

PAN AFRICA CHRISTIAN UNIVERSITY

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: COMPUTING AND INFORMATION TECHNOLOGY

COURSE CODE: BSIT408

COURSE TITLE: ADVANCED DATABASE MANAGEMENT

CAMPUS: ROYSAMBU

EXAM DATE: WEDNESDAY, XXXXX/AUGUST, 2025

TIME: 8:00AM-11:00AM

INSTRUCTIONS

- This exam script has **TWO (2)** sections.
- Read all questions carefully before attempting.
- Answer All questions in Section **A** and any other Three questions in Section **B**.
- Write only your **student number** on the answer booklet provided.

SECTION A

(Answer ALL questions in this section)

Question 1:

- a) Transactions usually cannot be nested inside one another. Explain. **[2 Marks]**
- b) Systems do not allow a given transaction to commit changes to databases on an individual basis, that is, without simultaneously committing changes to all other databases. Justify this statement. **[3 Marks]**
- c) Write SQL DDL command to create customer table described below. **[3 Marks]**

Field Name	Data type	Size	Required
CustID	Number	10	Primary key
FName	Text	20	Required
Credit_Status	Number	4	-
Date_Reg	Date		-

Table 1: Customer

- d) A medical surgery keeps patients' records in a database server located in a dedicated room. These records can be accessed remotely by the staff working at the surgery (doctors and office staff). Explain two examples of physical security control for protecting this database. **[2 Marks]**

SECTION B

(Answer any THREE (3) questions in this section)

Question 2:

- a) Table 2 is named *Results* in a database. Use it to answer the questions that follow.

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FirstName	LastName	IDNo	DOB	Marks
Jane	Jones	123680	23-06-1984	95
Tony	Rock	899011	14-04-1989	60
Jack	Kelly	123956	12-03-1990	75
Jacob	Mayfair	453289	18-06-1994	45
Agnes	Monroe	190012	10-10-1992	88

Table 2: Results

Write an SQL statement that would perform each of the following:

- i. Display *LastName*, *IDNo* and *DOB* for all records whose *FirstName* starts with letter *J*. **[2 Marks]**
- ii. Display all records whose marks range from 50 to 90. **[2 Marks]**

b) Tables 3 and 4 contains the following details:

Table 3

RegNo	Age
1001	19
1002	23
1003	27

Table 4

RegNo	Hostel

1001	Lion
1002	Giraffe
1003	Zebra
1004	Gazelle

State the output of each of the following operations when performed on the tables:

- i. Full Join **[2 Marks]**
- ii. Outer Join **[2 Marks]**
- iii. Inner Join **[2 Marks]**

Question 3:

- a) "A database link connection is one-way". Give reasons supporting or disapproving the statement. **[4 Marks]**
- b) When a transaction is rolled back under timestamp ordering, it is assigned a new timestamp. Explain why it cannot simply keep its old timestamp. **[4 Marks]**
- c) A transaction can crash while being executed by the database system. Discuss any two reasons as to why a transaction can fail. **[2 Marks]**

Question 4:

- a) "A data warehouse is subject-oriented, integrated, time-variant and non-volatile." Using an example, explain what is meant by these terms. **[4 Marks]**
- b) Starvation occurs when a transaction tends to wait for an indefinite period in order to acquire a lock. Highlight the two reasons why a transaction would become a victim of starvation. **[2 Marks]**
- c) Figure 1 below illustrates a wait-for-Graph consisting of transactions T1, T2, T3 and T4. With reasons, Give the status of each of the transactions by specifying whether it is deadlocked or not. **[4 Marks]**

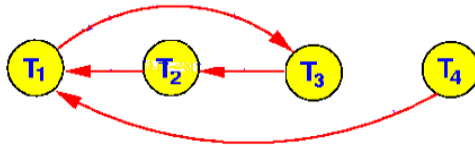


Figure 1: Wait-for-Graph

Question 5:

a) A typical banking institution has several branches and several customers, at a given point in time multiple transactions are taking place. Using illustrations from the given scenario discuss three problems that can arise should the concurrent transactions not be managed. For each problem propose a solution. **[6 Marks]**

b) "Database-system implementers have paid much more attention to the ACID properties than file-system implementers." Giving reason, justify this statement.

[4 Marks]

Question 6:

Given is the following schedule that involves transactions T1 and T2:

	<i>T1</i>	<i>T2</i>
	Read (A) Write (A)	Read (A) Read (B)
	Read (B) Write (B)	

a) Explain if the schedule conflict serializable.

[4 Marks]

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b) Justify if the schedule is recoverable if both transactions commit immediately after the last operation. **[4 Marks]**

c) Giving reason, state if the schedule is possible under the timestamp protocol.

[2 Marks]

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