

PAN AFRICA CHRISTIAN UNIVERSITY

BACHELOR OF BUSINESS INFORMATION TECHNOLOGY AND BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: COMPUTING AND INFORMATION TECHNOLOGY
COURSE CODE: BIT106/BCIT106
COURSE TITLE: DATABASE SYSTEMS
CAMPUS: ROYSAMBU
EXAM DATE: MONDAY, XXXX, DECEMBER, 2022
TIME: 2:00PM -5:00PM

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) "In the second normal form, all non-key attributes are fully functional dependent on the primary key." With an aid of an example, explain the meaning of these statement.

[2 Marks]

b) XYZ is a commercial bank whose daily activities involve cash deposits, withdrawals by their customers as well as accounts updates by the bank employees. The bank tellers access customers' accounts with the help of a banking Information System installed in their work stations. These transactions are stored in the bank databases created and maintained within the bank's server room. Identify two database users involved above and state their roles.

[4 Marks]

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

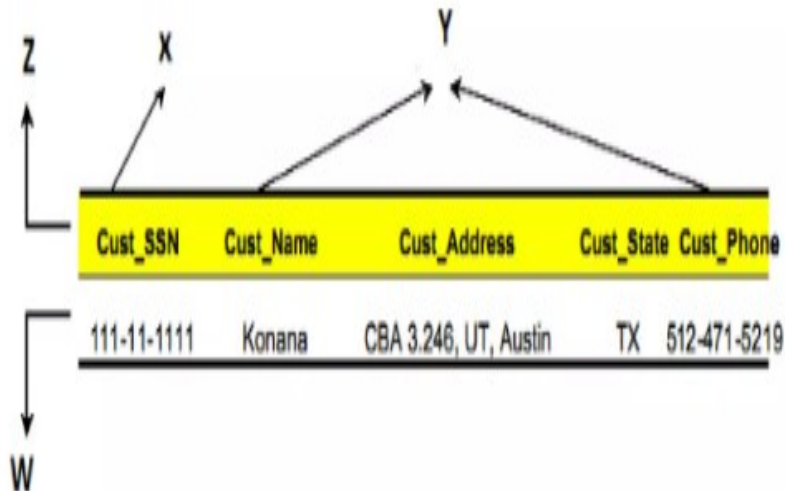
StaffID	F. Name	Department	Salary
001	Peter	ICT	35,000
002	Mary	Leadership	50,000
003	Abraham	ICT	44,000

Staff table

Write SQL statement to display *Staffid* and *FName* of all staff working in ICT department

[2 Marks]

d) Study the figure model below and use it to answer the questions that follow.



- i. Name the parts labelled W and Y. [1 Mark]
- ii. Identify the candidate key. [1 Mark]

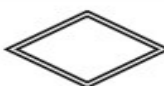
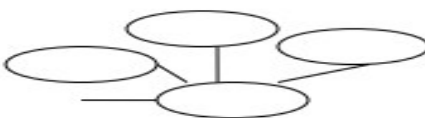
SECTION B

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

Question 2:

- a) The table below shows the Entity Relationship model symbols. Name each of them.

[3 Marks]

Symbol	
1.	
2.	
3.	
4.	
5.	
6.	

b) A University database contains the following:

A lecturer has lecturer code (unique), lecturer's name, lecturer's address, rank, department. The lecturer teaches courses. Each course has course name, course number(unique), course credits hours. Students register courses. Each student has student number(unique), name, major, date of birth. Courses have sections. Each section has a number(unique) and location.

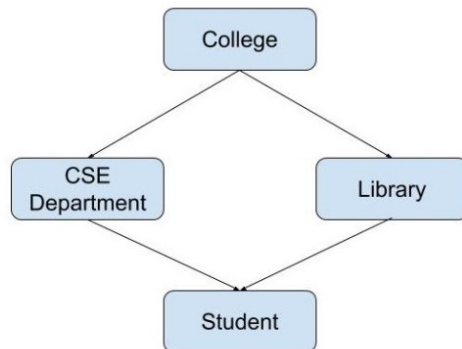
The following information is given on dependencies: A lecturer should teach at most 4 courses, and each course could be taught by two lecturers. A student may register many courses and each course can be registered by many students. The same course may have more than one section.

Draw an ER diagram to represent the scenario, taking into consideration all required constraints (including: Cardinality ratio, multiplicity and Participation) on all relationships.

[7 Marks]

Question 3:

a) Use the data model below to answer the questions that follow.



i. Identify the above data model.

[1 Mark]

ii. Outline two advantages of using the above data model.

[2 Marks]

b) Use the tables below to answer the questions that follows.

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Employees Details

Emp Number	First Name	Surname	Gender	Age	DOA	Marital Status	Department
EMP 001	Agnes	Kimathi	Female	24	12/09/97	Single	Accounts
EMP 002	William	Omondi	Male	34	24/08/89	Married	Personnel
EMP 003	Christine	Wamaitha	Female	26	09/01/93	Single	Marketing
EMP 004	Teresiah	Munene	Female	28	06/08/98	Married	Personnel
EMP 005	Wesley	Resley	Male	32	16/04/89	Married	Accounts
EMP 006	Augustine	Muita	Male	29	30/7/88	Single	Marketing
EMP 007	Anthony	Kimuri	Male	30	02/03/99	Married	Security
EMP 008	Regina	Kimberly	Female	27	07/04/96	Single	Security

Branches

Branch	Branch Number
Ngong Road	USM 01
Sarit Centre	USM 02
Kimathi	USM 03
Agakhan Walk	USM 04
Temple Road	USM 05
Market Street	USM 06
Monrovia	USM 07

Salary		
ID NO	Branch Code	Basic Pay
EMP 001	USM 06	Ksh.8,000.00
EMP 002	USM 07	Ksh.12,000.00
EMP 003	USM 04	Ksh. 9,600.00
EMP 004	USM 03	Ksh. 7,200.00
EMP 005	USM 01	Ksh.9,800.00
EMP 006	USM 02	Ksh.12,400.00
EMP 007	USM 04	Ksh. 13,200.00
EMP 008	USM 06	Ksh.8,500.00

i. Identify the suitable field to be used as primary key from the employees table.

[1 Mark]

ii. In relation to the tables show a foreign key.

[1 Mark]

iii. State the field types for the following:

[2 Marks]

A. EMP NUMBER

B. Basic pay

C. DOA

D. AGE

iv. Write the relational algebraic expression that would filter out only persons whose age is less than 30.

[3 Marks]

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Question 4:

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

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. Create *results table* shown above where *IDNo* is a primary key. **[3 Marks]**
- ii. Insert all the records in the results table. **[3 Marks]**
- iii. Display *LastName*, *IDNo* and *DOB* for all records whose *FirstName* starts with letter *J*. **[2 Marks]**
- iv. Display all records whose marks range from 50 to 90. **[2 Marks]**

Question 5:

- a) The manager of Afya Bank would like to install a database system to centralize the data from their different branches. Explain two factors that they should consider during implementation. **[4 Marks]**
- b) Premier firm is a software firm dealing with the design of databases. Describe the role of the company in each of the following design phases of a database design.
 - i. Conceptual database design **[2 Marks]**

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ii. Logical database design

[2 Marks]

iii. Physical database design

[2 Marks]

Question 6:

The table below lists customer/car-hire data. Each customer may hire cars from various outlets. A car is registered at a particular outlet and can be hired out to a customer on a given date.

CarReg	Make	Model	CustNo	CustName	HireDate	OutletNo	OutletLoc
W565 CDC	Ford	Escort	C100	Smith.J.	14/5/01	21	Woodstock
W565 CDC	Ford	Escort	C222	Patel.V	15/5/01	21	Woodstock
V734 HSB	Nissan	Sunny	C100	Smith.J.	14/5/01	21	Woodstock
W104 RSM	Ford	Escort	C303	Brown. F.	14/5/01	24	Denham
W104 RSM	Ford	Escort	C100	Smith. J.	16/5/01	24	Denham
W611SBH	Nissan	Sunny	C222	Patel.V.	15/5/01	24	Denham

Required:

i. The data in the table is subject to update anomalies. Provide example of how *update and deletion anomalies* could occur on this table.

[4 Marks]

ii. Identify the *functional dependencies* represented by the data in the table. (State any assumptions you make about the data).

[6 Marks]

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