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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR
END SEMESTER EXAMINATION
FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE
KCS 404 – ADVANCED DATABSE SYSTEMS

Date: 19TH APRIL 2023
Time: 11:30AM – 1:30PM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Illustrate a transaction T_5 that transfers 2000/= from account M to account Z. (5 Marks)

b) State the concept of phantom deadlock (2 Marks)

c) Define the terms

i) Transaction: (2 Marks)

ii) Concurrency control (2 Marks)

d) Highlight reason why a transaction is failed & enters into aborted State. Mention the conditions under which we can restart the transaction & kill the transaction. (6 Marks)

e) State whether the following schedule is conflict serializable or not. Justify your answer. (6 Marks)

Tl	T2
Read (A)	
Write (A)	
	Read (A)
	Write (A)
Read (B)	
Write (B)	
	Read (B)
	Write (B)

f) Below are two tables from a database:
Employee(Eno, Ename, Phone)
Proj_Assigned(Eno, Proj_No, Role, DOP)
Using the information, write a query to find the list of all employees who are working in a project which is more than 10 months old. (4 Marks)

g) "ARIES"(Algorithms for Recovery and Isolation Exploiting Semantics) Recovery Algorithm
Recovery Algorithms are techniques to ensure database ACID without any failure. Highlight the three steps of ARIES recovery algorithm. (3 Marks)

QUESTION TWO (20 MARKS)

a) Explain why a transaction execution should be atomic. Explain properties, considering the following transaction. (10 Marks)

Ti : read (A);
A: = A- 50;
write (A);
read (B);
B: = B + 50;
write (B)

b) With the use of a well-organized diagram, discuss the states of transaction execution. (10 Marks)

QUESTION THREE (20 MARKS)

a) Define the term distribution transparency and classify the three dimensions of distribution transparency. (8 Marks)

b) Consider the following transaction :

T_1 : read (A);
read (B);
if A= 0 then B:=B+1
write (B);
T_2 : read (B);
read (A);
if B = 0 then A: A = 1;
write (A);

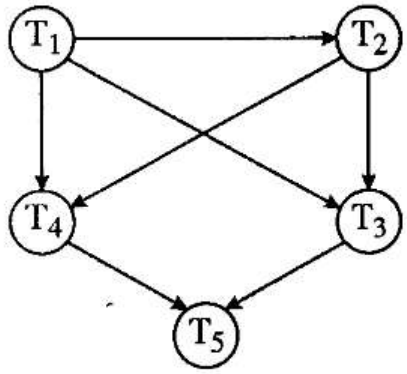
Add lock and unlock instruction to transactions T_1 and T_2, so that they observe the two-phase locking protocol. (6 Marks)

c) Consider a schedule S with two transactions T1 and T2 as follows;
S: R1(x); R2(x); W1(y); W2(y); commit1; commit2;
Showing your workings state if the schedule S is conflict serializable? (6 Marks)

QUESTION FOUR (20 MARKS)

a) Retrieve the contents of the column production-no, description, profit and compute 5% of the values contained in the column sell-price and 105% of the values contained in the field sell-price for each row from the table RODUCT-MAST. (6 Marks)

b) Consider the precedence graph in given Fig. Is the corresponding schedule conflict serializable? Explain your Answer. (10 Marks)



c) There are four different recovery techniques that are available in the Database, explain them. (4 Marks)

QUESTION FIVE (20 MARKS)

a) There are three phases for validation concurrency control protocol, discuss them. (6 Marks)

b) Explain 'Blind-Writes' operation with help of example. (6 Marks)

c) There are mainly four main types of APIs as indicated in database systems, discuss them. (8 Marks)