Database systems Marking Scheme august 2014

Question one

a) Explain three phases of database design
   - Conceptual Database Design. Produces the initial model of the mini world in a conceptual data model(e.g., in the ER model).
   - Logical Database Design. Transforms the conceptual schema into the data model supported by the DBMS(e.g., the relational model).
   - Physical Database Design. Design indexes, table distribution, buffer size, etc., to maximize performance of the final system

b) Explain any four database objects found in Ms access (4 marks)

   - Tables – this is where the actual data being stored is kept. A table is a collection of records that can be divided into fields. Each field holds a single piece of information about the record in which it resides
   - Queries – a query is used to extract only certain information from a database. A queery can select groups of records that fulfill certain conditions.
   - Forms- used in a variety of ways but the most common use is for data entry and display . they can also be used to edit and search your data.
   - Reports- enable you to output data to any number of destinations such as your printer or email message in an easy to read format.
   - Data access pages – are web pages that you can create and link to an access database. These pages can query or update the data contained within the database
   - Macros- are set of actions that each performs specific tasks with access. They help automate repetitive tasks without having to write.
   - Modules – modules are collections of visual basic applications(VBA) procedures . VBA in access allows you to create your own custom functions and procedures.

Question One (20 Marks)

a. i. Define the following terms as they relate to relational databases

Database – A shared collection of logically related data designed to fulfill the information needs of an organization

Relation – A table in a relational database

Tuple – Individual record in a relational database table

Super key – column or column combination that uniquely identifies a record within a table

8 Marks

ii. Explain the essence of defining input masks 2 Marks

Input masks help ensure valid entry of data in the required format and required value types

b. i. Describe any three data types supported by MS Access 6 Marks

Text – alphabetical and numerical data up to 255 characters

Memo – Support very big text up to 32000 characters

Number – Supports numerical values and supports arithmetic computations

Auto number

Date/time

Currency

Yes/No (Any three)

ii. Outline the steps to follow to filter a table in MS Access 4 Marks

Click the column label for the column you want to filter then activate the Home tab.

Click the Filter button. A menu appears.

Uncheck the items you do not want to appear, making sure only the items you want arechecked.

Click OK. Access filters your data and displays the word Filtered at the bottom of the window.

Question Two (20 Marks)

a. State and describe the five components of the database management system environment

- Hardware - The computer system(s) that the DBMS and the application programsrun on. This can range from a single PC, to a single mainframe, to anetwork of computers.
- Software - The DBMS software and the application programs, together withthe operating system, including network software if the DBMS is being usedover a network.

- Data - The data acts as a bridge between the hardware and software componentsand the human components. As we've already said, the databasecontains both the operational data and the meta-data (the 'data about data').
- Procedures - The instructions and rules that govern the design and use ofthe database. This may include instructions on how to log on to the DBMS,make backup copies of the database, and how to handle hardware or softwarefailures.
- People - This includes the database designers, database administrators(DBAs), application programmers, and the end-users.

b. i. Outline the procedure for defining a relationship in MS Access 2007/2010 10 Marks 8 Marks

- Close all tables and forms
- Activate the Database Tools tab
- Click the relationship button in the 'show/hide' group. The relationship window appears
- Click the Show Table button in the relationships group. The Show Table dialog appears
- Activate the Tables tab if your relationships will be based on tables, activate the Queries tab ifyour relationships will be based on queries, or activate the Both tab if your relationships will bebased on both.
- Double-click each table or query you want to use to build a relationship. The tables appear inthe Relationships window.Click the Close button to close the Show Table dialog box.
- Drag the Primary table's primary key over the related table's foreign key. After you drag theprimary key to the related table's box, the cursor changes to an arrow. Make sure the arrowpoints to the foreign key. The Edit Relationships Dialog box appears, and then click the Enforce Referential Integrity checkbox.
- Click Create. Access creates a one-to-many relationship between the tables.

ii. Describe the essence of enforcing referential integrity when defining relationships 2 Marks

If a foreign key exists in a table, either the foreign key value must match a candidatekey value of some record in its home table or the foreign key value must be wholly null

Question Three (20 Marks)

a. Discuss the three-tier database management system architecture describing four advantages it offers over the two-tier architecture 10 Marks

This architecture includes three layers, each potentially running on adifferent platform:

- The user interface layer, which runs on the end-user's computer (the client)
- The business logic and data processing layer. This middle tier runs on a serverand is often called the application server. One application server isdesigned to serve multiple clients.
- A DBMS, which stores the data required by the middle tier. This tier may runon a separate server called the database server.

The three-tier design has many advantages over the traditional two-tier design,such as:

- A 'thin' client, which requires less expensive hardware
- Simplified application maintenance, as a result of centralizing the businesslogic for many end-users into a single application server. This eliminates theconcerns of software distribution that are problematic in the traditional two-tierclient–server architecture.
- Added modularity, which makes it easier to modify or replace one tier withoutaffecting the other tiers.
- Easier load balancing, again as a result of separating the core business logicfrom the database functions.

b. i. Wamagoro enterprises, a client of yours, wish to start using queries in displaying records from multiple tables and they have called you for help. Outline the procedure for creating a query that uses multiple tables in MS Access 2007/2010. 8 Marks

- Open the tables and/or queries you want to use in Query Design view.
- Choose the field names you want to retrieve in the order you want to retrieve them.
- Choose the field names you want to sort by in the order you want to sort. Under the fields youwant to sort by, choose Ascending or Descending.
- Enter your selection criteria, if necessary
- Deselect the Show button for columns you do not want to display
- Click the Run button. Access retrieves the columns you chose and displays the rows in the orderyou specified.

ii. Define a query 2 Marks

Question Four (20 Marks)

a. Describe five functions that should be provided by a modern full-scale multi-user DBMS 10 Marks

- Integrity services
- Support for data communication
- Authorization services
- Recovery services
- Concurrency control
- Data storage, retrieval and update
- Transaction support *Any five plus descriptions*

b. i. Describe any four properties of relational tables 8 Marks

- The table has a name that is distinct from all other tables in the database.
- Each cell of the table contains exactly one value.
- Each column has a distinct name.
- The values of a column are all from the same domain.
- The order of columns has no significance. In other words, provided a columnname is moved along with the column values, we can interchange columns.
- Each record is distinct; there are no duplicate records. *Any four*

ii. Describe the essence of reports in database management systems 2 Marks

Reports help when you want to analyzeyour data or present your data to others.