OCD027

UNIVERSITY OF BOLTON

OFF CAMPUS DIVISION

WESTERN INTERNATIONAL COLLEGE

B.SC(HONS)COMPUTING

SEMESTER ONE EXAMINATION 2022/2023

ADVANCED DATABASE SYSTEMS

MODULE NO: CPU6007

Date: Saturday, 07 January 2023 **Time: 2:00 PM – 4:00 PM**

INSTRUCTIONS TO CANDIDATES:

There are FIVE questions in this paper.

Answer any FOUR questions.

All questions carry equal marks.

Marks for parts of questions are shown in brackets.

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Q1.

a. Consider the following relations for the distributed database of an IT organization.

Employee (Emp_id, Emp_name, p_id, designation, salary)

Projects(p_id,project_name,location)

It has been decided to develop a number of fragmentations based on these relations for the convenience of the users and improve the efficiency of the DDBMS. Do meaningful horizontal and vertical fragmentation for the above-mentioned relations. In each case, give the fragments. Also, you are required to list any one advantage for each fragmentation.

(12 marks)

b. Compare and contrast homogeneous and heterogeneous databases with respect to distributed databases.

(6 marks)

c. Identify any one need for an object-oriented database. Discuss any three required features of OODBMS.

(7 marks)

Total 25 marks

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Q2.

a. Differentiate between Strict 2-phase locking protocol and conservative 2-phase locking protocol in concurrency control of databases.

(4 marks)

b. Consider the following two transactions:

T1	T2
read(A);	
	read(B)
read(B);	
if A=0 then B:=B+1;	
	read(A);
write(B);	
	if B=0 then A:=A+1;
	write(A);

Discuss the Two-phase locking protocol for the concurrency control database. Add lock and unlock instructions to transactions T_1 and T_2, so that they observe Two- phase locking protocol.

(8 marks)

c. Describe the dirty read problem which could arise if two or more transactions access the same database item concurrently. Use examples of simple transactions T_3 and T_4 to illustrate your answer.

(6 marks)

d. Explain Conflict serialisability with your own conflict serialisable schedule with transactions T_4 and T_5.

(7 marks)

Total 25 Marks

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Q3.

a. Database management systems have to make provision to recover from situations such as system crashes. Discuss about Deferred database modification and Immediate database modification with suitable example for database recovery.

(10 marks)

b. List the different levels in RAID technology and explain its features with suitable diagrams. How does it improve reliability?

(7 marks)

c. A major problem for locking mechanism is the issue of Deadlock. Give an example of deadlock occurring in two transactions named T_6 and T_7. Suggest a mechanism to detect the deadlock and a technique to prevent the problem.

(8 marks)

Total 25 Marks

Q4.

a. Compare and contrast classification and clustering data mining operations. Use your own suitable examples as needed.

(8 marks)

b. Compare and contrast OLAP and OLTP. Give any 8 points.

(8 marks)

c. A UAE based electronics showroom has an Oracle Database to handle its daily transactions. Recently the senior management decided to create a data warehouse for the company. You are supposed to be the database consultant for this company. Explain, the term 'ETL' with respect to data warehouses construction. Use suitable examples and/or diagrams as needed.

(9 marks)

Total 25 marks

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Q5.

a. Consider a data warehouse for an event management system which consists of dimensions such as event, audience, location and date. It measures count and charge for every event. Assume meaningful attributes for each dimension. Events considered are sports, concerts, seminars, etc. Charge is the fare when the audience pays to watch the event on a given date. Audience can be students, adults and children. Each category has its own charge rate. Explain the steps involved in constructing a data warehouse. This Star schema developed will help the higher management to make effective decisions on event arrangement and management. Design and show a star-schema for the ROLAP.

(11 marks)

b. List out any four MOLAP operations for above mentioned event management system data warehouse. For ease, consider the events, location and date as the dimensions required for the data warehouse. Use your own suitable examples and/or diagrams as needed with description.

(14 marks)

Total 25 marks

END OF PAPER