

PAN AFRICA CHRISTIAN UNIVERSITY

BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: COMPUTING AND INFORMATION TECHNOLOGY

COURSE CODE: BIT106

COURSE TITLE: DATABASE SYSTEM

EXAM DATE: XXXXX,XXXX AUGUST,2018

TIME: XXXXXXXX

INSTRUCTIONS

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

SECTION A (Answer ALL questions in this section)

Question 1:

a) Define the following terms as applied in database system:

[4 Marks]

- i) Database
- ii) Database management system
- iii) Entity
- iv) Normalization

b) Students' records in XYZ COLLEGE are kept by various sections: Hostel, Health Centre, Academic Office, major departments, Accounts Section and Library. If each of these sections maintains its own file-based system for processing, state three problems that will arise from using this file-based approach. **[3 Marks]**

c) Outline three roles of database administrator. **[3 Marks]**

d) With reference to the tables below:

i. State the primary keys. **[1 Mark]**

ii. State the foreign key. **[1 Mark]**

iii. Suggest giving a reason a possible relationship that exists between the manufacturer table and the product table. **[2 Marks]**

Manufacturers Table

<u>ManufacturerID</u>
Manufacturer Name

Product Table

<u>ProductID</u>
Product description
manufacturerID

e) With the aid of a diagram, describe the three levels of database architecture. **[6 Marks]**

SECTION B

(Answer any FOUR (4) questions in this section)

Question 2:

a) Distinguish between the following terms: **[6 Marks]**

i) Candidate key and primary key

ii) Composite attribute and derived attribute

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- iii) Database schema and database instance
- b) Explain four components of a database management system. **[4 Marks]**
- c) Describe the following database models. **[6 Marks]**
- i) Hierarchical
 - ii) Network
 - iii) Relational
- d) Discuss four measures of security in a database. **[4 Marks]**

Question 3:

- a) Differentiate between Data Definition Language and Data Manipulation Language. **[2 Marks]**
- b) Explain the function of each of the following SQL JOIN: **[3 Marks]**
- i. INNER JOIN
 - ii. LEFT JOIN
 - iii. FULL JOIN

- c) Use the employee table below to answer the questions that follow.

EmployeeID	Names	DOB	Gender	Telephone
1001	Peter Kimani	09/02/83	Male	09069666
1002	Caroline Kioko	27/05/56	Female	0987549474
1003	Phiona Omondi	11/12/95	Female	79383363
1004	Susan Karimi	20/07/87	Female	995759330

- i) Write SQL statement that would create the above table. Use appropriate data types. **[3 Marks]**

ii) Write SQL statement to display all the employee details. **[3 Marks]**

iii) Write SQL statement to display Ids, names and birth dates of all female employees.

[3 Marks]

iv) Write SQL statement to insert a fifth row to the table.

[3 Marks]

v) Write SQL statement to add a field named *county* after Gender to the table. **[3**

Marks]

Question 4:

a) Distinguish between logical data independence and physical data independence .

[2 Marks]

b) When a library first receives a book from a publisher it is sent together with the accompanying delivery note to the desk. Here the delivery note is checked against a file of books ordered. If no order can be found to much the note, a letter of enquiry is sent to the publisher. If marching order found, catalogue note is prepared from the details on the validated delivery note. The catalogue note together with the book is sent to the Registration department. The validated delivery note is sent to the Accounts department where it is stored. On receipt of the invoice from the publisher, the Accounts department checks its store of the delivery note found, then an instruction to pay the publishers is made, and subsequently a cheque is sent. If no corresponding delivery note is found, the invoice is stored in a pending file.

i) List all the entities together with their attributes.

[6 Marks]

ii) Explain three cardinality of the relationships by these entity types.

[3 Marks]

iii) Draw entity relation diagram to represent the information.

[9 Marks]

Question 5:

a) Explain each of the following criteria for classification of database management systems

- i) based on data models **[2 Marks]**
- ii) based on the number of users **[2 Marks]**
- iii) based on database distribution **[2 Marks]**
- b) Outline two goals that would be achieved from using a normalized table. **[2 Marks]**
- c) In a college, a lecturer may teach many subjects but may not belong to more than one department. The college maintains information of its lecturer subjects area as follows; lecturer number , lecturer name ,lecturer grade, department code , department name ,subjects codes, subjects name , and subjects level. Represent this information to 3rd normal form. **[12 Marks]**

Question 6:

- a) State four properties of relational tables. **[4 Marks]**
- b i) Define the term relational algebra. **[1 Mark]**
- ii) Using examples, write a structured query language statements equivalent for each of the following relational algebra operations;
 - I. Select **[2 Marks]**
 - II. Set Difference **[2 Marks]**
 - III. Union **[2 Marks]**
- c) Using illustrations, describe how the insertion, deletion and modification anomalies occur in a database relation. **[9 Marks]**

Question 7:

- a) Outline the four ACID properties of transaction processing. **[4 Marks]**
- b) Let us assume that there are two transactions, T1 and T2, where T1 tries to lock a data item which is already locked by T2. Use the following algorithms to express deadlock avoidance approach.
 - i) Wait-die algorithm **[3 Marks]**

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- ii) Wound-wait algorithm
- c) Describe the stages of database development lifecycle.

[3 Marks]

[10 Marks]

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