

**UNIVERSITY OF BOLTON**  
**CREATIVE TECHNOLOGIES**  
**COMPUTING PATHWAY**  
**SEMESTER ONE EXAMINATION 2018/2019**  
**ADVANCED DATABASE SYSTEMS**  
**MODULE NO: CPU6007**

Date: Monday 14<sup>th</sup> January 2019

Time: 14:00 – 16:00

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**INSTRUCTIONS TO CANDIDATES:**

There are **FIVE** questions.

Answer **ANY FOUR** questions.

All questions carry equal marks.

Marks for parts of questions are shown in brackets.

All rough work must be written in your answer book.

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**Question 1**

- a) Discuss the potential advantages and disadvantages of implementing a distributed database management system (DDBMS) **(6 marks)**
- b) Define the terms homogeneous and heterogeneous with regard to distributed database management systems **(4 marks)**
- c) Identify the purpose of replication within the design of a distributed database? **(4 marks)**
- d) In distributed database design what strategies are available for placement of data **(8 marks)**
- e) Discuss the effect of transparency in a distributed database design **(3 marks)**

**Question 2**

- a) Define the circumstances in which an OODBMS should not be used to manage data **(4 marks)**
- b) Discuss the concept of Pointer Swizzling and its role in achieving acceptable performance in object DBMS's **(8 marks)**
- c) Identify three disadvantages and three advantages of an object-oriented database system (OODBMS) **(6 marks)**
- d) Identify seven features from the Object-Oriented Database Manifesto and analyse their impact on Database Design. **(7 marks)**

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**Question 3**

- a) Identify the features of OLAP that could support the business analytics of a national supermarket chain. **(6 marks)**
- b) Discuss the statement, “OLAP is an extension of the SQL GROUP BY function”. **(6 marks)**
- c) Compare and Contrast the four OLAP tool categories. **(8 marks)**
- d) Discuss the relationship between Data Warehousing and OLAP. **(5 marks)**

**Question 4**

- a) Design a data warehouse structure for a national car dealer chain to provide business decision makers with the important data they need. The company records information about its dealerships, customers and cars sold in its database. For each dealership it records location and manufacturer. For each car it records make, model and total cost. For customer it records name and address. For each sale the dealership, date, salesman and car are recorded. Using the four-step dimensional modelling process design a star schema for the data warehouse. **(9 marks)**
- b) Describe the relationship between Data Mining and Data Warehousing **(4 marks)**
- c) Identify the primary types of Data Mining operation and give an example of one technique used in each type.. **(12 marks)**

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**Question 5**

- a) Describe how ACID properties impact the recoverability of database transactions. **(4 marks)**
- b) Discuss checkpoints with regard to data stored in buffers and secondary storage **(4 marks)**
- c) The following is a transaction log. For each of the transactions explain what recovery option is needed following the crash using Immediate Update and Deferred Update: **(10 Marks)**
- [start\_transaction, T1]  
[write\_item, T1, D, 0, 20]  
[start\_transaction, T3]  
[commit, T1]  
[write\_item, T3, C, 14, 30]  
[checkpoint]  
[start\_transaction, T2]  
[write\_item, T2, B, 0, 15]  
[commit, T3]  
[write\_item, T2, A, 0, 20]  
[commit, T2]  
[start\_transaction, T5]  
[write\_item, T5, B, 15, 12]  
[start\_transaction, T4]  
[write\_item, T4, A, 20, 30]  
[write\_item, T4, D, 20, 25]  
→ → CRASH ← ←
- d) Compare and contrast shadow paging differ and log-based with regard to data recovery? **(7 Marks)**

**END OF QUESTIONS**