EXTERNAL INTEGRATED SUMMATIVE ASSESSMENT (EISA)

119458 - OCCUPATIONAL CERTIFICATE: SOFTWARE ENGINEER, NQF LEVEL 6, CREDITS 240

PRACTICAL EXAMINATION

EXAMPLER

Duration: 3 Hours

Total Marks: 100

Pass Mark:

CANDIDATE INFORMATION	
SURNAME	
NAMES	
ID NUMBER	
EISA REGISTRATION NUMBER	
ASSESSMENT CENTRE	
ASSESSMENT CENTRE ACCREDITATION NUMBER	

INSTRUCTIONS TO CANDIDATES

1. This is an individual assessment.

2. Deployment is not required.

3. Save all files clearly.

4. Your solution must execute without errors.

5. Where indicated, you must include screenshots of your results (e.g., database query outputs, drawings, application output).

6. Any screenshots should be clear and saved under question

IMPORTANT INSTRUCTION

Open a new blank Microsoft word document. Add question numbers as per this question paper where you will paste your practical screenshots

SCENARIO

A training provider has a mini library which is run on manual basis. The Head of the institution has requested you to lead the development of a new library to manage Books, Members, and Loans. The system must allow registering books and members, loaning and returning books, and viewing current loans.

Question 1.1 [25]

1.1.1 Problem Statement

Write a clear problem statement from the scenario explaining: (5)

- What must the system solve?
- Who will use it?
- The purpose of the system

1.1.2 Data Gathering

To develop the planned Library Management System, you need to understand the current manual system to be able to see the shortfalls.

Design a one-page questionnaire as an information gathering tool that can be used to collect data from current staff member (librarian) who is responsible for loaning out and collection of books from the learners. (10)

The questionnaire that you design should have structured closed and open questions with clear instructions to guide the person who will complete it.

1.1.3 Standard methods to document a system design

1.3 The tools that are commonly used to document a system design include Unified Modeling Language (UML) diagrams (class, sequence, state, deployment), data modeling (ERD), and process modeling.

Draw a sequence diagram of the general process of loaning out a library book   (3)

1.1.4. Part of the standard practices in creating documentation for programs in software engineering to create the Readme file provides an overview, details on setup and usage, and information on features including Project Title.

Create Project Title and overview for the planned library system as part of Readme file which should not be more than 6 lines. Use the following sample / format: (2)

```
# [Project Title]

**Author:** [Your Name]

**Date:** [YYYY-MM-DD]

**Application For:** [Program Name, e.g., Car Tracking System]

## 1. Description

A brief (1-3 sentence) summary of what this project does and its purpose.
```

1.2 Recommending appropriate IT solutions to business problems.   [10]

As a software engineer, you plan to recommend an automated Library Management System for a training institution to as a solution to a manual book loan system to students. See the table below and do the question that follows

Current manual process	recommended electronic system	Justification
Borrowing book – learner approach the Librarian and tells her the book title		
Borrowing recording – the Librarian records in an exercise book learner name, book title and date		
Book return – the learner brings back the book; the librarian searches the learner's name in the exercise book and cancels the name		
Borrowers report – the librarian goes page by page writing the names of the learners who borrowed book on a new separate paper		
Overdue books report – the Librarian checks page by page in the exercise book and writing names on a new separate paper		

Copy and complete the following recommendation and justification table   (10)

Question 2 [20]

2.1 System Design (5)

Sketch a system design showing the main components using the available tools / features in Microsoft Word or any related application. The design must show user interface, application logic, database and how they interact.

NOTE: If you are using another application for sketching the design, then take a screenshot of the design and paste in the Microsoft word document. Add suitable heading

2. 2 Standard methods to design a database (10)

Create file: library.sql

REQUIRED TABLE STRUCTURE

Table: Books

Field Name	Data Type	Constraints
book_id	Integer	Primary Key
title	Varchar (100)	Not Null
author	Varchar (100)	Not Null
available	Boolean/Integer	Not Null

Table: Members

Field Name	Data Type	Constraints
member_id	Integer	Primary Key
name	Varchar (100)	Not Null
email	Varchar (100)	Not Null

| CellNumber | Varchar (10) | |

Table: Loans

Field Name	Data Type	Constraints
loan_id	Integer	Primary Key
book_id	Integer	Foreign Key references Books(book_id)
member_id	Integer	Foreign Key references Members(member_id)
loan_date	Date	Not Null

2.3 Manipulating data within a database (5)

In the **Books** table, please insert the following records using the INSERT command:

- 1, "Clean Code", "Robert Martin", 1
- 2, "The Pragmatic Programmer", "Andrew Hunt", 1
- 3, "Design Patterns", "Erich Gamma", 1
- 4, "Refactoring", "Martin Fowler", 1

In the **Members** table, please insert the following records using the INSERT command:

- 1, "Sarah Smith", "sarah@email.com"
- 2, "David Brown", "david@email.com"
- 3, "Alice Wonder", "alice@email.com"

In the **Loans** table, please insert the following records using the INSERT command:

- 1, 1, 1, '2026-02-20'
- 2, 2, 3, '2026-02-21'

Write and run the following SQL commands and take screenshots and paste in your word document.

- Select all available books
- Update book with book_id = 1 to available = 0.
- Delete member with member_id = 2.
- Write a JOIN query showing Member name, Book title, Loan date.

Ensure that you take the screenshot of both the **SQL command and the output** (displayed records)

ELO 3: Develop software to add value to the organisation **[20]**

3.1.1 General principles of system integration and deployment **(4)**

Describe what incremental deployment is and how it can be used for the Library Management System. (2)

Write a paragraph for incremental deployment approach explaining: (2)

- Risks involved
- How risks will be reduced

3.1.2 Standard methods to write source Code

Write SQL code to retrieve all records from the Books table created in question 2.1.2 and include inline comments as shown in the sample below:

```
SELECT
   s.first_name,    -- Employee's first name
   s.last_name,     -- Employee's last name
FROM
   Employee        -- main Employee table
```

The records must be **sorted by Author** and include the following: (9)

Book ID

Title

Author

3.1.3 Standard methods for debugging a source code

As the software engineer responsible for maintaining a Library Management System, you have been informed that the system produces incorrect output regarding books borrowed. You see the following function code.

```
1      FUNCTION BorrowBook(book)
2      IF book.isBorrowed = TRUE THEN
3      PRINT "Book borrowed successfully"
4           ELSE
5           book.isBorrowed = TRUE
6      PRINT "Book already borrowed"
7      ENDIF
8      END FUNCTION
```

Look through and identify the error and then rewrite the line(s) with error and the corrected code and explain why it was causing error. (3)

3.1.4 Standard methods for debugging a source code

You need to correct all errors before deploying the new Library Management System. Check the following psuedocode source code meant to calculate the fines for overdue books which was written as part of planning.

17 FUNCTION CalculateFine(daysLate)

18 IF daysLate < 0 THEN

19 fine = daysLate × finePerDay

20 ELSE

21 fine = 0

22 ENDIF

23 RETURN fine

24 END FUNCTION

Identify the line with error and then rewrite the corrected code. Explain why the code was causing the error   (4)

Question 4   [30]

4.1.1 Functional test specifications

The following is a sign in page for a Library Management System. It gives you the option to sign in with correct username and password. The system also gives you option to reset password if you have forgotten it and to recover username if you have forgotten it.

Assume the following are the correct login details:

Email address: Engineer1@techno.co.za   **Password**: SoftwareEng#

Write functional test case with correct email and any WRONG password in your Microsoft word document in the following format: (10)

Test case 1 details

Objective   **:** Verify login with valid credentials

Preconditions   : User currently registered

                    : Validation set to proceed only if both field inputs are correct

Test Case Title   :

Function / Module   :

Test data   :

Expected message :

Test result / Status :

4.1.2 non-functional test specifications

Write non-functional test case with correct email and any WRONG password in your Microsoft word document in the following format: (10)

Reliability test - session timeout after 20 minutes of inactivity

Functional Test Case details

Write the test case session timeout after inactivity for 20 minutes

Objective   **:** Verify if account trigger session timeout after inactivity

for 20 minutes

Preconditions   : User currently registered

: Validation set to logout user after 30 minutes of inactivity

Test Case Title   :

Function / Module :

Test data   :

Expected message :

Test result / Status :

4.1.3 Recording all activities and producing a report where required

The software tester working on the Library Management System recorded the following results when he was trying to verify functional (user registration, login and product search) and non-

functional requirements (performance, security, usability, load testing) are implemented correctly.

Project Name: New Tech System

Client: Westville Training Academy

Project Duration: 6 Months (Jan 2026 – June 2026)

Testing Phase: System Testing

Release Version: v1.0

Test Category	Total Test Cases	Passed	Failed	Blocked
Functional	20	15	4	1
Performance	10	10	0	0
Security	5	3	1	1
Usability	5	4	1	0
Total	**40**	**32**	**6**	**2**

Based on the above information, write a testing report using as much information as possible from the scenario given above using the following format / layout in your Microsoft word document   (10)

Testing Report Created by:	
Project Information	

Test Objective	
Test Summary	
Defect Summary (Failed)	
Test Environment Overview	
Recommendations	

Total Marks 100