WI-2-60-1-6

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY

University Examinations 2024/2025

EXAMINATIONS FOR THE THIRD YEAR SECOND SEMESTER DEGREE OF BACHELOR OF SCIENCE IN COMPUTER TECHNOLOGY

BCT 2304: DATABASE MANAGEMENT SYSTEMS

DATE: JANUARY 2025 TIME: 2 HOURS

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

Question 1 (30 Marks)

a) Define the following terms:
   i. Database
   ii. Data definition language (DDL)
   iii. Data control language (DCL)
   iv. candidate key
   v. Compound key
   vi. Relationship Cardinality (6 Marks)

b) Explain any four (4) ways in which the database approach overcame limitations associated with the early conventional file processing systems. (4 marks)

c) With reference to database design, explain 'referential integrity', and its importance in a relational database (4 Marks)

d) Describe the three levels of the ANSI/SPARC model. You should include information about what each level is for, which users might be interested in which levels, and how the levels relate to one another. (6 Marks)

e) Examine the table shown below.

staffNo	branchNo	branchAddress	name	position	hoursPerWeek
S4555	B002	City Center Plaza, Seattle, WA 98122	Ellen Layman	Assistant	16
S4555	B004	16 – 14th Avenue, Seattle, WA 98128	Ellen Layman	Assistant	9
S4612	B002	City Center Plaza, Seattle, WA 98122	Dave Sinclair	Assistant	14
S4612	B004	16 – 14th Avenue, Seattle, WA 98128	Dave Sinclair	Assistant	10

a. Why is this table not in 2NF?
b. Describe and illustrate the process of normalizing the data shown in this table to third normal form (3NF).
f) Identify the primary, (alternate) and foreign keys in your 3NF relations.

(10 Marks)

Question 2 (20 Marks)

a) Explain the relationship between relation, tuple and domain (6 marks)

b) A manufacturing company produces products. The following product information is stored: product name, product ID and quantity on hand. These products are made up of many components. Each component can be supplied by one or more suppliers. The following component information is kept: component ID, name, description, suppliers who supply them, and products in which they are used.

Create an ERD to show how you would track this information.
Show entity names, primary keys, attributes for each entity, relationships between the entities and cardinality.
Indicate all the assumptions made

(14 Marks)

Question 3 (20 Marks)

The following form part of a database held in a Relational Database Management System (RDBMS)

Employee (empNo, fName, lName, address, DOB, sex, position, deptNo)
Department (deptNo, deptName, mgrEmpno)
Project (projNo, projName, deptNo)
WorksOn (empNo, projNo, dateWorked, hoursWorked)

po

Where:

Employee contains employee details and empNo is the primary key

Department contains department details and deptNo is the primary key. mgrEmpno identifies the employee who is the manager of the department. There is only one manager for each department.

Project contains details of each department and projNo is the primary key. No two departments can run the same project

WorksOn contains details of the hours worked by employees on each project, and empNo/projNo/dateWorked form the composite key

a. Explain how referential integrity rules apply to these relations (2 Marks)

b. Formulate queries in SQL to perform the following:

i. Display the total number of employees (2 Mark)

ii. Amend the content of an employee's last name (2 Marks)

iii. Insert a row into the Project Table (2 Marks)

iv. List all the details of employees who are female and born after 1990 (3 marks)

v. Use a subquery to list the names and addresses of all employees who work for the IT department (4 Marks)

vi. Create a view consisting of the attributes empNo, fName, lName, projName and hoursWorked (Make use of a join) (5 Marks)

Question 4 (20 Marks)

Use the information presented in the order form below to answer the following questions:

a) Perform a relational Data Analysis to identify the entities and attributes underlying the contents of the order form (15 Marks)

b) Draw the entity relationship diagram resulting from this RDA (see next page) (5 Marks)

Dog International Gifts and Publications Order Form 2015

ORDER NUMBER

12345

Avoid disappointment - some goods may sell out - order early for Christmas!

Order Now! Phone: 01709 513999 Fax: 01709 881673 Web: www.dogint.org

Mail: Dog International, PO Box 61, Collie Cross Industrial Estate, Barking, EX2 9YG

Yes! I would like to purchase some Dog International Gifts and Publications Please use BLOCK CAPITALS throughout Name_____ — Address*_____	DELIVERY ADDRESS* (if different) Name_____ – Address_____ _____

Ref. No	Page No.	Description	Q'ty	Price Each	Total £
			GOODS TOTAL		
			VAT @ 17.5%		
			GRAND TOTAL		

PAYMENT METHO☐ enclose☐ cheque/postal or☐r for £__☐_____ made payable to DOG INTERNATIONAL or

Please charge my: VISA MASTERCARD DELTA SWITCH the amount of £_____ Card Number

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Expiry date_____/_____ Signature of card holder_____

Customer Code Number **NO32**