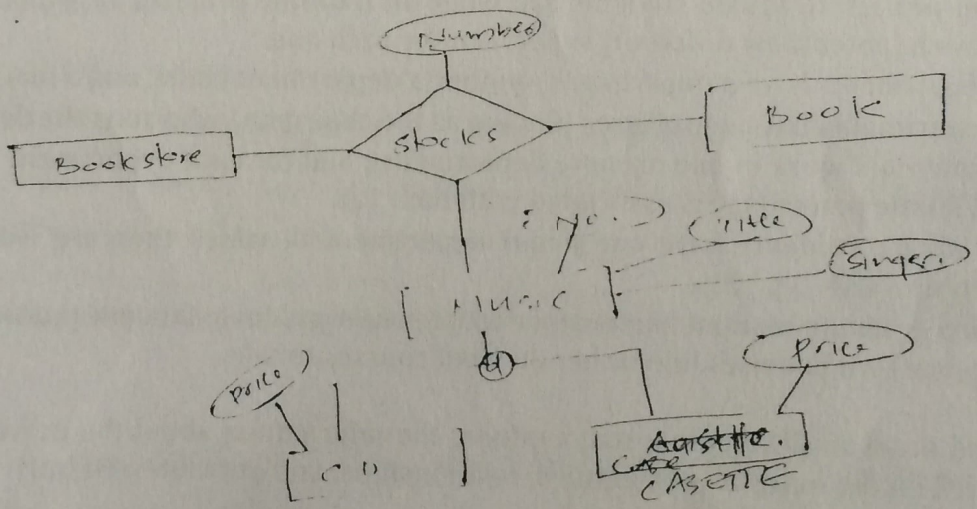
- Professors have an SSN, name, age, rank, and research specialty.
- Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget.
- Graduate students have an SSN, name, age, and degree program (e.g., M.S. or Ph.D.).
- Each project is managed by one professor (known as the project's principal investigator).
- Each project is worked on by one or more professors (known as the project's co-investigators).
- Professors can manage and/or work on multiple projects.
- Each project is worked on by one or more graduate students (known as the project's research assistants).
- When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one.
- Departments have a department number, a department name, and a main office.
- Departments have a professor (known as the chairman) who runs the department.
- Professors work in one or more departments, and for each department that they work in, a time percentage is associated with their job.
- Graduate students have one major department in which they are working on their degree.
- Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take.

Design and draw an ER diagram that captures the information about the university. Use only the basic ER model here; that is, entities, relationships, and attributes. Be sure to indicate any key and participation constraints. (5)

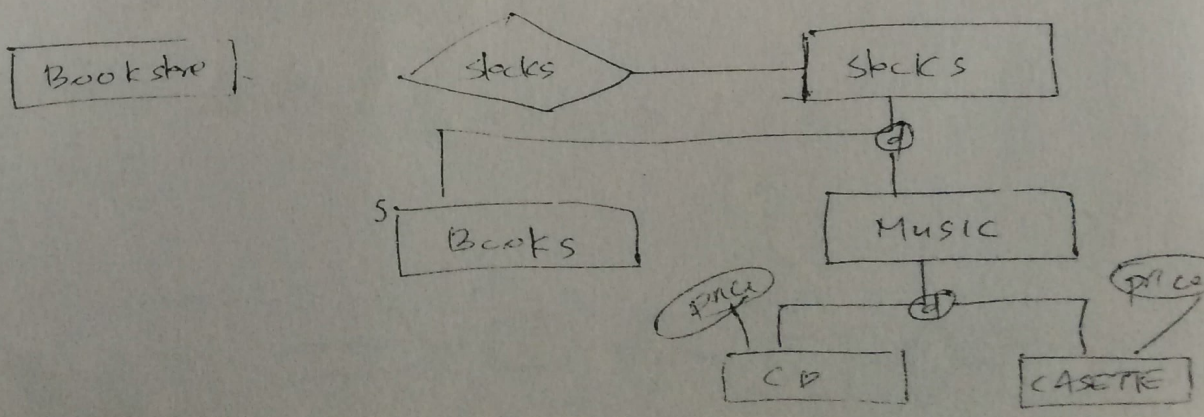
...ider the ER diagram in the following figure:



i) Suppose the bookstore adds music cassettes and compact disks to its collection. The same music item may be present in cassette or compact disk format, with differing prices. Extend the E-R diagram (wherever it is necessary only) to model this addition, ignoring the effect on shopping baskets. (1.5)

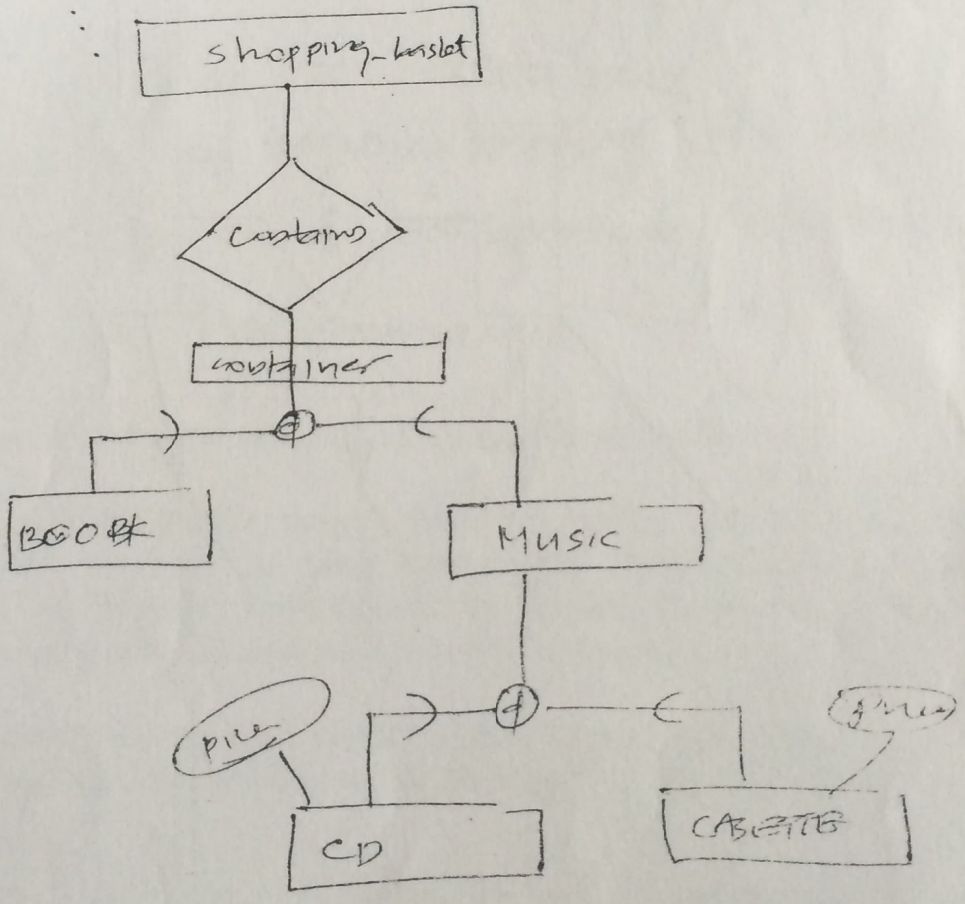


OR



6c

ii) Now extend the E-R diagram, using generalization, to model the case where a shopping basket may contain any combination of books, music cassettes, or compact disks. (1.5)



Department of Computer Science and Engineering

Mid Term Exam I, Monsoon semester 2015

CS3002 Database Management Systems

Maximum Marks: 20 Time: 1 Hour

Name: Roll No:

1. [2 Marks] Define the terms – instance of a database and database schema?
2. [2 Marks] Discuss the various reasons that lead to the occurrence of NULL values in relations. Answer in 2 or 3 sentences.
3. [1 Mark] Based on question number 2, choose the statement(s) which correctly define(s) a NULL value.
   a) NULL is a special value with zero bytes
   b) NULL is no value or unknown value
   c) NULL is represented by a blank space
   d) NULL is not same as zero
4. [1 Mark] What is the use of 'group by' clause?
5. [2 Marks] Consider the following relations for a database that keeps track of student enrolment in courses and the books adopted for each course:

   STUDENT (Ssn, Name, Major, Bdate)

   COURSE (Course#, Cname, Dept)

   ENROLL (Ssn, Course#, Quarter, Grade)

   BOOK_ADOPTION (Course#, Quarter, Book_isbn)

   TEXT (Book_isbn, Book_title, Publisher, Author)

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

6. [4 Marks] Design an E/R diagram describing the following domain:

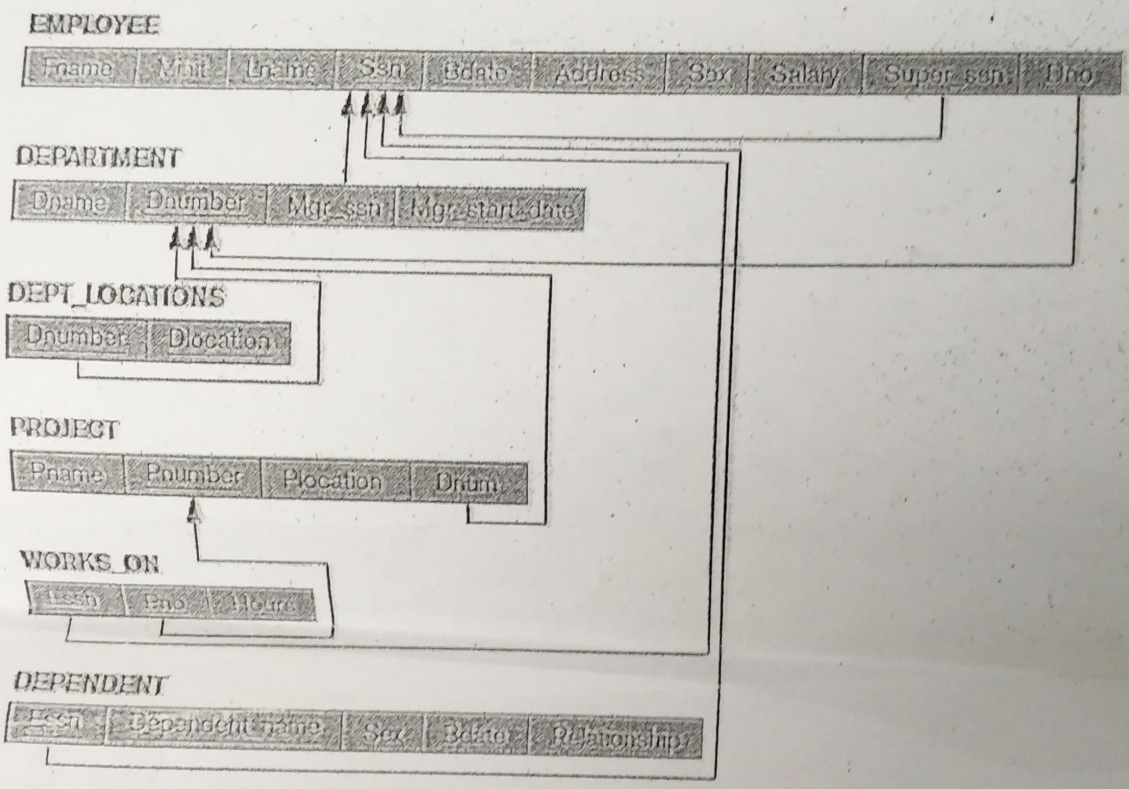
A Person has attributes pid (key) and name. A Skier is a type of Person with attribute aptitude. A Snowboarder is a type of Skier. A PairOfSkis has attribute sid (key) and model. A Snowboard has attribute id (key) and model. A Skier owns zero or more PairOfSkis. The ownership relation has a purchase price. A PairOfSkis is owned by at most one Skier. A Snowboarder owns zero or more Snowboards. The ownership relation has a purchase price. A Snowboard is owned by at most one Snowboarder. A person can rent a PairOfSkis or a Snowboard. A person cannot rent more than one PairOfSkis or one Snowboard at the same time. A person cannot rent a PairOfSkis and a Snowboard at the same time either. A piece of equipment can be rented by at most one person at a time. The rental comes with a start date and an end date.

a) [2 Marks] Write the SQL CREATE TABLE statement for the OWNS relation between Skier and PairOfSkis. Make sure that your statement specifies the PRIMARY KEY and any FOREIGN KEYS. Additionally, enforce the constraint that purchase price should be greater than zero.

7. [1 Mark] A retrieval query in SQL has a well-defined syntax. What are the clauses in it?

8. [1 Mark] If you were designing a Web-based system to make airline reservations and sell airline tickets, which DBMS architecture would you? Why? Why would the other architectures not be a good choice?

9. Consider the COMPANY relational database schema shown below.



a) [1 Mark] Write the SQL query for retrieving the names of all employees in department 5 who work more than 10 hours per week on the ProductX project.

10. [1+1+1 = 3 Marks] What do the following queries do on the COMPANY instance in question number 9?

) SELECT DISTINCT Pnumber FROM PROJECT WHERE Pnumber IN (SELECT Pnumber FROM PROJECT, DEPARTMENT, EMPLOYEE WHERE Dnum=Dnumber AND Mgr_ssn=Ssn AND Lname='Smith') OR Pnumber IN (SELECT Pno FROM WORKS_ON, EMPLOYEE WHERE Essn=Ssn AND Lname='Smith');

SELECT Lname, Fname FROM EMPLOYEE WHERE Salary > ALL (SELECT Salary FROM EMPLOYEE WHERE Dno=5);

SELECT Dnumber, COUNT (*) FROM DEPARTMENT, EMPLOYEE WHERE Dnumber=Dno AND Salary>40000 AND (SELECT Dno FROM EMPLOYEE GROUP BY Dno HAVING COUNT (*) > 5);

National Institute of Technology Calicut
Department of Computer Science and Engineering
CS3002 Database Management Systems
Mid Term II - 3rd October 2012

Time: 1Hour Max. Marks: 20

RollNumber: B100475CS. Name: Bandna Kumari

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1. Consider the following relations containing airline flight information:

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)

Note: The Employees relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft (otherwise, he or she would not qualify as a pilot), and only pilots are certified to fly.
Write the following queries in relational algebra and SQL.

a) Find the eid's of pilots certified for some Boeing aircraft. **(0.5+0.5=1)**

Relational Albebra:

$A - C \leftarrow Aircraft \bowtie_{A.aid = C.aid} Certified$

$B \leftarrow \Pi_{eid}(A - C)$

$result \leftarrow \Pi_{eid}(B * Employee)$.

SQL:

```
Select employee.eid from Employees, Certified, Aircraft
where employee.eid = certified.eid and
certified.aid = Aircraft.aid ;
```

b) Find the aid's of all aircraft that can be used on non-stop flights from Bonn to Madras. **(1+1=2)**

Relational Albebra:

$\Pi_{aid}(\sigma_{from='Bonn' \text{ AND } To='Madras' \text{ AND } Crus.}(Flights * Aircraft))$

SQL:

```
Select aid from (Aircraft, flights
where from='Bonn' And To = 'Madras';
```

iii). Find the names of pilots who can operate planes with a range greater than 3,000 miles but are no certified on any Boeing aircraft. (1+1=2)

Relational Algebra:

SQL:

select ename from employees, Aircrabl-
where (cruisingrange > 3,000)

2. Consider the following schema:

Suppliers(sid: integer, sname: string, address: string)
Parts(pid: integer, pname: string, color: string)
Catalog(sid: integer, pid: integer, cost: real)

Note: The key fields are underlined, and the domain of each field is listed after the field name. Therefore sid is the key for Suppliers, pid is the key for Parts, and sid and pid together form the key for Catalog. The Catalog relation lists the prices charged for parts by Suppliers.

State in one sentance each what the following queries compute: (1+1=2)

) $\pi_{sname}(\pi_{sid}((\sigma_{color=red} Parts)$ JOIN $(\sigma_{cost<100}$ Catalog)) JOIN Suppliers)

Names of Suppliers who charged the cost for parts less than 100 of color red.

ii) $(\pi_{sid}((\sigma_{color=red} Parts)$ JOIN $(\sigma_{cost<100} Catalog)$ JOIN $Suppliers)) \cap$
$(\pi_{sid}((\sigma_{color=green} Parts)$ JOIN $(\sigma_{cost<100} Catalog)$ JOIN $Suppliers))$

Gives supplier ids who has charged cost of less than 100 for parts of color red and green.

3. Write the following queries using SQL and show the result of each query as it applies to the tables below. (no need)

Movie(title, year, length, inColor, studioName, producerC)
StarsIn(movieTitle, movieYear, starName)
MovieStar(name, address, gender, birthdate)
MovieExec(name, address, cert#, netWorth)
Studio(name, address, presC#)