Estd. 2030

ABES Engineering College, Ghaziabad

B. Tech Odd Semester Sessional Test-2

Printed Pages: 04
Session: 2022-23

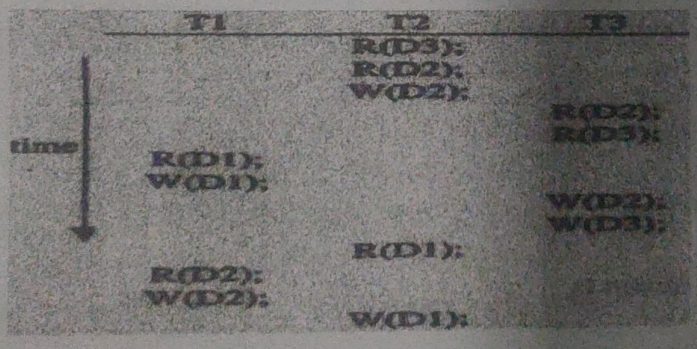
Course Code: KCS501
Course Name: Database Management System
Maximum Marks: 75

Roll No.:
Date of Exam:
Time: 2 Hrs

Instructions:
1. **Attempt All sections.**
2. **If require any missing data, then choose suitably.**

Q.No	Question	Marks	CO	KL	PI
	Section-A	**Total Marks : 5*2 =10**			
1	**Attempt ALL Parts**				
a)	Consider the following relational schemes for a library database: **Book** (Title, Author, Catalog_no, Publisher, Year, Price) **Collection** (Title, Author, Catalog_no) with the following functional dependencies(FDs): Title, Author --> Catalog_no Catalog_no --> Title, Author, Publisher, Year Publisher, Title, Year --> Price Assume {Author, Title} is the key for both schemes. Find Normal Form of each relation Book and Collection. **(GATE2008)**	2	CO3	K3	1.3.1, 4.3.3
b)	Explain deadlock prevention techniques "Wait-Die" and "Wound-Wait".	2	CO4	K2	1.3.1
c)	List advantage and disadvantage of data replication and data fragmentation in distributed database.	2	CO4	K2	1.3.1
d)	Consider the following two transactions: T31: Read (A) Read (B) If A = 0 then B = B + 1; Write (B) T32: Read (B) Read (A) If B = 0 then A = A + 1; Write (A) Add lock and unlock instructions to transactions T31 and T32, so that they observe the two phase locking protocol.	2	CO5	K3	1.3.1

e)	Consider the following two phase locking protocol. Suppose a transaction T accesses (for read or write operations), a certain set of objects $\{O_1 \ldots, O_k\}$. This is done in the following manner: **Step 1.** T acquires exclusive locks to $O_1,\ldots,O_k$ in increasing order of their addresses. **Step 2.** The required operations are performed. **Step 3.** All locks are released. Which among following serializability and deadlock freedom will be guaranteed? Explain. **(GATE2016)**	2	CO5	K3	1.3.1, 4.3.3
	Section-B	**Total Marks : 3*5 = 15**			
2	**Attempt ANY ONE part from the following**				
a)	Consider the relation R(P,Q,S,T,X,Y,Z,W) with the following functional dependencies. PQ->X; P->YX; Q->Y; Y->ZW Consider the decomposition of the relation R into the constituent relations according to the following two decomposition schemes. D_1 : R=[(P,Q,S,T);(P,T,X);(Q,Y);(Y,Z,W)] D_2 : R=[(P,Q,S);(T,X);(Q,Y);(Y,Z,W)] Identify that which among D_1 and D_2 are lossless decomposition.	5	CO3	K3	1.3.1
b)	Let a Relation R(A,B,C,D,E) and functional dependency set F = {A→B, B→C, C→D, D→A}. Relation R is decomposed into R1(ABC) and R2(CDE). Check whether decomposition is dependency preserving or not.	5	CO3	K3	2.2.4
3	**Attempt ANY ONE part from the following**				
a)	Identify from the given schedule, which schedule is recoverable? **S1:** r1(X), w1(X), r2(X), r1(Y), r2(Y), w2(X), w1(Y), c1, c2; **S2:** r1(X), r2(X), r1(Z), r3(X), r3(Y), w1(X),w3(Y), r2(Y), w2(Z), w2(Y), c1, c2, c3;	5	CO4	K3	4.3.2
b)	For the given schedule identify which is cascade less? **S1:** r1(A),w2(A),r1(B),c1,w3(B), r3(B), w3(A), c3, r2(C), c2; **S2:** r1(A),w2(B),c2,r1(B),w1(B),c1;	5	CO4	K3	1.3.1
4	**Attempt ANY ONE part from the following**				
a)	Explain significance of lock conversion in case of two-phase locking with a suitable example.	5	CO5	K2	1.3.1
b)	Discuss multi version scheme of concurrency control.	5	CO5	K2	1.3.1

5	**Attempt ANY ONE part from the following**				
a)	i) Find out highest normal form of the Relation R(W,X,Y,Z) with the set F= { WY → XZ, X →Y }. ii) Consider a relation R(A,B,C,D,E) with set F={ A→CD,C→B,B→AE} Find all the prime attributes of this Relation and Decompose the given relation in 3NF.	5+5	CO3	K3	4.3.1
b)	i) Define Minimal Cover. Suppose a relation R(A,B,C) has FD set F={A->B, B->C, A->C, AB->B, AB->C, AC->B }. Convert this FD set into minimal cover. ii) Explain the Loss Less Decomposition with example.	5+5	CO3	K3	4.3.1
6	**Attempt ANY ONE part from the following**				
a)	Consider the transactions T1, T2, and T3 and the schedules S1 and S2 given below. T1: r1(X); r1(Z); w1(X); w1(Z) T2: r2(Y); r2(Z); w2(Z) T3: r3(Y); r3(X); w3(Y) S1: r1(X); r3(Y); r3(X); r2(Y); r2(Z); w3(Y); w2(Z); r1(Z); w1(X); w1(Z) S2: r1(X); r3(Y); r2(Y); r3(X); r1(Z); r2(Z); w3(Y); w1(X); w2(Z); w1(Z) Explain that which of the schedule S1 and S2 are conflict serializable? **(GATE2014)**	10	CO4	K3	4.3.1
b)	Consider three data items D1, D2 and D3 and the following execution schedule of transactions T1, T2 and T3. In the diagram, R(D) and W(D) denote the actions reading and writing the data item D respectively.  Show that the given schedule is serializable or not. If Serializable, then find serial schedule. **(GATE2003)**	7+3	CO4	K3	4.3.1

7	**Attempt ANY ONE part from the following**				
a)	Discuss the features of deferred database modification and immediate database modification in brief. Consider the following log sequence of two transactions on a bank account, with initial balance 12000, that transfer 2000 to a mortgage payment and then apply a 5% interest. 1. T1 start 2. T1 B old=12000 new=10000 3. T1 M old=0 new=2000 4. T1 commit 5. T2 start 6. T2 B old=10000 new=10500 7. T2 commit Suppose the database system crashes just before log record 7 is written. When the system is restarted, find out that which log records have to UNDO and REDO for recovery process.	7+3	CO4	K3	1.3.1
b)	Check whether the given schedule S is view serializable or not. If yes, then give the serial schedule. $S : R_1(A) , W_2(A) , R_3(A) , W_1(A) , W_3(A).$ Explain the significance of 'Blind Write' in view serializability.	7+3	CO4	K3	1.3.1
8	**Attempt ANY ONE part from the following**				
a)	Explain the Validation Based protocol for concurrency control.	10	CO5	K2	1.3.1
b)	Explain time stamping protocol for concurrency controlling. State significance of Thomas' Write Rule.	6+4	CO5	K2	1.3.1
9	**Attempt ANY ONE part from the following**				
a)	Explain multiple granularity concurrency control scheme. Explain Intension mode lock compatibility matrix and its significance in detail.	5+5	CO5	K2	1.3.1
b)	Explain two phase locking protocol. List the salient Features of strict two phase locking protocol. Explain with a suitable example how cascading rollbacks can be avoided using strict two phase locking.	6+4	CO5	K2	1.3.1, 4.3.3

CO Course Outcomes mapped with respective question
KL Bloom's knowledge Level (K1, K2, K3, K4, K5, K6)
K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5:Evaluate,K6-Create