

PDPM IITDM JABALPUR
CS203 DATABASE DESIGN AND MANAGEMENT
QUIZ 1
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MaxMarks 30

Time 1 hour

Roll No: _____ **Name:** _____

1. [1] The database environment has all of the following components except:
(a). Users (b). Separate files
(c). Database. (d). Database administrator
2. [2] Which of the following is/are TRUE for relational database?
(a). Number of rows is cardinality, number of columns is degree
(b). Tuple is an entity, column is a relation
(c). Relation is an entity, tuple is a relationship
(d). Row is a tuple, column is an attribute
3. [2] Given the basic ER and relational models, which of the following is/are INCORRECT?
(a). An attribute of an entity can have more than one value
(b). An attribute of an entity can be composite
(c). In a row of a relational table, an attribute can have more than one value
(d). In a row of a relational table, an attribute can have exactly one value or a NULL value
4. [2] Which of the following statements is/are TRUE:
(a). Each superkey is a superset of some candidate key.
(b). Each primary key is also a candidate key, but there may be candidate keys that are not primary keys.
5. [2] Consider a relational table with a single record for each registered student with the following attributes.
 1. Registration_Number: Unique registration number of each registered student
 2. UID: Unique Identity number, unique at the national level for each citizen
 3. BankAccount_Number: Unique account number at the bank. A student can have multiple accounts or joint accounts. This attributes stores the primary account number
 4. Name: Name of the Student
 5. Hostel_Room: Room number of the hostel

Which of the following options is/are INCORRECT?

- (a). BankAccount_Number is a candidate key
- (b). Registration_Number can be a primary key
- (c). UID is a candidate key if all students are from the same country
- (d). If S is a superkey such that $S \cap \text{UID}$ is NULL then $S \cup \text{UID}$ is also a superkey

6. [6] Anju has a large DVD movie collection. Her friends like to borrow her DVD's, and she needs a way to keep track of who has what. She maintains a list of friends, identified by unique FID's (friend identifiers) and a list of DVD's, identified by DVDID's (DVD identifiers). With each friend is the name and the all-important telephone numbers which she can call to get the DVD back. With each DVD is the star actor name and title. Whenever a friend borrows a DVD, Anju will enter that fact into her database along with the date borrowed. Whenever the DVD gets returned that fact, too, gets noted along with the date returned. Anju wants to keep a complete history of her friends' borrowing habits so that she can ask favors of the heavy borrowers (or perhaps refuse to make further loans to those who habitually don't return them quickly).

Construct an ER model for Anju. Which of the following questions can be answered from your ER diagram? Briefly justify the answers.

- (A) Who habitually don't return DVD's quickly?
- (B) Who borrowed a DVD multiple times?
- (C) Who will be heavy borrowers?
- (D) Which DVDs are borrowed by someone at present

7. [5] Consider an ER model in which entity sets E1 and E2 are connected by an m:n relationship R12, E1 and E3 are connected by a 1:n (1 on the side of E1 and n on the side of E3) relationship R13.

E1 has two single-valued attributes a11 and a12 of which a11 is the key attribute. E2 has two single-valued attributes a21 and a22 of which a21 is the key attribute. E3 has two single-valued attributes a31 and a32 of which a31 is the key attribute. The relationships do not have any other attributes.

Derived a relational model from this ER model.

8. [10] Consider the following database schema of computer products:

Computer(mname,modelnum,category)

Model(modelnum,speed,ram,hd,price)

Maker(mname,address,phone)

where

maker indicates the manufacturer of the computer

category takes values such as "desktop", "laptop", "server";

Write the following queries in relational algebra:

- (a). Find all the makers who make *some* laptop(s).
- (b). Find the phone numbers of all the makers who make desktops with speed 3.2.
- (c). Find the makers who don't make any desktop, and do make some laptop(s).
- (d). Find the makers who make all models with speed faster than 3.2.
- (e). Find the manufacturers who manufacture computers with ram more than 32GB and ram less than 8GB.