CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

SECOND YEAR SECOND SEMESTER EXAMINATION FOR THE AWARD OF DIPLOMA IN COMPUTER SCIENCE

COSC 0251: DATABASE SYSTEMS II

STREAMS: DIPLOMA (COMPUTER SCIENCE)   **TIME: 2 HOURS**

DAY/DATE: THURSDAY 13/12/2018   **2.30 P.M. – 4.30 P.M.**

CANDIDATES' INSTRUCTIONS

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

SECTION A {compulsory}

Question one (30 marks)

a) Explain the following terms;
    i.   Database   (1 mark)
    ii. Distributed database   (1 mark)

b) Database system administrators (DBA) are responsible for the overall management of a database. Discuss the roles of a DBA.   (6 marks)

c) State and outline the techniques of recovering from non-catastrophic transaction failures.
                                                                    (4 marks)

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.
(2 marks)

g) Using a transaction state diagram, briefly discuss the typical states that a transaction goes through during execution. (4 marks)

h) Explain why a three tire database systems is preferable to a two tire. (2 marks)

Question two (20 marks)

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. (6 marks)

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. (2 marks)

Advice the management on the following two methods used in distributing data; replication and fragmentation, and clearly explain the merits and demerits of each, citing necessary examples. (3 marks)

(ii) Finally, make your recommendations for the implementation, clearly indicating what to be put in place to achieve it, in terms of resources both human and infrastructure. Give a justification of why the resources identified are needed. (3 marks)

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. (12 marks)

Question four (20mks)

a) The consistency and reliability aspects of transactions are due to the "ACIDity" properties of transcations. Discuss each of these properties (8 marks)

b) Discuss the following database replication methods
  i.   Snapshot replication   (4 marks)
  ii.   Merging replication   (4marks)
  iii. Transactional replication   (4 marks)

Question five (20 marks)

  a) Differentiate between homogeneous and Heterogeneous distributed databases. (4 marks)

  b) State FOUR (4) methods a database administrator can use to provide high availability of databases   (4 marks)

  c) What is data backup, Briefly describe any two types of data backup   (6 marks)

  d) Describe, using a diagram, the possible states of a transaction.   (6 marks)