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T3 DBMS Exam

Ans-1 given $n = 40,000$, $B = 1024$, $R = 100$

number of records in one block

$$\begin{aligned} \text{blocking factor} &= \frac{\text{B Size}}{\text{Record size}} \\ &= \frac{1024}{100} = 10 \text{ records / block} \end{aligned}$$

$$\begin{aligned} \text{no. of blocks needed} &= \frac{40000}{10} \\ &= 4000 \end{aligned}$$

$$\text{Total index size} = 10 + 5 = 15$$

$$\begin{aligned} \text{Index blocking factor} &= \frac{1024}{15} \\ &= 68 \text{ indexes / block} \end{aligned}$$

$$\begin{aligned} \text{Number of index blocks} &= \frac{n_i}{b_i} = \frac{40000}{68} \\ &= 589 \end{aligned}$$

$$\begin{aligned} \text{no of block access} &= \log 589 \\ &= 10 \end{aligned}$$

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Ans 2

(a) π Cust - name (depositer) \cup π Cust - name
(borrower)

(b) π Cust - name (depositer) \cap π Cust - name
(borrower)

(c) π acc_id (σ balance ≥ 300 (account))

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Ans-3

(i) Create table employee
(emp char(3), ename varchar(20)
not null, job varchar(20)
default = 'clerk', salary
number(5), primary key (emp));

(ii) ~~Select~~ Select ename, job from
employee having

Salary between 30000 and 5000;

(iii) Create view empl as
Select job, ename from employee;

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Ans-4

Transactions

Data Items

lock mode

T_1 $\xrightarrow{\text{lock}}$ Q

$\xrightarrow{\text{lock}}$ P

T_2 $\xrightarrow{\text{not lock}}$ Q

T_3 $\xrightarrow{\text{lock}}$ Q

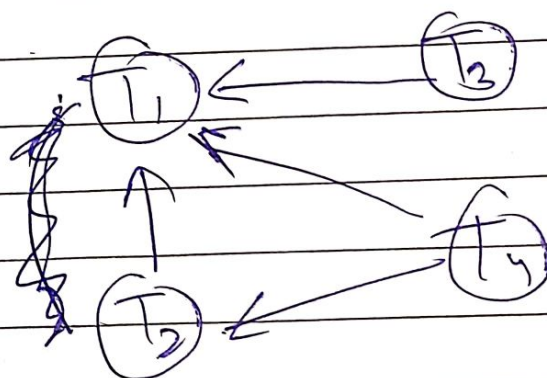
T_4 $\xrightarrow{\text{deadly lock}}$ P

incompatible

shared
Exclusive

Shared
Exclusive

Compatible



~~As the graph contains a cycle, there is a deadlock.~~
there is no cycle
 \therefore No deadlock

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Ans-5 $R = (A, B, C, D)$

F.D = $A \rightarrow B$ and $C \rightarrow D$

Decomposition $R_1(A, B)$ and $R_2(C, D)$

We need to first check conditions of lossy join decomposition

(i) Attribute(R_1) \cup Attribute(R_2) = Attribute(R)
 $(A, B) \cup (C, D) = A, B, C, D$

The condition is satisfied.

(ii) Attribute(R_1) \cap Attribute(R_2) $\neq \phi$
 $(A, B) \cap (C, D) = \phi$

Here this condition is not satisfied
Therefore we can say that this is lossy
 Δ $R_1(A, B)$ and $R_2(C, D)$ is lossy
decomposition.

(6)

Ans-6

T_{31} : lock-S(A)
 read(A)
 lock-X(B)
 read(B)
 if $A = 0$
 then $B := B+1$
 write(B)
 unlock(A)
 unlock(B)

T_{32} : lock-S(B)
 read(B)
 lock-X(A)
 read(A)
 if $B = 0$
 then $A := A+1$
 write(A)
 unlock(B)
 unlock(A)

Executor of these transactions
 can result in deadlock.

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T_{31}	T_{32}
lock-S(A)	lock-S(B)
read(A)	read(B)
lock-X(B)	
	lock-X(A)

The transactions are now deadlocked.

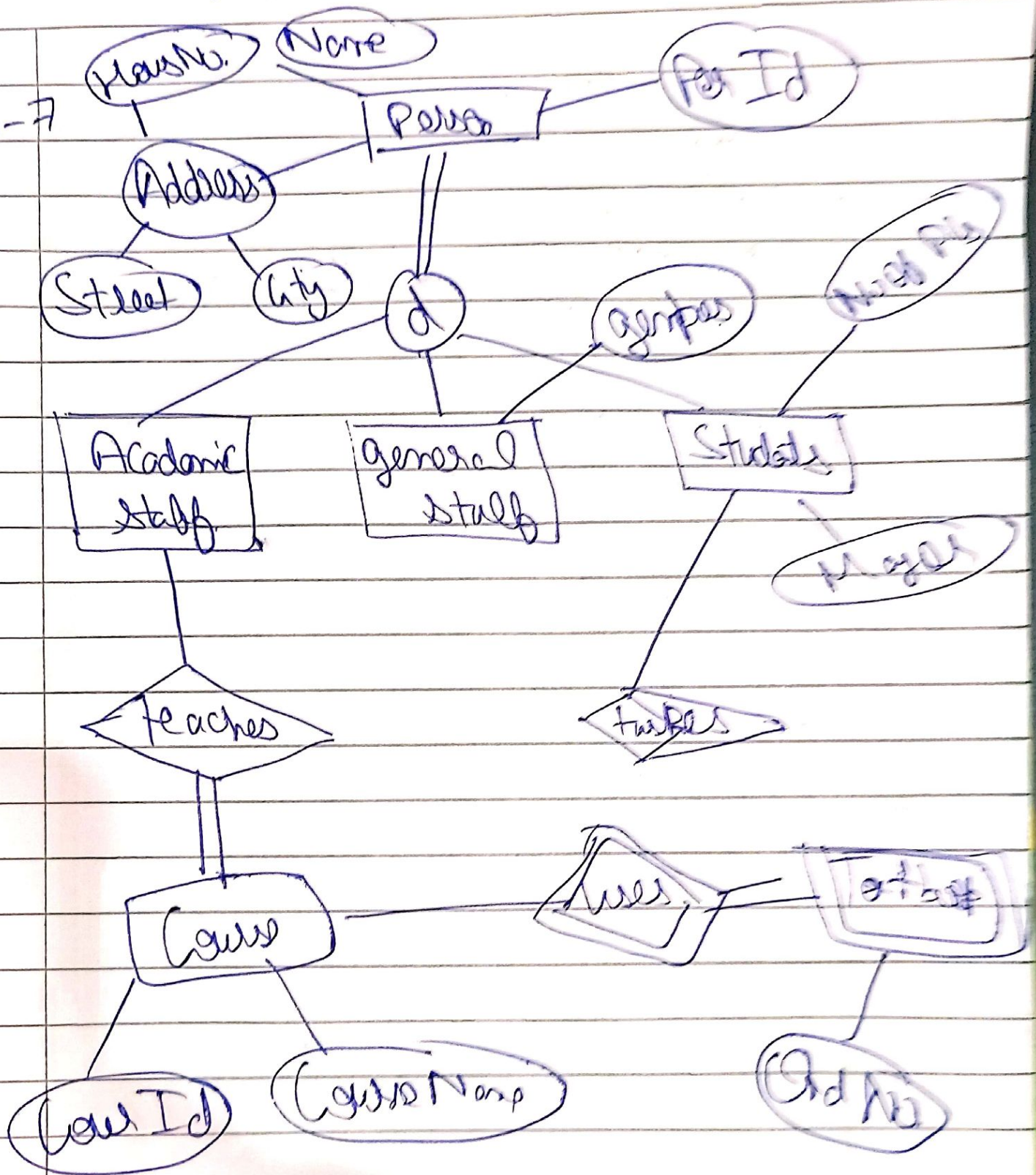
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Ans-7



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Ans-8 (a) For conflict serializability of a schedule we should check for conflict operations, which are Read-Write, Write-Read and Write-Write between each pair of transactions, and based on those conflicts we make a precedence graph, if the graph contains a cycle, it's not a conflict serializable schedule.

To make a precedence graph:
If Read(x) in T_i followed by Write(x) in T_j then we draw an edge from T_i to T_j ($T_i \rightarrow T_j$)

If we make a precedence graph for S_1 and S_2 , we would get directed edges for S_1 as $T_2 \rightarrow T_1$, $T_2 \rightarrow T_3$,

$T_3 \rightarrow T_1$ and for S_2 as $T_2 \rightarrow T_1$, $T_2 \rightarrow T_3$, $T_3 \rightarrow T_1$, $T_1 \rightarrow T_2$.

In S_1 there is no cycle, but S_2 has a cycle. Hence only S_1 is Conflict Serializable.

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Ans-8
~~Q8~~

$S_1 : g_1(x)$

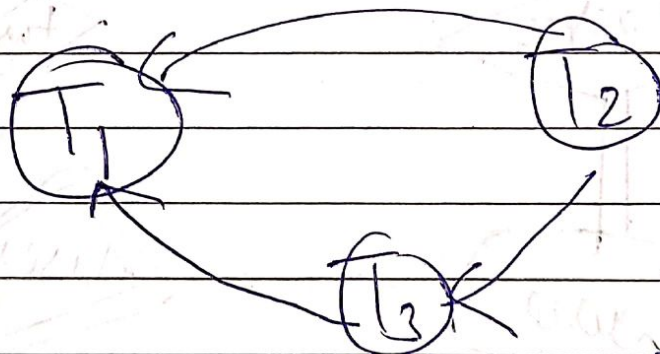
$g_3(y)$
 $g_3(0)$

$g_2(y)$
 $g_2(z)$

$w_3(y)$

$w_2(x)$

$g_1(z)$
 $w_1(x)$
 $w_1(z)$



$T_2 \rightarrow T_3 \rightarrow T_1$

Since there is no cycle,

S_1 is serializable.

(11)

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Ans 8 (b) $S_2: \pi_1(x)$

$\pi_3(y)$

$\pi_2(y)$

$\pi_3(x)$

$\pi_1(z)$

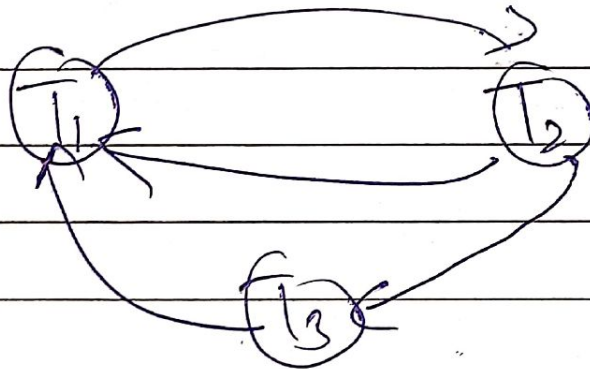
$\pi_2(z)$

$w_3(y)$

$w_1(x)$

$w_2(z)$

$w_1(z)$



Since, there is cycle formation,
 S_2 is not serializable