

Name:	 UPES UNIVERSITY WITH A PURPOSE
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: M.Tech Program: CSE Course Code: CSEG 7002	Semester: I Time 03 hrs. Max. Marks: 100
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Instructions:

SECTION A

S. No.		Marks	CO
Q 1	Elaborate the problems generated due to redundant information in tuples and update anomalies.	5	CO2
Q 2	Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{AB \twoheadrightarrow C, A \twoheadrightarrow DE, B \twoheadrightarrow F, F \twoheadrightarrow GH, D \twoheadrightarrow IJ\}$. Find is the candidate key for R.	5	CO1
Q 3	Describe the roles of the Analysis, Redo, and Undo phases in ARIES.	5	CO3
Q 4	Differentiate between OLTP and OLAP with the help of an illustration.	5	CO4

SECTION B

Q 5	Explain the significance of Data Fragmentation? Define Horizontal, Vertical and Hybrid Fragmentation with the suitable example.	10	CO5
Q 6	Analyze how OLAP technology helps in discovery driven exploration of data cubes.	10	CO4
Q 7	Briefly answer the following questions: a) Identify how does the recovery manager ensure atomicity of transactions? How does it ensure durability? b) Differentiate between stable storage and disk? c) Differentiate between a system crash and a media failure? d) Describe the steal and no-force policies.	10	CO3
Q 8	Differentiate between persistent and transient objects? Explain persistence is handled in typical Object oriented database systems? <p style="text-align: center;">OR</p> Define replication in the distributed database systems with the help of an example. How replication helps in recovery during failure? Explain.	10	CO5

SECTION-C

Q 9

- a) Suppose that A and B are two accounts that are accessed by transactions T1 and T2
 T₁: read(B); B:=B-50; write(B); read(A); A:=A+50; write(A);
 T₂: read(A); read(B); display(A+B);

Here transaction T1 transfers Rs. 50 from account B to account A, while T2 displays the total amount of money in accounts A and B. Add lock and unlock instructions to the above transactions, so that they observe the two-phase locking protocol. Can the locking result in an undesirable situation? If yes, what? Justify your logic.

- b) Draw a precedence graph to determine if this schedule is conflict serializable.

T1	T2	T3	T4
read(X) (1)			
	read(X) (2)		
write(Y) (3)			
		read(Y) (4)	
	read(Y) (5)		
	write(X) (6)		
		read(W) (7)	
		write(Y) (8)	
			read(W) (9)
			read(Z) (10)
			write(W) (11)
read(Z) (12)			
write(Z) (13)			

10

10

CO2

Q 10

Consider the B+ tree index of order d=2 shown in Figure

- a) Show the tree that would result from inserting a data entry with key 9 into this tree.
 b) Show the B+ tree that would result from inserting a data entry with key 3 into the original tree. How many page reads and page writes does the insertion require?

20

CO1

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| <ul style="list-style-type: none">c) Show the B+ tree that would result from deleting the data entry with key 8 from the original tree, assuming that the left sibling is checked for possible redistribution.d) Show the B+ tree that would result from starting with the original tree, inserting a data entry with key 46 and then deleting the data entry with key 52.e) Show the B+ tree that would result from deleting the data entry with key 91 from the original tree. | | |
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OR

Answer the following questions about data on external storage in a DBMS.

- a) Why does a DBMS store data on external storage?
- b) Why are I/O costs important in a DBMS?
- c) What is a record id? Given a record's id, how many I/O's are needed to fetch it into main memory?
- d) What is the role of the buffer manager in a DBMS? What is the role of the disk space manager? How do these layers interact with the file and access methods layer?