



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS

**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR SCIENCE IN
INFORMATION SYTEMS**

4TH YEAR 1ST SEMESTER 2022/2023 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE:ITB 2401

COURSE TITLE: DATABASE APPLICATION

EXAM VENUE:

STREAM: Bsc IS

DATE: DEC 2022

EXAM SESSION:

TIME: 2.00 HOURS

INSTRUCTIONS:

- 1. Answer Question 1 (Compulsory) and ANY other two questions**
- 2. Candidates are advised not to write on the question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

QUESTION ONE [30 MARKS]

- a) State and explain any two types of Database Systems. **4 Marks**
- b) **Discuss** the advantages and disadvantages of a database system over traditional file system. **6 Marks**
- c) The ANSI-SPARC Architecture has 3 level abstractions i.e. External, Conceptual and Internal levels. draw and explain the three tier architecture explaining why the separation is desirable **4 Marks**
- d) Consider the following relational database called “University”:

STUDENT (studentId, courseid, studentname, program, major)

COURSE (courseId, trimesterid, coursename, credithours, grade)

TRIMESTER (trimesterId, trimestername, year, instructor)

Specify the SQL statements that perform the tasks below:

- i) Create the three (3) tables clearly considering their relationships through key fields. **6 Marks**
- ii) Retrieve the names of all students showing their *coursename* and grade. **2 Marks**
- iii) The Database Administrator accidentally executed an SQL statement that deleted all the entries in the STUDENT table. What SQL statement was this? **1 Mark**
- iv) A student with *studentId* ‘04JCS101’ had his name recorded as ‘Anthony Omondi’ instead of ‘Anthony Omollo’. Write the query that effects the change. **2 Marks**
- v) Add an attribute called ‘Points’ to the COURSE table. Set it in such a manner that it cannot accept null/empty entries and that it takes floating point values. **2 Marks**
- vi) Create a view called StudentCourse that brings together all the three tables over the key fields. **2 Marks**
- vii) Query the view created in (vi) above to generate student list showing their names and courses done the year 2012. **2 Marks**

QUESTION TWO [20 MARKS]

- a) Explain the the factors influencing information system control audit on the organizations and its impacts 6 marks
- b) Explain the distinctions among the terms primary key, candidate key, and super key 4 marks

Consider a case of a Library Management System. Use it to answer the following questions:

- c) When books are purchased and stocked in the Library with all their details recorded in the system. The Librarians have to add new books to the system catalogue by assigning a book number then recording the ISBN number, publisher, author(s) and year of publication. Students and Lecturers visit the library at any time when they can read open shelve books while in the library or borrow for a specific period of time. Whenever Students or Lecturers borrow books, the Librarian has to update the details under the borrowed books ledger where they record the student registration number or lecturer's personal file number, date of borrow, date of return. The system keeps track of the Librarian serving leasing the book i.e. Staff Id and Name. A fine payable to the Finance Clerk is charged for books returned after the expiry date before being cleared by the Librarian during which the Staff Id and Name of Finance Clerk are captured including date of payment. Similarly, in case a Student or Lecturer loses a book, they have to clear with the Finance Clerk before they are allowed to use the library again. The Chief Librarian using his/her Staff Id and Name, periodically generates reports to analyse the operation of the library i.e. views the number of books borrowed and the return schedules. The system further keeps track of Librarians on duty basing on the fact that they operate in shifts.

- i. Identify the entities involved with their respective attributes. 5 marks
- ii. Design and draw an ER diagram that captures all the information about the Library System. Use only the basic ER model; that is, entities, relationships, and attributes. Be sure to indicate any key and participation constraints. 5 marks

QUESTION THREE 20 MARKS.

- a) List and b explain any four (4) principal business functions as outlined in information systems for business functions. 4 Marks
- b) Discuss the following four Four Major Types of information Systems 8 Marks
- i. Decision support systems
 - ii. Executive support systems
 - iii. Management information systems
 - iv. Computer based Systems
- c) With the help of a diagram, list and briefly explain the four levels major types of systems in an organization. 8 Marks

QUESTION FOUR 20 MARKS

Implementation of the Customer Order Form database in question 3 above takes into account the existing database security threats:

- a) Discuss any two database security threats. 4 Marks
- b) Discuss any three Computer-based countermeasures to the database security threats. 6 Marks
- c) DDBMS must synchronize global transaction to ensure that all subtransactions have completed successfully before recording a final COMMIT for global transaction. How does the Two-phase commit enforce database security? 6 Marks
- d) Discuss the following SQL commands with example:- 4 marks
- i. Alter table Command
 - ii. Alter drop table command

QUESTION 5 20 MARKS

- a) Write the following queries in SQL, using the university schema. (We suggest you actually run these queries on a database, using the sample data that we provided below. 6 marks

<i>ID</i>	<i>name</i>	<i>dept_name</i>	<i>salary</i>
22222	Einstein	Physics	95000
12121	Wu	Finance	90000
32343	El Said	History	60000
45565	Katz	Comp. Sci.	75000
98345	Kim	Elec. Eng.	80000
76766	Crick	Biology	72000
10101	Srinivasan	Comp. Sci.	65000
58583	Califieri	History	62000
83821	Brandt	Comp. Sci.	92000
15151	Mozart	Music	40000
33456	Gold	Physics	87000
76543	Singh	Finance	80000

(a) The *instructor* table

<i>dept_name</i>	<i>building</i>	<i>budget</i>
Comp. Sci.	Taylor	100000
Biology	Watson	90000
Elec. Eng.	Taylor	85000
Music	Packard	80000
Finance	Painter	120000
History	Painter	50000
Physics	Watson	70000

(b) The *department* table

- i. Find the titles of courses in the Comp. Sci. department that have 3 credits.
- ii. Find the IDs of all students who were taught by an instructor named Einstein; make sure there are no duplicates in the result.
- iii. Find the highest salary of any instructor.
- iv. Find all instructors earning the highest salary (there may be more than one with the same salary).
- v. Find the enrollment of each section that was offered in Autumn 2009.
- vi. Find the maximum enrollment, across all sections, in Autumn 2009.
- vii. Find the sections that had the maximum enrollment in Autumn 2009.

- b) Replication servers can either be Synchronous or Asynchronous. Discuss this with respect to Distributed Database Management Systems . **4 Marks**
- c) List the four main information contained in each record in an audit trail. **4 Marks**
- d) Define the following terms; **6 Marks**
- i. Foreign Key
 - ii. Candidate key
 - iii. Primary Key
 - iv. Super Key
 - v. Composite Key
 - vi. Alternate Key
 - vii. Weak Key