



# MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (MATHEMATICS)

SMA 392: DATABASE SYSTEMS

DATE: 16/4/2019

TIME: 8.30-10.30 AM

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## INSTRUCTIONS

Answer **question ONE** and any other **TWO** questions.

### QUESTION ONE (30 MARKS) (COMPULSORY)

- a) Distinguish between a file and a database in database systems (4 marks)
- b) Explain two factors to consider for selecting a database. (4 marks)
- c) Explain two types of anomalies in database systems. (4 marks)
- d) Explain the following database concepts
  - i. Business Rules
  - ii. Online Analytical Process (4 marks)
- e) Briefly describe three possible vulnerabilities in a database system (6 marks)
- f) Draw an Entity Relationship Diagram for MU that captures the following entities: Students, Lecturers, Library and Computer Lab. Include 2 attributes for each entity. (4 marks)
- g) Explain two categories of database users. (4 marks)

### QUESTION TWO (20 MARKS)

- a) James wants to design tables to be used in a given database. Explain four constraints that he may include when designing the tables. (8 marks)

- b) Models are used to represent the architecture of various systems. Discuss object oriented and network models in details using well labelled diagrams. (8 marks)
- c) Discuss how two tables can be connected logically in MS-Access. You can use Student as table one and Staff as table two (4 marks)

### QUESTION THREE (20 MARKS)

- a) Show, giving appropriate SQL commands, step by \_step how you would go about the following tasks:
  - i. Create a database called **mksu**. (2 marks)
  - ii. Select the database above and create a table called Staff with five fields. Include the appropriate data types, primary key and other attributes. (5 marks)
  - iii. Add two records in the table. (4 marks)
  - iv. Select all Female Lecturers in ICT department (4 marks)
- b) James wants to develop a database for a given set up. State all the steps in the database development cycle that he is supposed to follow. (5 marks)

### QUESTION FOUR (20 MARKS)

- a) Discuss three components of a database environment apart from the major database components. (6 marks)
- b) John wants to query a database by restricting row data in the student table. Explain using examples, four possible methods/commands he can use to achieve this task. (8 marks)
- c) Erick, a database administrator is supposed to protect the database from various threats. Advise him on three methods he can use to perform this task. (6 marks)

### QUESTION FIVE (20 MARKS)

- a) Distinguish between the following:
  - i. Composite key and Super key
  - ii. Inner join and right join (8 marks)
- b) Explain three types of data schema used in databases (6 marks)
- c) Write three sql commands that can be used to implement any three constraints identified in question 2(a) above. (6 marks)