KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2019/2020 ACADEMIC YEAR
FOURTH YEAR, FIRST SEMESTER EXAMINATIONS
FOR THE BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

Date: 15th April 2019
Time: 8.30 – 10.30am

KCS 404 – ADVANCED DATABASE SYSTEMS

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a)   Define the following terms as used in database systems   (10 Marks)
   i)   Database-

   ii)   Metadata

   iii)   Schema

   iv)   Atomicity

   v)   Database instance.

b)   Analyze the insertion, deletion and update anomalies that occur due to redundancy in a database.
                                                                                                                        (6 Marks)
c)   Explain the properties of transactions giving examples   (8 Marks)

d)   Differentiate between discretionary access control and mandatory access control   (2 Marks)

e)   Describe how the following can be implanted in a database   (4 Marks)

       i)   Data integrity

       ii)   Data security

QUESTION TWO (20 MARKS)

a)   Describe five functions of a database management system   (10 Marks)

b)   Consider the table structure below.

STUDENTS TABLE

ADM_YEAR	FNAME	LNAME	AGE	SEX	ADMNO	ENTRY_MARK	HOUSE
2011	Joseph	Peter	13	M	2034	530	A
2013	Mark	James	14	M	2011	554	A
2014	Jane	Muthama	17	F	2022	519	B
2014	Bosire	Jones	15	M	2100	560	B
2015	Nancy	Gitau	13	F	2123	533	A
2006	Mary	Simiyu	16	F	2140	540	B

Use the above table to answer questions that follow.

a)   Design a query to show ADMNO, FNAME and AGE respectively for all students whose LNAME
       ends with letter 's'   (2 Marks)
b)   Design a query to retrieve all students admitted between the years 2001 and 2004
                                                                                   (2 Marks)
c)   Design a query to retrieve all students who scored at least 540 and at most 550 marks. The query
       should display ADMNO, LASTNAME, and ENTRY_MARK fields respectively. Further it should
       sort the list in ascending order of ADMNO
                                                                                   (3 Marks)
d)   Design a query to retrieve all students whose age is over 13 years, they are male and are members of
       house 'A'   (3 Marks)

QUESTION THREE (20 Marks)

a)   Explain five types of threats that databases are normally exposed to.   (5 Marks)

b)   With aid of a diagram, briefly explain the three levels of ANSI-SPARC architecture
                                                                                   (9 Marks)
e)   The objective of the three-level architecture is to separate each user's view of the database from the
       way the database is physically represented. Discuss several reasons why this separation is desirable:
                                                                                   (6 Marks)

QUESTION FOUR (20 MARKS)

a)   Explain the mechanisms that database administrators should put in place in order to protect the database against intentional or accidental threats.   (8 Marks)

b)   The Describe, with examples, the types of problem that can occur in a multi-user environment when concurrent access to the database is allowed.   (6 Marks)

c)   During database design and implementation some languages are used. Explain the languages giving relevant examples of how they are applied in the process   (6 Marks)

QUESTION FIVE (20 MARKS)

Christine has designed the following table using a database application

Adams the payroll guy is about to retire after 40 years and it's time to replace his manual timecard system with some sort of computerized database. You have been asked to come up with the database design. The time card system has the following properties:

- A timecard contains hours worked and date submitted
- Each timecard is associated with exactly one employee
- Each timecard has unique ID
- Each timecard has a status: approved, not approved, or pending (not examined yet)
- Each employee has a name, address and unique ID
- Each employee submits a timecard every pay period time. i.e in I year, they will submit multiple timecards
- Each employee is associated with exactly one manager
- Each manager is also an employee
- Each manager is in-charge of one or more employees.
- Each manager approves timecards for one or more employees

a)   Draw an ER Diagram that captures this information   (15 Marks)

b)   Describe five core set of activities for which a database administrator function is typically responsible.   (5 Marks)