P.G. Diploma in Bio - Informatics
Annual Examinations – 2006

Paper PBID – 103
Biological Databases and Their Management

Time allowed: Three hours Maximum Marks: 80

1. Attempt all questions from Section I.
2 Attempt any six questions from Section II.
3 Attempt any three questions from Section III

SECTION – I Marks

1. Attempt all the objective type questions given below and write the correct answer on the answer sheet. 1X20=20

(i) In a relational schema, each tupple is divided into fields called

(a) Relation (b) Domain (c) Queries

(d) All of the above (e) None of the above

(ii) A logical schema:

(a) is a standard way of organizing information into accessible parts
(b) describes how data is actually stored on disk
(c) is the entire database
(d) All of the above
(e) None of the above

(iii) An operation that will increase the length of a list

(a) Insert (b) Look-up (c) Modify

(d) All of the above (e) None of the above

(iv) A data dictionary is a special file that contains

(a) The name of all fields in all files (c) All of the above

(b) The data types of all the fields in all files (d) None of the above

(v) Data integrity control

(a) is used to set upper and lower limit on numeric data
(b) requires the use of password to prohibit unauthorized access to the file
(c) has the data dictionary keep the data and time of the last access, last backup and most recent modification of all files
(d) All of the above
(e) None of the above

(vi) A locked file can be

(a) accessed by only one user
(b) modified by user with the correct password
(c) is used to hide sensitive information
(d) both (b) and (c)
(e) None of the above

(vii) The logical data structure with a one-to-many relationship is a :

(a) Network (b) tree (c) chain (d) relation (e) None of the above

(viii) The designer of a form includes

(a) field designators (c) prompts

(b) data both (a) and (b) (d) None of the above

(ix) Which of the following is a type of DBMS software:

(a) DML (b) Query language (c) Utilities (d) Report writing

(e) All of the above

(x) The index consists of

(a) a list of keys (b) pointers to the master list (c) Both (a) and (b)

(d) All of the above (e) None of the above

(xi) A schema describes

(a) data elements (c) record and files

(b) record relationships (d) all of the above (e) None of the above

(xii) Which of the following is not a relational database

(a) dBASE IV (b) 4th Dimension (c) FoxPro (d) Reflex

(e) None of the above

(xiii) Data security threat include

(a) hardware failure (d) Privacy invasion

(b) fraudulent manipulation of data (e) All of the above

(c) None of the above

(xiv) The data dictionary tells the DBMS

(a) what files are in the database
(b) what attributes are possessed by the data
(c) what these file contain
(d) None of the above
(e) All of the above

(xv) A top-to-bottom relationship among the items in a database is established by a

(a) Hierarchical Schema (d) Network Schema

(b) Relational Schema (e) All of the above

(c) None of the above

(xvi) In LIN[ESIZE]{80n}, the maximum value of n is:

(a) 100 (b) 200 (c) 300 (d) 400 (e) 500

(xvii) In SPA[CE]{1n}, the maximum value of n is:

(a) 10 (b) 20 (c) 30

(d) 40 (e) 50

(xviii) Which command forward n print positions:

(a) TABn (b) SKIPn (c) COLn

(d) All of the above (e) None of the above

(xix) Format for DATA data type:

(a) DD:MM:YY (b) MM:D:YY (c) DD:MM:YYYY

(d) YYY:MM:DD (e) None of the above

(xix) In the following command:

P (DNO, DNUEMPS, AVGSAL) ←DNO τ COUNT (EMPNO), AVERAGE (SALARY) (EMP) the grouping attribute is:

(a) EMPNO (b) SALARY (c) DNO

(d) Both (a) & (b) (e) None of the above

SECTION – II

5X6=30

Q2. Attempt any <u>six</u> of the following

(i) When is a query language called relationally complete?
(ii) Define Boyce-Codd Normal Form. How does it differ from 3NF? Why is it considered a stronger form of 3NF?
(iii) A weak entity set can always be made into a strong entity set by adding to its attributes the primary key attributes of its identifying entity set. Outline what sort of redundancy will result if we do so.
(iv) Explain the distinctions among the terms primary key, candidate key and super key.
(v) Write a query, which will return the DAY of the week (i.e. MONDAY), for any data entered in the format: DD.MM.YY
(vi) Write down the advantages of Relational Database Model. Compare it with Hierarchical Database Model.
(vii) Describe the relationship between connection contexts and execution contexts.
(viii) Describe the difference in meaning between the terms relation and relational schema.

SECTION – III

10X3=30

Attempt any <u>three</u> questions of the following

Q3. Consider the relational database of Figure 1.0; write down SQL queries for the followings:

a) Find all employees who work (directly or indirectly) under the manager "Jones".
b) Find all cities of residence of all employees who work (directly or indirectly) under the manager "Jones".
c) Find all pairs of employees who have a (direct or indirect) manager in common.

d) Find all pairs of employees who have a (direct or indirect) manager in common, and are at the same number of levels of supervision below the common managers.

Employee (person-name, street, city)
Works (person-name, company-name, salary)
Company (company-name, city)
Manages (person-name, manager-name)

Figure 1.0: Relational Database

Q4. A University registrar's office maintains data about the following entities:

a) Courses, including number title, credits, syllabus, and prerequisites;
b) Course offerings, including course number, year, semester, section number, instructors, timing and classroom;
c) Students, including student –id, name, and program; and
d) Instructors, including identification number, name, department, and title.

Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.
Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

Q5. Let R=(A, B, C), and r_1 and r_2 both be relations on schema R. Give an expression in the domain relational calculus that is equivalent to each of the following:

a) $\prod_A (r)$
b) $\delta_{B=17} (r)$
c) r x s
d) $\prod_{A,F} (\delta_{C=D} (r \times s))$

Q6. Write a stepwise procedure to define triggers in SQL * Form.