Total No. of Questions :8] **SEAT No. :**

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[5133] - 1003

M.Sc. (Computer science)

CS-103: DISTRIBUTED DATABASE CONCEPTS

(2013 Pattern) (Semester - I)

Time : 3 Hours] ***[Max. Marks :50***

Instructions to the candidates:

1) ***Attempt any 5 out of 8 questions.***
2) ***Figures to the right indicate full marks.***
3) ***All questions carry equal marks.***

Q1) Answer the following: **[10]**

a) Discuss the complicating factors in design of DDBMS.

b) Explain Distributed catalog management.

c) What are the objectives of query processing.

Q2) Answer the following: **[10]**

a) Define the process of localization of data involved in query.

b) Consider the following relation

Person (Pno, Pname, Pcity, age) perform a horizontal fragmentation of person with respect to the following predicates:

P1: age < 40;

P2: age >= 40;

Consider the relation Dependents (dno, Pno, name) perform a derived fragmentation of Dependents with respect to the person relation.

Draw the join graph of Person ⋈Dependents & state its types.

c) What is nested transaction?

P.T.O.

Q3) Answer the following: **[10]**

a) Explain shared Memory & shared Disk.

b) Explain each step of query processor by specifying input & output of each of the step.

c) Explain terms:

i) Type incorrect query.

ii) Semantically incorrect query.

Q4) Answer the following: **[10]**

a) Consider the following relations

EMP (eno, ename, addr, age, dno)

DEPT (dno, dname, budget)

Emp relation is partitioned horizontally as

EMP1 = σage < 20 (EMP)

EMP2 = σ20 < age < 40 (EMP)

EMP3 = σage > = 40 (EMP)

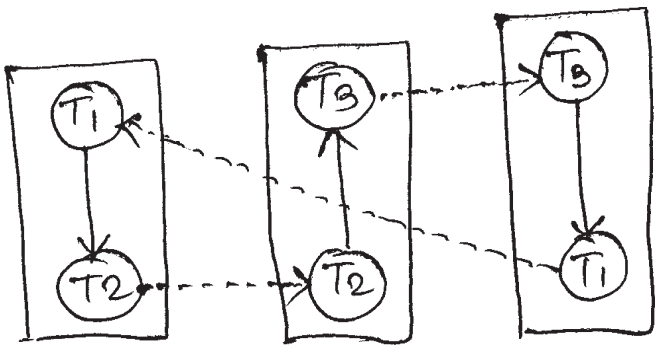
DEPT relation is also partitioned horizontally as

DEPT1 = σbudget < 1,00,000 (DEPT)

DEPT2 = σbudget > = 1,00,000 (DEPT)

Draw a join graph of EMP $\bowtie$ DEPT. Is the graph simple or partitioned? If it is partitioned modify the fragments of EMP & DEPT so that the join graph of EMP $\bowtie$ DEPT will be simple.

b)



Apply the distributed deadlock detection algorithm and identify a global deadlock, if it exists.

c) What is Minterm predicate?

Q5) Answer the following: **[10]**

a) Discuss the MDBS architecture.

b) Let Q = $\{q_1, q_2, q_3\}$ be set of queries & A = $\{A_1, A_2, A_3\}$ be set of attributes , S = $\{S_1, S_2\}$ be a set of sites.

Matrix P describe attribute value & matrixes describe application access frequency Assume that refi(qk) =1 & Si & Ai key attribute, use Bond energy algorithm to vertical fragmentation of attributes in the set A.

$$\begin{array}{c} \quad A_1 \; A_2 \; A_3 \\ \begin{matrix} q_1 \\ q_2 \\ q_3 \end{matrix} \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix} \end{array} \qquad \begin{array}{c} \quad S_1 \; S_2 \\ \begin{matrix} q_1 \\ q_2 \\ q_3 \end{matrix} \begin{bmatrix} 2 & 28 \\ 30 & 8 \\ 33 & 35 \end{bmatrix} \end{array}$$

(P) (Q)

c) Write short note on distributed deadlock delection.

Q6) Answer the following: **[10]**

a) Explain Top-down design process of DDBMS.

b) Explain centralized 2PC protocol in distributed environment.

c) What are the correctness rules of fragmentation?

Q7) Answer the following: **[10]**

a) Consider data items *x* & *y* with the following read & write time stamps

RTS(*x*) = 10, WTS(*x*) = 10, RTS(*y*) = 12, WTS(*y*) = 8

If the following sequence of requests is received what will be the behaviour of Basic Time stamp ordering algorithm?

$\langle R_1(x),12\rangle$, $\langle W_1(x),12\rangle$, $\langle R_2(x),15\rangle$, $\langle W_2(x),13\rangle$

$\langle R_3(y),16\rangle$, $\langle W_3(x),11\rangle$, $\langle W_4(x),15\rangle$, $\langle W_5(y),15\rangle$

b) Write note on workflow.

Q8) Answer the following: **[10]**

a) Consider the following query

SELECT ename, sal

FROM EMP, PROJ, ASG, PAY

WHERE EMP . eno = ASG . eno

and EMP . title = PAY . title

and (budget > 20,000 or dur > 24)

and ASG . Pno = PROJ . Pno

Compose the selection predicate corresponding to the where clause & transform it using idempotency rule into simplest form.

b) Define the following terms:

i) Fix | Flush

ii) No-Fix | Flush

iii) Fix | No-Flush

iv) No-Fix | No-Flush

v) Check pointing

EEE