



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (MATHEMATICS AND COMPUTER SCIENCE)

SMA 392/: DATABASE SYSTEMS

DATE: 12/11/2020

TIME: 2.00-4.00 PM

INSTRUCTIONS

Answer question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

- a) Define the following terms:
 - i. Information
 - ii. Database Management System
 - iii. Attribute (6 marks)
- b)
 - i Define file system. (2 marks)
 - ii Outline **FIVE** limitations of the file system. (5 marks)
 - iii With the use of suitable diagrams, illustrate the difference between the file system and a database system. (6 marks)
 - iv Explain how database systems have addressed each of the limitations of the file system mentioned above. (5 marks)
- c)
 - i Explain what a Database Systems Environment is. (2 marks)
 - ii List **FOUR** components of the database systems environment. (4 marks)

QUESTION TWO (20 MARKS)

- a) With the use of a suitable diagram, describe the database development lifecycle. (10 marks)
- b)
 - i. Explain the significance of the following database objects:
 - 1. Form
 - 2. Query
 - 3. Report (6 marks)
 - ii. Difference datasheet view from design view as used in MS Access. (4 marks)

QUESTION THREE (20 MARKS)

- a)
 - i. Use suitable notations to discuss the main components of an Entity Relationship Diagram (ERD). (6 marks)
 - ii. Explain the steps followed while resolving a many-to-many relationship. Use an example of your choice. (5 marks)
- (b) *At Mulu Mutisya Institute, prospective students apply for admission into the institute online. Qualified applicants are then short listed and subsequently admitted into the institute. Student's admission number, names, date of birth and gender are some of the details kept about a student. Once a student is admitted into the institute, he/she can register for a particular course, such as Engineering, Computing, Business studies, etc. Details such as the course code, course name, duration and mode (full-time or part-time) are kept. Various units are offered within the institution and a student takes at least five units in any given semester. The unit code, name, stage, academic year and semester are some of the details recorded about a unit. In addition, a unit can only be offered if a minimum of eight students register for it.*
 - i. Based on the above description, draw a suitable ER-Diagram. (6 marks)
 - ii. Differentiate between optional and mandatory associations, using examples from the diagram drawn in (i) above. (3 marks)

QUESTION FOUR (20 MARKS)

- a) Describe three factors considered while designing database systems. (6 marks)
- b) Using suitable examples, differentiate a transitive from a partial dependency as used in data normalization. (4 marks)

- c) Normalize the following table to 3 NF and draw the corresponding Entity Relationship Diagram (ERD) resulting from the process. (10 marks)

Patient_no.	Patient_name	Consultant_no	Consultant_name	Consultation_date
P001	Pijays	C101	Caesar Nguta	05-12-2010
		C111	Jane Mbugus	08-12-2010
P100	Penta	V110	Moses Otoyoy	27-12-2010
		C101	Caesar Nguta	08-12-2010

QUESTION FIVE (20 MARKS)

- a) Describe the five components of the DBMS environment and discuss how they relate to each other. (10 marks)
- b) James has been asked to create a relationship between two tables in MS-Access. Explain the process he is likely to follow to accomplish this task. (4 marks)
- c) Erick, a database administrator is supposed to protect the database from various threats. Discuss three database threats he is likely to deal with. (6 marks)