



“Investing in Africa’s future

COLLEGE OF ENGINEERING AND APPLIED SCIENCES (CEAS)

NCIS 301: DATABASE SYSTEMS

END OF SECOND SEMESTER EXAMINATIONS **END OF FIRST APRIL 2025**

LECTURER: MR A.C MUZENDA

DURATION: 3 HOURS

INSTRUCTIONS

Answer any four (4) questions in Section A
Total possible mark is 100

Start **each** question on a new page in your answer Booklet.
The marks allocated to **each** question are shown at the end of the section.

QUESTION ONE

Discuss the advantages and disadvantages of the database approach as compared to the traditional file-based approach for managing data. In your answer, consider factors such as data integrity, data redundancy, data sharing, and data access. **[25 marks]**

QUESTION TWO

- a. Describe the roles of three different types of users who interact with a database system.

[12 Marks]

- b. Distinguish between logical and physical data independence and provide two examples of possible changes they allow.

[8 Marks]

- c. Consider a relation $R(A, B, C, D, E, F, G, H)$ with Functional Dependencies

$AB \rightarrow E$

$C \rightarrow D$

$F \rightarrow GH$

$B \rightarrow F$

Consider $R_1(A, B, C, D)$ with the above functional dependencies. What would be a candidate key for R_1 ? **[5 marks]**

QUESTION THREE

- a. With reference to relational database define the following:

I. Primary key

II. Attribute

III. Relationship

[9 marks]

- b. Give the syntax for the following SQL statements. Use appropriate examples to illustrate your answer:

i. SELECT

[4 marks]

ii. DELETE

[4 marks]

iii. INSERT

[4 marks]

iv. UPDATE

[4 marks]

QUESTION FOUR

- a. Outline any five (5) functions of an Entity Relationship Diagram (ERD). **[5 Marks]**
- b. Catholic University of Zimbabwe needs to develop a registration system to keep student information and registration details. The university comprises of several departments and each department belongs to a faculty. Each department is managed by a head of department and it has a department name, phone extension, and specific mailing address. Additionally, each department offers at least one programme, which belongs to only one department at a time. A programme is identified by its code, name, programme type (full-time or part-time), and duration. A student can only be enrolled in one programme at a given time and has a registration number, name, gender, date of birth, and address. Moreover, a student may register for more than one course per semester, and each course belongs to a department. A course has a title, credits, and can have prerequisites. Each department has at least one instructor who is assigned more than one course to teach. An instructor belongs to only one department and has a name, employee number, and title. At the end of the semester, course instructors award grades to students in each course they are enrolled in.
- Design an ERD to capture the above requirements. Indicate cardinalities and primary keys. **[15 Marks]**
- c. Explain the potential problems that would arise if many-to-many relationship is directly translated into a single table in a relational database. Illustrate your answer with an example from your ERD. **[5 Marks]**

QUESTION FIVE

- a. Explain the main the functions of a Database Management System (DBMS)? **[6 marks]**
- b. Describe the main components of a database management system? **[12 marks]**
- c. Deadlock is a problem brought about when trying to solve concurrence problems. How can a system deal with deadlock? **[7 marks]**

QUESTION SIX

- a. Briefly describe the characteristics of a network database system. Illustrate your answer with a diagram. **[10 marks]**

- b. Using your own examples show all the stages of normalization up to fifth normal form. **[15 marks]**

END OF EXAMINATION