ME (Comp) Sem II
A.T.K.T

Date 13/12/2007

(13)

Con. 5542-07.

BB-7458

Advanced Database Management systems

(3 Hours)

[Total Marks : 100

N.B. (1) Question No. 1 is **compulsory.**
(2) Attempt any **four** out of remaining.
(3) Assume **suitable** data if **necessary** and **justify** the assumptions.
(4) **Figures** to the **right** indicate **full** marks.

1. (a) Consider the relation R {A, B, C, D, E, F, G, H, I, J} and the set F of functional dependencies F = { {A, B} → C, A → {D, E}, B → F, F → {G, H}, D → {I, J} } 9
   (i) Evaluate each of the following as a candidate key for R, giving reasons why it can or cannot be a key : {A}, {A, B}, {A, B, F}
   (ii) Based on the above key determination, state whether the relation R is in 3NF and in BCNF giving proper reasons.
   (iii) Consider the decomposition of R into R1(A, B, C, D, E, F), R2(F, G, H, I, J). Is this decomposition loss less ? Show why.
   (b) Explain 4NF and 5NF with example. 6
   (c) Define 3NF and BCNF. 5

2. (a) How can you include the method signature into each class of the object oriented Database schema ? 10
   (b) Draw the serializable graphs for the schedules S_1 and S_2, and state whether each schedule is conflict serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s). 5
   S_1 : $r_1(X)$; $r_2(Z)$; $r_1(Z)$; $r_3(X)$; $r_3(Y)$; $w_1(X)$; $w_3(Y)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$;
   S_2 : $r_1(X)$; $r_2(Z)$; $r_3(X)$; $r_1(Z)$; $r_2(Y)$; $r_3(Y)$; $w_1(X)$; $w_2(Z)$; $w_3(Y)$; $w_2(Y)$.
   (c) For the schedules given in Q. No. 2. (b) determine whether each schedule is view serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s). 5

3. (a) How do optimistic concurrency control techniques differ from other concurrency control techniques ? Why are they also called validation are certification techniques ? Discuss the typical phases of an optimistic concurrency control method. 10
   (b) Explain with example ARIES recovery procedure. 10

4. Consider university database that keeps track of students and their majors, transcripts and registration and university's courses. Several sections of each course are offered and each section is related to the instructor who is teaching. It also keeps track of the sponsored research projects of faculty and graduate students of the academic departments of the particular college. The database also keeps track of research grants and contracts awarded to the university. A grant related to one principle investigator and to all researchers it supports.
   (a) Design Object Oriented Database Schema. 15
   (b) Answer the following queries in Object Query Language :— 5
      (i) Retrieve the names of all students who completed the course called "ADBMS".
      (ii) Retrieve the top three computer science majors based on gpa.

6. XML document of 'Restaurant Menu Card' has food items, categorized into Starters, Drinks, Chinese, South and Punjabi. Each food item element contains name, cost, calories, and veg/non-veg flag.
   (a) Write DTD rules for above XML document. 7
   (b) Write XML Schema for above XML document. 8
   (c) Write X-Path to refer "South" food items and X-Query to retrieve all veg food items having cost above Rs. 1000/-. 5

7. Write short notes on any **four** of the following :— 20
   (a) Data warehousing
   (b) GIS applications
   (c) Data Mining Steps
   (d) Temporal Database
   (e) Multimedia data model
   (f) Deductive Database with respect to need, optimization.