



# MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (STATISTICS AND PROGRAMMING)

SST 203: DATABASE SYSTEMS

DATE: 30/11/2020

TIME: 11:00 – 1:00 PM

**INSTRUCTIONS: Answer Question ONE and any other TWO Questions**

## QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Define the terms:
  - i. Model
  - ii. Transaction
  - iii. Deadlock (3 marks)
- b) Explain any four reasons why it was necessary for organizations to their data. (4 marks)
- c) State three data security measures that any company should embrace. (3 marks)
- d) Briefly explain three database classification categories giving an example of each classification. (6 marks)
- e) Differentiate between logical and physical design in as far as database design is concerned. (4 marks)
- f) Outline any three database models that have been used in the development of database systems, over the years. (6 marks)
- g) Explain any four roles of a database administrator.

## QUESTION TWO (20 MARKS)

- a)
  - (i) Define an Entity Relationship Diagram (ERD). (2 marks)
  - (ii) Using suitable notations, describe the four elements that constitute an ERD. (8 marks)
- b) Draw a suitable ERD based on the following case study:  
*The MKSU Library consists of several types of books. ISBN number, title, author and book type are some of the records kept about each of the books. Students may be allowed to borrow up to three books. A book may however be borrowed by only one student at a time. Admission number, names, course and year of study are the details of students that are recorded. A book may be authored by several writers and a writer may author several books as well. Author's number, names, gender and address are some of the details recorded.*  
(6 marks)
- c) Using an example, describe what referential integrity is. (4 marks)

**QUESTION THREE (20 MARKS)**

- a) Describe any four stages of the database systems development lifecycle. (8 marks)
- b) With the use of a diagram, explain the ANSI-SPARC database architecture. (8 marks)
- c) Using an example, explain the difference between a primary key and a foreign key. (4 marks)

**QUESTION FOUR (20 MARKS)**

- a) Define the term data security (2 marks)
- b) Explain three reasons why it is important to secure data in computerized systems. (6 marks)
- c) Discuss any three security threats to a database system and state any two control mechanisms that can be used to counter these threats. (6 marks)
- e) (i) Differentiate between physical and logical security. (2 marks)  
(ii) Give two examples of each of the above-mentioned types of security. (4 marks)

**QUESTION FIVE (20 MARKS)**

Consider the following table:

| Player no | Player_name | Manager's no | Manager's name | Practice_date |
|-----------|-------------|--------------|----------------|---------------|
| P001      | Cluchy      | C101         | Morris Okeyo   | 05-12-2010    |
|           |             | C111         | Jane Mbaluto   | 08-12-2010    |
| P100      | Kittes      | V110         | Moses Kitavi   | 27-12-2010    |
|           |             | C101         | Morris Okeyo   | 08-12-2010    |

- a) Normalize the table above to 3NF. (6 marks)
- b) Draw the resultant ERD. (6 marks)
- c) Use SQL to implement the ERD into database. Include the Primary-Foreign key relationships. (5 marks)
- d) Write an SQL statement to display numbers and names of all the patients who have appointments with more than one consultant. (3 marks)