**Relational Model (15 Marks)**

1. (3 marks) State the two properties of data independence provided in a DBMS. Why are they important? Given an example situation of when data independence is useful.

Answer:

The properties of data independence in a DBMS are:

1. Logical Data Independence – this refers to the logical structure of the data and how it is indexed (e.g. tables, rows and columns/attributes)
2. Physical Data Independence – this refers to how the data is physically stored within a storage system (e.g. stored as a data structure like a binary tree or HashMap, file system that is being used)

Data independence is useful for abstraction when we build programs or applications that use and access a DBMS. Let’s say initially you used a Linux file system for your program/application which uses a DBMS, but then switched to a Windows file system. Because of data independence, this won’t affect how you write or structure the program/application in relation to the database you’re using, since the structure of the data will be independent of the file system that it is stored on.

1. (12 marks) Consider the relations in a banking database given by the schemas…  
   1. Identify a primary key for each relation. For each key, briefly state the assumptions or conditions under which each key would be valid.

Answer:  
BRANCH, primary key: branchName – if there are multiple branches in the same city or address they should be referred to with a different and unique branch name  
CUSTOMER, primary key: cID – will always be unique to each customer, even if there are duplicate names or e



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