VKR/KS/13/3400

Faculty of Engineering & Technology
Eighth Semester B.E. (Information Technology)
Examination
DISTRIBUTED DATABASES AND OBJECT ORIENTED DATABASES
Sections—A&B

Time—Three Hours] [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Answer **THREE** questions from Section A and **THREE** questions from Section B.

(3) Due credit will be given to neatness and adequate dimensions.

(4) Assume suitable data wherever necessary.

(5) Illustrate your answers wherever necessary with the help of neat sketches.

SECTION—A

1. (a) What is distributed database ? Explain the features of distributed databases with reference to that of the centralised databases. 7

(b) Discuss the general structure of distributed database management system clearly specifying the components therein. Enlist and explain the types of accesses in distributed databases. 7

2. (a) Define fragment and fragmentation. Enlist the rules for defining fragments. Also explain giving example how these rules will be verified for horizontal fragmentation. 7

(b) Consider the following global, fragmentation, allocation schema :

Global schema : SUPPLIER (SNUM, NAME, CITY)

Fragmentation schema : $SUPPLIER_1 = SL_{CITY = "SF"}$ SUPPLIER

$SUPPLIER_2 = SL_{CITY = "LA"}$ SUPPLIER

Allocation schema : $SUPPLIER_1$ at site 1 and 3

$SUPPLIER_2$ at site 2, 4 and 5

Write an application that receives as an input supplier number and outputs the name of the supplier with supplier number at levels 1, 2 and 3 of transparency. 6

3. (a) List and explain the objectives of the design of data distribution. 7

(b) Consider the following two allocations of fragments :

1 : R_1 at site 1; R_2 at site 2; R_3 at site 3

2 : R_1 and R_2 at site 1; R_2 and R_3 at site 3

with the following applications (all with same frequency of activation) :

A1 : issued at site 1, reads 5 records of R1 and 5 records of R2

A2 : issued at site 3, reads 5 records of R3 and 5 records of R2

A3 : issued at site 2, reads 10 records of R2.

(i) If we take locality of reference as objective, which solution is the best ? Explain.

(ii) If we take complete locality of applications as objective, which solution is the best ? Explain.

(iii) Assume now that A3 updates 10 records of R2. Taking locality of reference as objective, which solution is the best ? Explain. 6

4. (a) What do you understand by semi-join program ? Write a semi-join program for equi-join $R\ JN_{A=B}S$. Also draw and explain the operator graph of the said semi-join program. 6

(b) Determine common subexpressions in the following global queries for the below mentioned global schema....

DEPT (DNUM, NAME, MERNUM, AREA)

EMP (ENUM, NAME, SAL, TAX, MERNUM, DNUM)

Do step-by-step transformation indicating which rule is applied at each step. Apply criterion 1 and 2 to simplify global queries.

(i) $PJ_{NAME,TAX}((EMP\ JN_{DNUM=DNOM}SL_{AREA="NORTH"}DEPT)$

$DF(EMP\ JN_{DNUM=DNUM}SL_{DNUM<10}DEPT))$

(ii) $SL_{DNUM=10}DEPT\ NJN(SL_{PNUM<P1}SUPPLY\ DF\ SL_{PNUM<P2}SUPPLY)$

$UN(SL_{DNUM=10}DEPT\ NJN\ SL_{PNUM<P1}SUPPLY)$ 7

5. (a) Define database profile. What information does it contain with respect to its fragments ? 3

(b) Explain ACID properties of transaction. 3

(c) Explain 2P commit protocol in DDBMS. 7

SECTION—B

6. (a) Enlist and explain in detail the communication failures in distributed database. 6

(b) Describe with block diagram the process of recovery in distributed databases. 7

7. (a) Describe the general OODMBS architecture and discuss the three levels of object-orientation supported by the object oriented data model. 8

(b) Discuss the advantages and disadvantages of OODBMS. 5

8. (a) Enlist the thirteen mandatory features of an OODBMS. Explain any six of them in detail. 9

   (b) State minimum four points of difference between a RDBMS and OODBMS, excluding the expansion of the terms. 4

9. (a) Enlist and explain the performance issues in object-oriented DBMSs. 8

   (b) Describe the POST6RES system architecture in detail. 5

10. (a) Discuss in detail the application selection for an object oriented DBMSs. 5

    (b) Write short notes on :

    (i) Early binding and late binding

    (ii) RM/T constructs

    (iii) OPL & OQL. 9