



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2015/2016

**FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE
DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE
AND TECHNOLOGY**

MAIN CAMPUS

CSS 112: DATABASE SYSTEMS

Date: 21st April, 2016

Time: 8.30 - 10.30 am

INSTRUCTIONS:

- Answer question ONE and any other TWO questions.



Question One

a) Define the following terms:

[3 Marks]

- i. candidate key
- ii. super key
- iii. View

b) SQL allows attributes to have a special value NULL. However, it is desirable not to have NULL values in a relation. Why? Give two examples of the interpretation of the null values.
[5 Marks]

c) How would you describe a condition in which one attribute is dependent on another attribute and neither attribute is part of the primary key? Reduction to which normal form is designed to eliminate such dependencies?
[5 Marks]

d) State THREE reasons why an organization might move from using centralized to distributed databases.
[6 Marks]

e) Describe what you understand by the term 'Relational Model' and identify the main components of relational Model
[5 Marks]

f) What is the meaning of the term 'functional dependency'? Why is it important to establish functional dependencies during normalization?
[6 Marks]

Marks]

Question Two

a) List at least four responsibilities of a database management system. For each responsibility, explain the problems that would arise if the responsibility were not discharged, if these responsibilities were not met by a given DBM, what problems can occur? [6 Marks]

b) A MMUST registrar's office maintains data about the following entities: (a) courses, including number, title, credits, syllabus, and prerequisites; (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom; (c) students, including student-id, name, and program; and (d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

- i. Construct an E-R diagram for the registrar's office. [12 Marks]
- ii. Document all assumptions that you make about the mapping constraints. [2-Marks]

Question Three

Some computer installations, particularly the larger, more sophisticated ones are using databases in which to store the original data.

- i. Differentiate between a database and database management system.

[6 Marks]

ii. Explain briefly three of the major problems associated with the implementation and operation of a comprehensive database.

[6

Marks]

iii. List and explain briefly **six** of the advantages claimed for a well-designed database.

[8

Marks]

Question Four

Use the following table to answer the questions that follow:

WORK RECORD

Emp No	EmpName	Project No.	Project Name	Dept. No.	Dept. Loc.	Grade No	Grade Title	Start Date
4321	Omondi	PA2.32	Alpha	DA32	KSM	GR1 GR2	Grinder Grinder	24/7/07 24/7/09
3987	Lucy	PA2.32	Alpha	DA56	NKR	GR1 GR3	Grinder Grinder	24/7/07 24/7/09
6745	Omondi	PA5.90	Alpha	DA32	KSM	FN1	Packer	3/8/06
4519	Mtua	PA8.19	Omega	DA09	KSM	FN1 GR2 GR3	Packer Grinder Grinder	30/3/07 23/2/09 21/2/010

- i. Give **TWO** reasons why the WORKRECORD table is not in third normal form. [4 Marks]
- ii. Fully identify one occurrence of redundant data. [2 Marks]
- iii. Write down the functional dependencies implied by the table. [4 Marks]
- iv. Normalise the table as far as third normal form showing the intermediate stages and the primary keys. Write down any assumptions you make. [6 Marks]
- v. Construct an entity relationship diagram to show the relationships between the structures you have identified. Write down any assumptions you make. [4 Marks]

Question Five

A database contains the following tables:

```

game_record(gid, player_id, position, number_of_goals)
player (player_id, player_name, team_id)
team (team_id, team_name)
game (gid, home_team, away_team, game_date, goals_home, goals_away)

```

The **team** table contains details of football teams, the **player** table contains details of players in the teams and the **game** table contains summary details of the games which the teams play. The **game_record** table contains rows which describe the performance of individual players in each game. Assume that tables can be joined on identically named attributes and that the attributes **home_team**, **away_team** and **team_id** contain values from the same domain.

Write in SQL queries which will:

- a) List the teams in ascending order of team name together with a count of the number of home games played by that team; [5 Marks]
- b) List the name of the home team involved in the most recent game. (Assume that each game row in the **game** table has a different value

for game_date);

[5

Marks]

- c) List the name of each team together with the date of the most recent home game played by that team; [5

Marks]

- d) List the names and positions of Sofapaka players in games won away from home. [5

Marks]

