



UNIVERSITY OF EMBU

2016/2017 ACADEMIC YEAR

SECOND SEMESTER EXAMINATION

**FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF COMPUTER
SCIENCE**

CSC 122: DATABASE SYSTEMS

DATE: APRIL 13, 2017

TIME: 11:00AM-1:00PM

INSTRUCTIONS:

Answer Question ONE and ANY Other TWO Questions.

QUESTION ONE

- a) Explain the following terms as used in database systems (5 Marks)
- i. Database Management System
 - ii. Data model
 - iii. Normalization
 - iv. Database schema
 - v. Database instance
- b) A DBMS is made up of components that interrelate to achieve its objectives. Explain the roles of these functional components of a database system (5 Marks)
- i. File Manager:
 - ii. Database manager
 - iii. Query processor
 - iv. DML pre-compiler
 - v. DDL compiler
- c) List any **five** advantages of using the database approach as opposed to traditional file approach (5 Marks)



- d) List any **five** database system utilities (5 Marks)
- e) Using examples, explain the use of the following SQL commands (5 Marks)
- i. INSERT
 - ii. DELETE
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- f) List any **five** types of schema-based constraints that can be specified in a database system (5 Marks)

QUESTION TWO

- a) Discuss any **two** reasons that lead to the occurrence of NULL values in relations (4 Marks)
- b) Describe the **three** categories of data models as applies in database systems (6 Marks)
- c) In your own words, discuss the three-schema architecture of the database systems (10 Marks)

QUESTION THREE

- a) Differentiate between the following terms as they apply in database systems (6 Marks)
- i. Logical data independence and physical data independence
 - ii. Data definition language and data manipulation language
- b) ABC hospital plans to computerize its Patient Appointment System. A doctor can be scheduled for many appointments, but may not have any scheduled at all. Each appointment is scheduled with exactly 1 doctor. A patient can schedule 1 or more appointments. One appointment is scheduled with exactly 1 patient. An appointment must generate exactly 1 bill, a bill is generated by only 1 appointment. One payment is applied to exactly 1 bill, and 1 bill can be paid off over time by several payments. A bill can be outstanding, having nothing yet paid on it at all. One patient can make many payments, but a single payment is made by only one patient. Some patients are insured by an insurance company. If they are insured, they can only carry insurance by an insurance company. If they are insured, they can only carry insurance with one company. An insurance company can have many patients carry their policies. For patients that carry insurance, the insurance company will make payments, each single payment is made by exactly 1 insurance company.

Required

Draw the ER diagram for above Patient Appointment System Case Study. Your ERD must consist of the entities, attributes and relationships identified in the case study (14 Marks)

QUESTION FOUR

- a) Write SQL statements for creating a relation representing a Lecturer entity within a University. The Lecturer has the following attributes: PFNO (Primary Key), ID NO (Unique for each Lecturer), first name, surname, year of birth, date of employment, designation, telephone number (unique for each Lecturer), and address. Remember to add the necessary constraints as it happens in the real life situation (10 Marks)
- b) Describe the following properties of database transactions (10 Marks)
- i. Atomicity
 - ii. Consistency
 - iii. Isolation
 - iv. Durability

QUESTION FIVE

- a) In your own words, briefly explain any **five** organization issues that affect development of database systems (10 Marks)
- b) Assuming that the above relation in question 4(a) on Lecturer has been populated with data, write SQL statements to obtain the following data.
- i. A list of all lecturers in the relation (2 Marks)
 - ii. A list of surnames of all lecturers born before 1980 (2 Marks)
- c) Study the following tables: Boys, Playgroups and Activities

Boys

Name	Age	Address
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Playgroups

PlaygroupID	Name
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Activities

PlaygroupID	Date	Description
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Using the above information write SQL statements to do the following

- i. Find a list of names of all the boys (2 Marks)
- ii. Find a list of names of all boys aged 4 (2 Marks)
- iii. Return a list of names and addresses of all Boys in playgroup with PlaygroupID=1 (2 Marks)

END



