CS–503

B. E. (Fifth Semester) EXAMINATION, Dec., 2011

(Computer Science Engg. Branch)

DATABASE MANAGEMENT SYSTEM

(CS – 503)

Time : Three Hours

Maximum Marks : 100

Mininum Pass Marks : 35

Note : Attempt all questions. All questions carry equal marks.

1. (a) Define the following terms : 5

   (i) Data redundancy and consistency

   (ii) Referential Integrity

   (b) Draw an E-R diagram for a hospital with a set of patients and a set of medical doctors. With each patient a log of the various conducted tests is also associated. 5

   (c) When is the concept of weak entity used in data modelling ? Define the terms owner entity, weak entity, identifying relationship, partial key. 10

Or

2. (a) A university database contains information about professors (identified by social security number) and courses (identified by courseid) professors teach

courses ; each of the following situations concerns the teaches relationship set.

For each situation draw an E-R diagram : 10

(i) Professors can teach the same course in several semesters and each offering must be recorded.

(ii) Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded.

(iii) Every Professor must teach some course.

(iv) Every Professor teaches exactly one course.

(v) Every Professor teaches exactly one course and every course must be taught by some Professor.

(b) Define the following terms : 10

(i) Data Models

(ii) Domain Constraints

3. (a) Given the relation schema : 10

ENROLL (S #, C #, Section), S # is student number.

TEACH (Prof, C #, Section), C # is course number

ADVISE (Prof, S #), Prof. is Thesis adviser of S #.

PRE-REQ (C # , pre-C #), pre-C # is prerequisite course.

GRADE (S #, C #, grade, year).

STUDENT (S #, Sname), Sname is student name.

Give queries expressed in SQL and tuple calculus :

(i) List of students taking course with Smith or Jones.

(ii) List of students taking at least one course that their advisor teaches.

(iii) List those professors who teach more than one section of the same course.

(iv) List all students number and course number.

(v) List the student number and course number who get grade A

(b) What are the various characteristics of SQL ? Discuss *five* aggregate functions with a suitable example. 5

(c) Discuss the selection, projection and join operator of relational algebra with a suitable example. 5

Or

4. (a) Specify the following query in relational algebra : 10

Supplier (sid, sname, address)

Part (sid, pname, color)

Catalog (sid, pid, cost)

(i) Find the name of suppliers who supply some red or green part.

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

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

(b) List the operations of relational algebra and the purpose of each. 10

5. (a) What do you mean by Normalization ? Explain BCNF and 3 NF with suitable example. 10

(b) What do you mean by decomposition of a relation ?

Consider the relational scheme :

R (A, B, C, D, E, F) and FD.

$A \rightarrow BC, C \rightarrow A, D \rightarrow E, F \rightarrow A, E \rightarrow D$

Is the decomposition of R into R_1 (A, C, D), R_2 (B, C, D) and R_3 (E, F, D) lossless ?

Explain the requirements for lossless decomposition and dependency preserving. 10

P. T. O.

Or

6. (a) Define the following terms : 10

(i) Functional dependency

(ii) Lossless decomposition

(iii) Dependency preservation

(iv) Third Normal form

(b) Consider the following relation :

Book (book_title, authorname, book_type, listprice, author_affiliation, publisher)

suppose the following functional dependencies exist :

book_title →publisher, book_type

book_type→listprice

authorname →author_affiliation

(i) What normal form is the relation in ? Explain your answer.

(ii) Apply normalization until you cannot decompose the relations further. State the reasons behind each decomposition. 10

7. (a) What do you mean by schedule in the context of concurrent execution of transactions in RDBMS ? What is serializable schedule ? Discuss the various types of serializability with a suitable example. 10

(b) Compare and contrast the features of log based recovery mechanism versus check pointing based recovery. Suggest applications where you prefer log based recovery scheme over check pointing. Give an example of check pointing based recovery scheme. Discuss the recoverable schedule also. 10