THARAKA   **UNIVERSITY**

COLLEGE

(A Constituent College of Chuka University)

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGRE OF
BACHELOR OF SCIENCE IN COMPUTER SCIENCE**

COSC 0251: DATABASE SYSTEMS II

STREAMS: BSC (COSC)   **TIME: 2 HOURS**

DAY/DATE: FRIDAY 17/04/2020   **8.30 AM – 10.30 PM**

- **Answer question one and any other two from section B**
- **Do not write on this paper**

SECTION A {compulsory}

QUESTION ONE (30MARKS).

a) Explain the following terms;

       i. Database   (1mark]

       ii. Backup   (1mark)

b) Database system administrators (DBA) are responsible for the overall management of a database. Discuss the roles of a DBA.   (2 marks)

c) Using a suitable illustration explain the various states through which a transaction passes through in its lifetime?   (6marks)

d) In a client server setup, outline FOUR (4) roles of the client and FOUR (4) roles of the server.   (4 marks)

e) The SQL Server replication model has THREE (3) components. State and outline the components   (6 marks)

f) Describe location transparency and local autonomy as they relate to distributed databases   (4 marks)

g) How does client-server architecture work? (4marks)

h) What is the need for data recovery in a database? (2 marks).

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20MKS)
a)
i. Describe any two threats to database systems and any two consequences of security breach
(4 marks)
ii. As a database administrator discuss ways of protecting databases against threats.
(8 marks)
b)
i. What is database fragmentation? (**2 marks**)

ii. Describe how vertical and horizontal fragmentation is done is a database. (6marks)

QUESTION THREE (20mks)

a) The university is in the process of computerizing the student data management. You have been approached as a consultant to advice on the issue.

i. Clearly explain why distributing the data would be a better option than consolidating it at one point. (2marks)

ii. Advice the management on the following two methods used in distributing data; replication and fragmentation, and clearly explain one merit and one demerit of each, citing necessary examples. (6marks)

b) "To the user, a distributed system should look exactly like a non-distributed system". By explaining any EIGHT (8) design principles of distributes database system, qualify the above sentence. (12mks)

QUESTION FOUR (20MKS)

a) The consistency and reliability aspects of transactions are due to the "ACIDity" properties of transactions. Discuss the ACID properties of a transaction(8marks).
b) Discuss the following database replication methods

i. Snapshot replication (4 marks)
ii. Merging replication (4marks)
iii. Transactional replication (4 marks).

QUESTION FIVE (20MKS)

a) What is data backup, briefly describe any two types of data backup.   (6mks)

b) Explain how each of the following security controls protect databases against threats.
                                                                        (8marks)
   (i) Access control
   (ii) Inference control
   (iii) Flow control
   (iv) Encryption

c) Describe any four components of DBMS.   **(6 mks)**