UNIVERSITY OF GHANA

BA/BSc. COMPUTER SCIENCE/INFORMATION TECHNOLOGY, SECON D SEMESTER EXAMINATIONS: 2015/2016

CSIT 314: DATABASE MANAGEMENT SYSTEM ADMINISTRATION

(3 CREDITS)

INSTRUCTION:

Answer ALL Questions in Section A and Any Other Three (3) Questions in Section B

TIME ALLOWED:

TWO AND A HALF (2½) HOURS

SECTION A

(1) Which two files are used during operation of the DBMS?

(A) Query languages and utilities

(B) DML and query language

(C) Data dictionary and transaction log

(D) Data dictionary and query language

(2) _____ Data type can store unstructured data

(A) RAW   (B) CHAR   (C) NUMERIC   (D) VARCHAR

(3) The method of access which uses key transformation is known as

(A) Direct   (B) Hash   (C) Random   (D) Sequential

(4) _____ is a virtual table that draws its data from the result of an SQL

SELECT statement.

(A) View   (B) Synonym   (C) Sequence   (D) Transaction

(5) In E-R diagram generalization is represented by

(A) Ellipse   (B) Dashed ellipse   (C) Rectangle   (D) Triangle

(6) A logical schema

(A) Is the entire database   (B) is a standard way of organizing information into a accessible

part

(C) Describe how data is actually stored on disk   (D) none of these

(7) To delete a particular column in a relation the command used is:

(A) UPDATE   (B) DROP   (C) ALTER (D)   DELETE

(8) Which one of the following is not true for a view?

(A) View is derived from other tables.   (B) View is a virtual table.

(C) A view definition is permanently stored as part of the database.   (D) View never contains

derived columns.

(9) The natural join is equal to

(A) Cartesian Product   (B) Combination of Union and Cartesian product

(C) Combination of selection and Cartesian product   (D) Combination of projection and

Cartesian product

(10) Consider the join of a relation R with relation S. If R has m tuples and S has n tuples, then

the maximum size of join is:

(A) mn   (B) m+n   (C) (m+n)/2   (D) 2(m+n)

(11) An instance of relational schema R (A, B, C) has distinct values of A including NULL value

s. Which one of the following is true?

(A) A is a candidate key   (B) A is not a candidate key

(C) A is a primary Key   (D) Both (A) and (C)

(12) A data dictionary is a special file that contains:

(A) The name of all fields in all files.   (B) The width of all fields in all files.

(C) The data type of all fields in all files.   (D) All of the above.

(13) Which of the following database object does not physically exist?

(A) Base table   (B) index   (C) view   (D) none of the above

(14) Which of the operations constitute a basic set of operations for manipulating relational data?

(A) Predicate calculus   (B) Relational calculus

(C) Relational algebra   (D) None of the above

(15) The result of the UNION operation between R1 and R2 is a relation that includes

(A) All the tuples of R1   (B) all the tuples of R2

(C) All the tuples of R1 and R2   (D) all the tuples of R1 and R2 which have common

columns

(16) The users who use easy-to-use menu are called

(A) Sophisticated end users.   (B) Naïve users.   (C) Stand-alone users.   (D) Casual end

users.

(17) Which of the following is an advantage of view?

(A) Data security   (B) Derived columns

(C) Hiding of complex queries   (D) All of the above

(18) Which of the following operations need the participating relations to be union compatible?

(A) UNION   (B) INTERSECTION   (C) DIFFERENCE   (D) All of the

above

(19) Which of the following operation is used if we are interested in only certain columns of a tab

le?

(A) PROJECTION   (B) SELECTION   (C) UNION   (D) JOIN

(20) It is better to use files than a DBMS when there are

(A) Stringent real-time requirements.   (B) Multiple users wish to access the data.

(C) Complex relationships among data.   (D) All of the above.

(21) Which of the following is correct:

(A) A SQL query automatically eliminates duplicates.

(B) SQL permits attribute names to be repeated in the same relation.

(C) A SQL query will not work if there are no indexes on the relations

(D) None of these

(22) SET concept is used in

(A) Network Model   (B) Hierarchical Model   (C) Relational Model   (D) None of

these

(23) The statement in SQL which allows to change the definition of a table is

(A) Alter.   (B) Update.   (C) Create.   (D) Select.

(24) Transaction processing is associated with everything below except

(A) Producing detail, summary, or exception reports.   (B) Recording a business activity.

(C) Confirming an action or triggering a response.   (D) Maintaining data.

SECTION B

Answer Any Three Questions from this Section

QUESTION 1:

(1) (i) Explain the following terms briefly: attribute, domain, entity, relationship, entity set, relationship set, one-to-many relationship, many-to-many relationship, participation constraint, overlap constraint, covering constraint, weak entity set, aggregation, and role indicator.

(ii) Consider the following information about a university database:

Professors have an SSN, a name, an age, a rank, and a 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, a name, an age, and a 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. Gradua te 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.

QUESTION 2:

(A) Define the following terms: relation schema, relational database schema, domain, attribute, attribute domain, relation instance, relation cardinality, and relation degree.

(B) 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)

The key fields are underlined, and the domain of each field is listed after the field name. Therefor

e 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. Write the following

queries in **relational algebra, tuple relational calculus, and domain relational calculus**:

 (i) Find the names of suppliers who supply some red part.

 (ii) Find the sids of suppliers who supply some red or green part.

 (iii) Find the sids of suppliers who supply some red part or are at 221 Packer Street.

 (iv) Find the sids of suppliers who supply some red part and some green part.

 (v) Find the sids of suppliers who supply every part.

QUESTION 3:

(A) Consider the following relational schemas:

EMPLOYEE (EMPLOYEE_NAME, STREET, CITY)

WORKS (EMPLOYEE_NAME, COMPANYNAME, SALARY)

COMPANY (COMPANY_NAME, CITY).

Specify the table definitions in SQL.

(B) Give an expression in SQL for each of queries below:

(i) Find the names of all employees who work for first Bank Corporation.

(ii) Find the names and company names of all employees sorted in ascending order of company

name and descending order of employee names of that company.

(iii) Change the city of First Bank Corporation to 'Computer Science Department'

(iv) What is ODBC? What are the uses of ODBC? Under what circumstances we use this technology?

QUESTION 4:

(A) With respect to Oracle describe the following

(i) Data Block.   (ii) Data dictionary.   (iii) Segments.

(B)(i) In Oracle what is system global area and how is it organized?

(ii) Differentiate between DDL and DML giving examples.

(ii) Differentiate between database schema and database state.

(iii) Differentiate between WHERE and HAVING clause in SQL.

(iv) How is the database organized in Oracle?

(C) Explain the following functions of Oracle with suitable examples:

(i) To_Char ( )   (ii) Count ( )   (iii) Trim ( )   (iv) Length ( )

(D) Define the following with respect to SQL

(i) Specifying alias   (ii) UNIQUE function   (iii) ORDER BY clause

(iv) LIKE predicate   (v) Asterisk (*)

QUESTION 5:

(A) Information about films contains information about movies, stars and studios. Movies have a title, year of production, length and the film type. Stars have a name and address. Studios have a owner and a banner. Movies are shot in studios which own them. A movie is shot in only one studio. Stars are connected to one or more studios but can act in any film which may or may not be owned by the studio. Arrive at an E-R diagram. Clearly indicate attributes, keys, the cardinality ratios and participation constraints.

(B) What are the DBMS languages? Briefly explain.

Differentiate between

(i) Procedural and non-procedural languages.

(ii) Key and superkey   **(iii)** Primary and secondary storage. **(iv)** Internal and external schema

(v) Explain the relevance of Data Dictionary in a Database System.

(C) Explain the three data models namely relational, network and hierarchical and compare their relative advantages and disadvantages.

(i) What is NULL? Give an example to illustrate testing for NULL in SQL.

(ii) For the relation Person (name, address), write a SQL query which retrieves the names of people whose name begins with 'A' and address contains 'Legon'.

(iii) What is Oracle Process? Explain any four processes started by Oracle.

(iv) What is a view in SQL? When can views be updated?

(v) Using SQL create a view RS for the relations R and S of Q79. The view consists of the columns A and D renamed as X and Y respectively. Insert a tuple (10, 15) into it. Show the contents

of the view.

(vi) Describe the GRANT function and explain, how it relates to security. What types of privilege

s   may be granted? How are they revoked?

(vii) Describe substring comparison in SQL.