



KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

SECOND SEMESTER, 2018/2019 ACADEMIC YEAR

**EXAMINATION FOR THE DEGREE OF (BSC) IN INFORMATION TECHNOLOGY AND
BACHELOR OF BUSINESS MANAGEMENT & INFORMATION TECHNOLOGY**

COMP 124: DATABASE MANAGEMENT SYSTEM 1

STREAM: Y1S2

TIME: 2.00-4.00 PM

EXAMINATION SESSION: JAN-APRIL

DATE: 1/04/2019

INSTRUCTIONS

- (i) Question one is compulsory and any other two
- (ii) Do not write on the question paper
- (iii) Show your working clearly

QUESTION ONE: (30 MARKS)

- a) Describe the following concepts:
 - (i) File-based system (1 Mark)
 - (ii) Program-data dependency (1 Mark)
 - (iii) Program-data Independency (1 Mark)
- b) Name and briefly explain any two major components of the database system (2 Marks)
- c) What is a relational database management system? Briefly discuss the relational data model. (5 Marks)

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- d) What is an information system? Name one type of an information system. **(2 Marks)**
- e) Discuss one type of business information that is generated by information systems in a business environment. **(2 Marks)**
- f) Give an example of the relational database management system. Explain briefly three functions of the database management system. **(4 Marks)**
- g) A university consists of a number of departments. Each department offers several courses. A number of modules make up each course. Students enroll in a particular course and take modules towards the completion of that course. Each module is taught by a lecturer from the appropriate department, and each lecturer tutors a group of students. Using the UML notations, draw an ERD to model the above. **(5 Marks)**
- h) Name and briefly explain two main components of the SQL. **(2 Marks)**
- i) The Customer-Part table below shows the quantities in which customers have ordered parts.

Customer#	Customer_Name	Part#	Part_Desc	Quantity
C4	Carter	P7	Pin	5
C4	Carter	P2	Nut	100
C2	Carter	P2	Nut	200
C8	Brown	P4	Nut	5

- (i) Identify redundant duplication of data values. Explain why. **(1 Mark)**
- (ii) Identify non-redundant duplication of data values. Explain why. **(1 Mark)**
- (iii) Show how redundancy can be eliminated from the above table by decomposing the table into three. **(3 Marks)**

QUESTION TWO: (20 MARKS)

- a) Describe the following concepts in ER-modeling:
- (i) Entity **(1 Mark)**
 - (ii) Attributes **(1 Mark)**
 - (iii) Relationship **(1 Mark)**
- b) What is a unary relationship in ER-modeling? Give an example. **(3 Marks)**
- c) What is an integrity constraint(IC)? Give an example of an integrity constraint and briefly explain it **(3 Marks)**
- d) List the types of functional dependencies. Use a diagram to describe one type of functional dependencies. **(4 Marks)**

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e) Use the example report below to:

Page 7		DreamHome Customer Rental Details			Date 7-Oct-98	
Customer Name John Kay			Customer Number CR76			
Property Number	Property Address	Rent Start	Rent Finish	Rent	Owner Number	Owner Name
PG4	6 Lawrence St, Glasgow	1-Jul-94	31-Aug-96	350	CO40	Tina Murphy
PG16	5 Novar Dr, Glasgow	1-Sep-96	1-Sep-98	450	CO93	Tony Shaw

- (i) Describe a relation in un-normalized form. (1 mark)
- (ii) Convert from source to un-normalized form. (2 marks)
- (iii) Convert from UNF to 1NF (2 marks)
- (iv) Convert from 1NF to 2NF (2 marks)

QUESTION THREE: (20 MARKS)

- a) With relevant example diagram representations, differentiate between multi-valued attribute and composite attribute. (4 marks)
- b) With a relevant example, explain the different parts in a basic SQL query used to display data based on some criteria. (4 marks)
- c) What is normalization? When is a table in the 2NF? (4 marks)
- d) Given the relation schemas below:

Module (ModuleID, ModuleName, level, CourseCode, StaffNo)

Lecturer (StaffNo, StaffName, Status, DeptName, Salary)

Write the SQL statements to:

- (i) Show all the modules whose names end with S. (2 marks)
- (ii) Show the names of all lecturers who earn more than 25000.00 and less than 35000.00. (2 marks)
- (iii) Show the highest paid salary. (2 marks)
- (iv) Compute the number of modules taught by each lecturer. (2 marks)

QUESTION FOUR: (20 MARKS)

- a) Explain the properties of a normalized relation. (4 marks)

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- b) Buses come to a garage for repairs. A mechanic and helper perform the repair, record the reason for the repair and record the total cost of all parts used on a Shop Repair Order. Information on labor, parts and repair outcome is used for billing by the Accounting Department, parts monitoring by the inventory management computer system and a performance review by the supervisor.
- (i) Identify the entities in the above scenario. **(1 mark)**
 - (ii) Identify the processes in the above scenario. **(1 mark)**
 - (iii) Identify the data stores in the above scenario. **(1 mark)**
 - (iv) Identify the data flows in the above scenario. **(1 mark)**
 - (v) Draw a context diagram for the above scenario. **(4 marks)**
- c) Write (i) an occurrence of the relation schema below. (ii) An SQL statement to create the relation below. (iii) An SQL statement to insert multiple data given below into the Book relation. (iv) An SQL statement to show details of the book written by Brown in the relation below. **(8 marks)**

Book (book#, title, authername)

Using the following data:

Book# 811203 has the title Introduction to Biology and is written by Brown.

Book# 811204 has the title Microprocessor systems and is written by Jones and Smith

QUESTION FIVE: (20 MARKS)

- a) Describe a relation in the 3NF **(2 marks)**
 - b) What is Decomposition? **(2 marks)**
 - c) Name and explain the problems caused by data redundancy in relations. **(8 marks)**
 - d) Consider the following relational database schema:
 - Student** (StudentID, FirstName, LastName)
 - Register** (StudentID, ModuleID, SemesterStartDate)
 - Lecturer** (LecturerID, FirstName, LastName)
 - Module** (ModuleID, ModuleName, LecturerID)
- (i) Using the UML notation, draw an ERD of the above database schema. **(4 Marks)**
 - (ii) Write SQL statements to create the above relations **(4 Marks)**

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UNIVERSITY EXAMINATIONS

MAIN CAMPUS

FIRST SEMESTER, 2016/2017 ACADEMIC YEAR

EXAMINATION FOR THE DEGREE OF SCIENCE IN COMPUTER

SCIENCE/COMPUTER SECURITY /ACTUARIAL SCIENCE

COMP 124: DATABASE MANAGEMENT SYSTEM

STREAM: [Y1S2]

TIME:

EXAMINATION SESSION: APRIL

DATE: 2017

INSTRUCTIONS

- Instructions to candidates: Answer **QUESTION ONE** and any other **TWO** questions

QUESTION ONE

(30 MARKS)

- A.** Describe the Characteristics of SQL Commands 6 marks
- B.** The three level database architecture allows a clear separation of the information meaning. Explain the following three different views of the data brought about by these levels? 6 marks
- I.** External - individual user view
 - II.** Conceptual - community user view
 - III.** Internal - physical or storage view
- C.** List and explain the two types of data Independence. 5 marks
- D.** Consider the following relations: 6 marks
BRANCH(bno, street, area, city, pcode, Tel_no, Fax_no)
STAFF(Sno, Fname, Lname, address, position, salary, bno)
Express the following queries in SQL:
- (i) List the staff who work in the branch at '163 main street'
 - (ii) Find staff whose salary is larger than the salary of every member of staff at branch B3

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E. Discuss the Characteristics of DBMS 7 marks

QUESTION TWO

(20 MARKS)

- A. Explain the structural components of a DBMS. 10 marks
- B. Explain the following terms 4 marks
 - I. Database
 - II. Database management system
 - III. Instances
 - IV. Schema
- C. The role of DBA is very important and is defined by the following functions. 6 marks

QUESTION THREE

(20 MARKS)

- A. Discuss the three main types of actions involve databases? Briefly discuss them. 6 marks
- B. Describe Difference between File system & DBMS 8 marks
- C. Describe the different types of users on database? 6 marks

QUESTION FOUR

(20 MARKS)

- A. Explain the terms primary key, candidate key and foreign key. Give an example for each. 8 Marks
- B. Explain the Advantages of DBMS. 8 marks
- C. Differentiate between DDL (Data Definition Language) and DML- Data Manipulation Language. 4 marks

QUESTION FIVE

(20 MARKS)

- A. Describe the three groups of commands in SQL: 6 marks
- B. Discuss situations when DBMS should not be used? 6 marks
- C. Explain five duties of Database Administrator. 8 marks

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UNIVERSITY EXAMINATIONS
MAIN CAMPUS

THIRD SEMESTER, 2016/2017 ACADEMIC YEAR

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN
COMPUTER SCIENCE.

INTE 121/COMP124: DATABASE MANAGEMENT SYSTEM 1

STREAM: [Y1S2]

TIME: 2.00-4.00PM

EXAMINATION SESSION: AUGUST

DATE: 27/72017

INSTRUCTIONS

There are 5 questions in this paper. Answer Question 1 –Compulsory, and Any Other Two Questions.

Question 1 (30 Marks) –Compulsory Question

- a) Giving relevant examples, describe clearly the following concepts:
- (i) Information system (1 Mark)
 - (ii) Strategic information (1 Mark)
 - (iii) Database (1 Mark)
 - (iv) Database Schema (1 Mark)
 - (v) Relationship (1 Mark)
 - (vi) Composite attribute (1 Mark)
- b) Explain two limitations of the traditional file-based system. (2 Marks)
- c) What is a database management system? (1 Mark)
- d) Name and briefly explain any three major components of the database system (3 Marks)
- e) What does SQL stand for? (1 Mark)
- f) Name and briefly explain two main components of the SQL. (2 Marks)
- g) Given the following relation schema:
- Employees**(empid: integer(5), first_name: varchar(50), last_name: varchar(50), salary: integer(10), hire_date: date, dept_id: integer(5))

Write SQL statements to:-

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- (i) Create a database called Company. (1 Mark)
- (ii) Create the above Employees relation. (1 Mark)
- (iii) Insert a new record of the newest employee in the company. (2 Marks)
- (iv) Show all employees working in the company. (1 Mark)
- (v) Reflect the new salary (100,000/-) of the marketing manager whose employee id is 120. (2 Marks)
- h) Giving relevant example diagrams differentiate between multivalued attributes and derived attributes. (4 Marks)
- i) A university consists of a number of departments. Each department offers several courses. A number of modules make up each course. Students enroll in a particular course and take modules towards the completion of that course. Each module is taught by a lecturer from the appropriate department, and each lecturer tutors a group of students. Using the UML notations, draw an ERD to model the above. (4 Marks)

Question 2 (20 Marks)

- a) Describe the following concepts:
 - (i) Candidate key (1 Mark)
 - (ii) Alternate key (1 Mark)
 - (iii) Entity Integrity Constraint (1 Mark)
 - (iv) Referential Integrity Constraint (1 Mark)
 - (v) User-defined Integrity Constraint (1 Mark)
- b) With the aid of a diagram, discuss the relational data model. (3 Marks)
- c) Create an E-R diagram for each of the following pairs of enterprise rules. Indicate the entities and the type of relationship suggested between the entities. (2 Marks)
 - (i) A department employs many persons.
A person is employed by, at most, one department.
 - (ii) A customer may submit many orders.
An order is for exactly one customer.
- d) Draw an example ER-model showing a unary type of relationship. Explain your diagram clearly. (2 Marks)
- e) With example diagrams of each- Describe the three types of functional dependencies. (3 Marks)
- f) Given the following relation schema:
Employees(empid: integer(5), first_name: varchar(50), last_name: varchar(50), salary: integer(10), hire_date: date, dept_id: integer(5))

Write SQL statements to:-

- (i) Show all employees whose last name starts with Ma. (2 Marks)
- (ii) Show the total amount of the employees' salary, for employee's belonging to the department id 50. (2 Marks)
- (iii) Remove the details of a retired employee from the database whose employee id is 105. (1 Mark)

Question 3 (20 Marks)

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- a) Name, draw and explain briefly the four notations used in data flow diagramming. (4 Marks)
- b) What is the difference between logical data independence and physical data independence? (2 Marks)
- c) In a basic SQL query, what is the purpose of the SELECT clause, FROM clause and WHERE clause. (3 Marks)
- d) What is normalization? When is a table in the 2NF? (3 Marks)
- e) Consider the following relation schema to answer the questions below:

Suppliers(sid: integer, sname: string, address: string)

Parts(pid: integer, pname: string, colour: string)

Catalog(sid: integer, pid: integer, cost: real)

Additional information:

- The primary key for suppliers is sid; for Parts is pid and for catalogue is sid and pid.
- Suppliers can supply many different parts.
- Parts can have many different suppliers.
- The catalogue has a list of all the parts together with their suppliers and the cost for each part.

- (i) Using UML notation, represent the above database schema in an ERD. (3 Marks)
- (ii) Write SQL statements to create the above relations. (3 Marks)
- (iii) Write SQL statements to add (i) a new record into the Suppliers table and (ii) a new record into the Parts table. (2 Marks)

Question 4 (20 Marks)

- a) Describe the following concepts:
- (i) Primary key (1 Mark)
- (ii) Foreign key (1 Mark)
- b) What are the three major steps of the database design process? Explain. (3 Marks)
- c) Explain any two properties or rules of a normalized relation. (2 Marks)
- d) Consider the following relation schema to answer the questions below:

Suppliers(sid: integer, sname: string, address: string)

Parts(pid: integer, pname: string, colour: string)

Catalog(sid: integer, pid: integer, cost: real)

- (i) Write SQL statement to show all the parts (part id, part name and colour) that were supplied by a supplier whose id is 20. (2 Marks)
- (ii) Write SQL statement to show all parts whose cost is ranges between 1000 and 10000. (2 Marks)
- e) The relation below describes students and courses for which they are registered:

CourseNo	CourseName	StudentName	Address	Credits
CIS 200	Information Systems	John Warner	23 Main Street	5
CIS 220	Information Systems	Tim Hoffman	87 River Road	5
CIS 220	Information Systems	Jenny Lin	185 Winder Circle	5

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CIS 450	Systems Analysis and Design	Alice Chalmers	5483 Ocean Boulevard	5
CIS 480	Communication Networks	John Warner	23 Main Street	5
CIS 480	Communication Networks	Jenny Lin	185 Winder Circle	5

- (i) Does the relation contain any repeating groups? Explain showing redundant duplication and non-redundant duplication **(2 Marks)**
- (ii) In what Normal form is this relation? Explain **(1 Mark)**
- (iii) If the relation is not already in 3rd normal form, develop new relations that meet the requirements of third normal form. Explain the rules followed. **(6 Marks)**

Question 5 (20 Marks)

- a) Giving relevant examples, describe the following concepts:
 - (i) Instance of an entity **(1 Mark)**
 - (ii) Instance of an attribute **(1 Mark)**
 - (iii) Degree of a relationship **(1 Mark)**
- b) Normalization addresses the following problems of data redundancy: *redundant storage, insertion anomalies, update anomalies and deletion anomalies*. Discuss briefly each of the problems mentioned. **(4 Marks)**
- c) Create an E-R diagram for each of the following pairs of enterprise rules between the entities **Lecturer** and **Course**. Indicate the type of relationship suggested between the entities. **(3 Marks)**
 - a. 'A lecturer teaches, at most, one course'
'A course is taught by, at most, one lecturer'
 - b. 'A lecturer may teach many courses.'
'A course is taught by, at most, one lecturer.'
 - c. 'A lecturer may teach many courses.'
'A course may be taught by many lecturers.'
- d) The Customer-Part table below shows the quantities in which customers have ordered parts.

Customer#	Customer_Name	Part#	Part_Desc	Quantity
C4	Carter	P7	Pin	5
C4	Carter	P2	Nut	100
C2	Carter	P2	Nut	200
C8	Brown	P4	Nut	5

- (i) Identify redundant duplication of data values. Explain why. **(1 Mark)**
 - (ii) Identify non-redundant duplication of data values. Explain why. **(1 Mark)**
 - (iii) Show how redundancy can be eliminated from the above table by decomposing the table into three. **(3 Marks)**
- e) Consider the following relation schema to answer the questions below:

Salesperson (Name: *string*, PercentOfQuota: *integer*, Salary: *integer*)

Orders (Number: *integer*, CustName: *string*, SalespersonName: *string*, Amount: *integer*)

Customer (Name: *string*, City: *string*, IndustryType: *String*)

Write SQL statements to:-

- (i) Show the name of the salesperson with highest percent of quota. (1 Mark)
- (ii) Compute the average percent of quota for salespeople. (1 Mark)
- (iii) Compute the number of orders. (1 Mark)
- (iv) Show the names of customers who are located in a city ending with S. (1 Mark)
- (v) Show the names and salary of all salespeople who do not have an order with
Abernathy Construction, in ascending order of salary. (1 Mark)