

KASNEB

CICT PART II SECTION 3

DATABASE SYSTEMS

WEDNESDAY: 23 November 2016.

Time Allowed: 3 hours.

Answer ALL questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

- (a) Rewrite the following structured query language (SQL) statement using relational operators:
SELECT salary FROM employee WHERE salary > 30,000. (3 marks)
- (b) Distinguish between “union operator” and “intersect operator” as used in relation algebra. (2 marks)
- (c) Explain the following terminologies as used in database systems:
(i) Data striping. (2 marks)
(ii) Disk array. (2 marks)
- (d) Using a diagram, explain the term “specialisation” in context of database systems. (4 marks)
- (e) (i) Differentiate between “deadlock” and “starvation” as used in concurrency control. (4 marks)
(ii) Using an example, explain how a deadlock occurs. (3 marks)
- (Total: 20 marks)**

QUESTION TWO

- (a) Define the following terminologies as used in database systems:
(i) Conceptual mapping. (2 marks)
(ii) Conceptual view. (2 marks)
- (b) You have been tasked to gather requirements, then develop a simple school examination system database. The school has students from class one to class eight. Each class has four streams; Red, Green, White and Black. All the students take five examinable subjects: English, Kiswahili, Mathematics, Science and Music. The database should also capture the following students details: registration numbers, names, date of birth, class and stream.
- Required:**
- (i) Normalise the database to fourth normal form (4NF). (5 marks)
(ii) Sketch the Entity Relationship Diagram (ERD) for the above requirements. (5 marks)
(iii) Differentiate between an “entity” and an “attribute”. (2 marks)
(iv) Justify with reasons the benefits of developing a database in MySQL other than in Microsoft SQL Server. (4 marks)
- (Total: 20 marks)**

QUESTION THREE

- (a) Differentiate between “dirty read” and “phantom read” in the context of database systems. (4 marks)
- (b) Explain the term “database integration” in the context of database management. (2 marks)
- (c) Examine four roles of a database system administrator. (8 marks)
- (d) Analyse three problems of concurrency in database systems. (6 marks)
- (Total: 20 marks)**

QUESTION FOUR

Study the sample table named “supper-records” below and answer the questions that follow:

Supper-records table				
Id	Name	Food	Confirmed	Signup-date
1.	John	Pilau	Y	2016-04-11
2.	Sandy	Matoke	N	2016-05-14
3.	Tom	Bajia	Y	2016-04-18
4.	Tina	Flat bread	Y	2016-04-10

Required:

Using structured query language (SQL) write statements to perform the following tasks:

- (a) Create the “supper-records” table schema. (6 marks)
- (b) Insert the first record in the table “supper-records”. (3 marks)
- (c) Count the number of clients that have confirmed to take supper. (3 marks)
- (d) Retrieve all records and arrange them beginning with the clients who signed-up for supper first. (3 marks)
- (e) Change the food for the client called Tina to be “sausage”. (3 marks)
- (f) Delete the client who has not confirmed to take supper. (2 marks)

(Total: 20 marks)

QUESTION FIVE

(a) Distinguish between the following terms as used in database transactions:

- (i) “Active state” and “partially committed state”. (2 marks)
- (ii) “Committed state” and “terminated state”. (2 marks)

- (b) Describe the importance of system log in database systems. (2 marks)
- (c) Explain three types of objects that could be found in a relational database. (6 marks)
- (d) A lecturer is employed by one and only one faculty. Each lecturer must teach one or more students, and each student is taught by one or more lectures.

Required:

- (i) Draw an entity relationship diagram to represent the above scenario. (6 marks)
- (ii) Explain the term “recursive relationship” as used in database systems. (2 marks)

(Total: 20 marks)

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