BENGAL ENGINEERING AND SCIENCE UNIVERSITY, SHTBPUR B.E.(CST) 6th SEMESTER FINAL EXAMINATION. 2010

Database Management Systems (CS 601)

Answer a>-- 7 tions

F.M. 70

- 1. a) Discuss the main characteristics of database systems and how it differs from traditional tile systems.
- b) What is (he difference between a database schema and a database state?

[7 + 3]

- 2. a) Construct an E-R diagram for a hospital with a set of patients and set of doctors. Associate with each patient a log of the various tests and examinations conducted.
- bj What is The difference between a specialization and generalization'." Define derived attribute.

[6 -i- 4\

- 3. a)Discuss the characteristics of relations that make them different from ordinary tables and files.
- b) Define foreign key and candidate key.
- c) Why are tuples in a relation not ordered?

[5 + 3 + 2]

- 4. a) Why can we have at most one primary or clustering index on a file, but several secondary indexes?
- b) Consider a disk with block size 13 512 bytes. A block pointer is I' (J) bytes lon» and record pointer is $Pj\{=7\}$ bytes long. A file has I' = 30001 Employee records of lixed length of 125 bytes long. Suppose that the file is ordered by the; key field ENO and we want to construct a primary index on ENO. Calculate (i) the index blocking factor; (iii) the number of levels needed if we make it into a multilevel index (iii) the number of block accesses needed to search for and retrieve a record from the file given its ENO value using the primary index.

[2 + 8]

5.a) A University placement centre maintains a relational database of companies that, interview students on campus and makes job offer to those successful in the interview. The database is given below:

COMPANY (cname. duration)

STUDENT (srollno. sname, sdegree)

INTERVIEW (cname, srollno. idate)

OFFER (cname, srollno. osalary)

- (i) Write relational algebra expression for the following query:
- List the roll number and name of those students who appeared at least one interview but did not, receive any job offer.
- (ii) Write an SQL query to list, for each degree program in which more than five students were offered jobs, then name of the degree and average offered salary of students in the degree program.
- b) Define database trigger. What are different types of trigger? What are the triggering events?

[5 + 5]

- (i. a) Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples.
- b) Consider the relation H(A. B. C. D. E) With the functional dependencies

A — B

BC - D

D - BC

C -> A

Identify the candidate keys of this relation.

 $\{(> + 4]$

- 7. a) Define serializable schedule.
- b) Let. 7], T_2 and 7;t be transactions that operate on the same data items A, B, and C. Let $r\setminus (A)$ means that $T\setminus$ reads A. wi(A) means that $T\setminus$ writes A and so on for T_2 and TV. Each of the following schedule shows the order of reads and writes for $T\setminus$. T_2 and $X\setminus$. In each case draw the precedence graph. Determine whether each schedule is serializable. If it is serializable, give an equivalent serial schedule.
 - i) Si: r, 01): $r_2(A)$: ir, (.4); $/\bullet;$, (/*); $w_3(A)$; w->(A)
 - ii) S_i : $r \land B$: $r \land B$: $r \land A$:
 - i'i) *>V $r_{,}(A)$: $r_{,}J_{,}C)rr_{-}(C)$: $v_{-}(A)$: $r_{,}(n)$: $r_{-}(13)$: ir_,(/?). U"j(/1)
- 8. a) How does a query tree represent a relational algebra expression? Discuss the rules for transformation of query trees.
- b) Let relation r(A. B. C) and $r_1(C)$. D. E) have the following properties; /•] has 20.000 tuples. r_2 has 1 1000 tuples. 2fi tuples of n fit on one block and 1 tuples of r_2 fit on one block. For the block nested-loop join strategies, estimate; the number of block accesses required to join rl and r2.

[7 + 3]

- 9. a) What are the two standard log-based methods of recovery of database? What are the differences between them?
- b} Explain the purpose of checkpoint mechanism.

[0 + 4]

- 10. Write short notes on the following.
- i) Database Security
- ii) Time-stamp protocol

[5 + 5]