

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE : FCT 1083

COURSE : FUNDAMENTALS OF DATABASE

SEMESTER/SESSION : 3 – 2023/2024

DURATION : 3 HOURS

**Instructions:**

1. This booklet contains 5 questions. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO****THIS BOOKLET CONTAINS 5 PRINTED PAGES INCLUDING COVER PAGE**

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**QUESTION 1**

- a) Define the meaning of data. (2 marks)
- b) Describe **TWO (2)** differences between structured and unstructured data. (4 marks)
- c) State **TWO (2)** common problems with file system data processing. (2 marks)
- d) Explain **FOUR (4)** importance of business rules in database. (8 marks)

**QUESTION 2**

- a) List **TWO (2)** characteristics of a relational table. (2 marks)
- b) Describe **THREE (3)** types of keys in a table. (6 marks)
- c) Identify **THREE (3)** processes to develop Entity Relationship Diagram (ERD). (3 marks)
- d) Based on scenario in Figure 1, please answer all questions below.

A university library needs to develop a "Library Tracking System" to manage their operations efficiently. The system should keep track of books, members, and borrowings. Here are the details:

- **Books:** Each book has a unique ISBN, a title, an author, a publisher, and a year of publication.
- **Members:** Each member has a unique member ID, a name, an address, a phone number, and an email.
- **Borrowings:** When a member borrows a book, the system should record the borrow ID (unique), the member ID, the ISBN of the borrowed book, the date borrowed, and the due date. If the book is returned, the return date should also be recorded.

Figure 1. Library Tracking System

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- (i) State **THREE (3)** entities of Library Tracking System. (3 marks)
- (ii) Identify **FOUR (4)** attributes for each entity based on the answer given in question (i). (4 marks)
- (iii) List **THREE (3)** relationships involved. (3 marks)
- (iv) Draw an ERD with relationship and entities of Library Tracking System. (4 marks)

**QUESTION 3**

- a) Scenarios in Figure 2 and Table 1 show an Employee Management System.  
Answer all questions below.

A hospital needs to track patient visits to various doctors. Each patient can have multiple visits, and each visit is associated with a specific doctor. The hospital wants to store information about patients, doctors, and visits in a single table.

*Details:*

Patients: Each patient has a unique patient ID, a name, and a date of birth.

Doctors: Each doctor has a unique doctor ID and a specialization.

Visits: Tracks the visits by patients to doctors, including the visit date and reason for visit.

**Figure 2. Employee Management System**

First Normal Form:

**Table 1. First Normalized Table**

| PatientID | PatientName | DateOfBirth | DoctorID | Specialization | VisitDate  | Reason     |
|-----------|-------------|-------------|----------|----------------|------------|------------|
| 1         | John Doe    | 1985-04-12  | D101     | Cardiology     | 2024-05-20 | Checkup    |
| 1         | John Doe    | 1985-04-12  | D102     | Neurology      | 2024-06-15 | Migraine   |
| 2         | Jane Smith  | 1990-08-23  | D101     | Cardiology     | 2024-05-22 | Chest Pain |
| 3         | Alice Brown | 1982-11-05  | D103     | Dermatology    | 2024-07-10 | Skin Rash  |
| 3         | Alice Brown | 1982-11-05  | D104     | Orthopedics    | 2024-07-15 | Back Pain  |
| 1         | John Doe    | 1985-04-12  | D101     | Cardiology     | 2024-05-20 | Checkup    |

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- (i) Draw the dependency diagram. Identify PK, Partial and Transitive dependency. (5 marks)
- (ii) Normalize the table from the second normal form (2NF) to third normal form (3NF). (8 marks)
- b) Describes **TWO (2)** types of the JOIN in Structured Query Language (SQL). (4 marks)
- c) Figure 3 shows a database schema for a University System. Write SQL commands for the following questions:

Students (StudentID, Name, DepartmentID)

Departments (DepartmentID, DepartmentName)

Courses (CourseID, CourseName, DepartmentID, Credits)

Enrollments (EnrollmentID, StudentID, CourseID, Semester, Grade)

Figure 3. University System Database Schema.

- (i) Insert a new student into the Students table: (2 marks)
- StudentID: 1001
  - Name: "Hassan Bakri"
  - DepartmentID: 102
- (ii) Select all students who are enrolled in courses offered by the 'Computer Science' department. Display their names and the names of the courses they are enrolled in. (4 marks)
- (iii) Select all courses along with the number of students enrolled in each course. Display the course name and the count of students, sorted in descending order of enrollment count. (5 marks)
- (iv) Delete a specific course from the Courses and Enrollments which belong to CourseID '501'. (3 marks)

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- (v) Update the grade of a student in a specific course for a given semester. (4 marks)
- StudentID: 2001
  - CourseID: 302
  - Semester: 'April'
  - New Grade: 'A'

**QUESTION 4**

- a) List **THREE (3)** phases of System Development Life Cycle (SDLC). (3 marks)
- b) State **TWO (2)** types of maintenance in database. (2 marks)
- c) Give **TWO (2)** main factors that constrained the performance of a typical DBMS. (2 marks)
- d) List **THREE (3)** programming language for web development. (3 marks)

**QUESTION 5**

- a) Describe **THREE (3)** layer of database connectivity. (6 marks)
- b) List **TWO (2)** benefits of Hypertext Preprocessor (PHP) to create server-sides of data-intensive and dynamic websites. (2 marks)
- c) Explain **THREE (3)** disadvantages of cloud services. (6 marks)

-----END OF QUESTIONS-----

