higher education & training

Department:
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REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

SYSTEM ANALYSIS AND DESIGN
NQF LEVEL 4

(10041004)

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09:00–12:00

This question paper consists of 15 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
SYSTEM ANALYSIS AND DESIGN
NQF LEVEL 4
TIME: 3 HOURS
MARKS: 200

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Start each section on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1 A course of action designed to help an organisation respond to risk is known as a/an …

A evacuation plan.
B preventive maintenance plan.
C contingency plan.
D corrective maintenance plan.

1.1.2 A systems analyst identifies a risk that key stakeholders may not be adequately involved in the design process. What mitigation strategy would be most effective in addressing this risk?

A Develop a detailed project plan with clear deadlines.
B Conduct regular communication workshops with key stakeholders.
C Utilise a pre-defined system design template.
D Assign a dedicated team member to track project progress.

1.1.3 Acceptance testing is …

A running the system with line data by the actual user.
B testing changes made in an existing or a new program.
C checking the logic of programs in the candidate systems.
D making sure that the new programs process transactions according to specifications.

1.1.4 The system implementation approach of running the old system and the new system at the same time for a specified period, is known as … adoption.

A pilot
B direct
C phased
D parallel

1.1.5 The process of checking data before it is processed and testing its acceptability is classified as …

A program corrections.
B validation.
C personification.
D verification.

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1.1.6 … attacks often involve deceptive emails or messages that appear to be from a legitimate source, such as a bank, credit card company, or social media platform.

A Mining
B Phishing
C Hunting
D Doxing

1.1.7 … refers to how consistently and reliably a file, database, or system can be accessed by authorised personnel.

A Integrity
B Confidentiality
C Reliability
D Availability

1.1.8 … refers to the assurance that a network's programs, data, services, devices and connections have not been altered without authorisation.

A Integrity
B Confidentiality
C Reliability
D Availability

1.1.9 Which ONE of the following options is a valid way to avoid having a poorly designed user interface?

A Prioritising user feedback and making iterative improvements based on validation testing.
B Designing the interface without considering the target audience or their needs.
C Implementing a clean and intuitive layout with consistent design elements.
D Overloading the interface with unnecessary features and clutter.

1.1.10 Which ONE of the following are properties of a good use case?

A Clearly defines the actor's goals and how the system helps achieve them.
B Written in a technical language for developers to understand system logic.
C Describes the expected outcome and value delivered to the actor.
D Provides a step-by-step guide on how the system processes data internally.

(10 × 1) (10)

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1.2 Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A–Q) next to the question number (1.2.1–1.2.10).in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.2.1	An occupation which requires specialised knowledge, has personal responsibility and involves working with a client rather than a customer	A	primary key
		B	risk assessment
		C	analyst
1.2.2	It is used to link two database tables together	D	unit testing
1.2.3	A visual diagram or schema that represents the functional elements of a web page or website	E	interview
		F	actor
1.2.4	Looking at a small part of the system in isolation in order to test it	G	interrogation
		H	mitigation
1.2.5	A person whom you wish to gather data, often through a survey or questionnaire	I	foreign key
1.2.6	To prepare for and lessen the impact of risk	J	ethics
1.2.7	A set of moral principles that guide a person's behaviour and actions	K	profession
		L	verification
1.2.8	Someone who plays an important role that requires them to interact with the system from outside the boundary of the system	M	entity relations
		N	timebox
1.2.9	The process of identifying potential problems (hazards) and evaluating their likelihood and severity to determine how to manage them	O	deadline
		P	wireframe
1.2.10	A fixed time period in which an activity in software development must take place	Q	respondent

(10 × 1) (10)

1.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.3.1–1.3.10) in the ANSWER BOOK

1.3.1 Checkboxes on a form are a good way to present related choices where, only one of which can be true at a time.

1.3.2 UML class diagrams are a good way to represent the algorithmic nature of the interactions between classes.

1.3.3 Software piracy is an ethical issue that impacts businesses and the country's economy.

1.3.4 The IFIP is a professional body for the computer industry in South Africa.

1.3.5 Software piracy is a form of theft.

1.3.6 All people have the right to equal treatment, regardless of their race, gender, religion, age, or disability.

1.3.7 Software that has a copyright means that you are allowed to copy, modify and sell the software.

1.3.8 Proactive risk management is also sometimes referred to as firefighting.

1.3.9 An interviewer is not allowed to discuss the objectives of an interview with the interviewee.

1.3.10 A systems analyst should have the skills to educate people in the use of an information system.

(10 × 1) (10)

1.4 Write the following abbreviations in full:

1.4.1 SLA

1.4.2 UAT

1.4.3 XP

1.4.4 SAAS

1.4.5 OCR

1.4.6 CRC

1.4.7 DBMS

1.4.8 ITA

1.4.9 OOP

1.4.10 DSS

(10 × 1) (10)
[40]

TOTAL SECTION A: 40

SECTION B

QUESTION 2

2.1 Read the following scenario and answer the questions.

In a busy computer repair store, Sarah, a technician, finds an outdated anti-virus program on a customer's laptop. Instead of suggesting an update, Sarah secretly takes the license key. Later, she installs the same software on other customers' computers without asking for it, using the copied key. As a level 4 student, you may have remembered your lecturer telling you that most countries have copyright infringement laws to protect such intellectual property (IP).

2.1.1 Define the term *Intellectual Property*. (2)

2.1.2 Identify the unacceptable practice that Sarah is engaging in. (1)

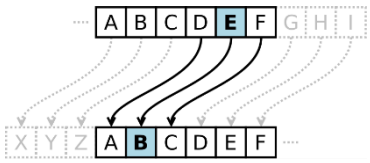
2.1.3 Motivate your answer to QUESTION 2.1.2 by providing ONE reason. (1 × 2) (2)

2.1.4 State TWO ways in which Sarah's actions affect the developers of the anti-virus program. (2 × 1) (2)

2.2 Study the excerpt below and answer the questions that follow.

Simple security solutions as old as time

During ancient Roman times, the Roman Emperor Julius Caesar started using a cypher to protect sensitive information. The cypher that Julius Caesar used operated by shifting each letter in the plaintext by a fixed number of positions down or up the alphabet. The cypher is now known as the Caesar Cipher. It is a substitution cypher that shifts letters in a message to make it unreadable if intercepted. The letters are either shifted a number of characters to the RIGHT or to the LEFT.



The Caesar cypher works when each letter in the plaintext is replaced by a letter with some fixed number of positions down the alphabet, either to the right or left. For example, with a LEFT SHIFT of 3, the letter D would be replaced by A, E would become B, F would become C and so on.

[Adapted from: https://www.khanacademy.org/computing/computer-science/cryptography/crypt/v/caesar-cipher#:~:text=The%20Caesar%20Cipher%2C%20used%20by,exploits%20patterns%20in%20letter%20frequencies]

2.2.1 Define the term *cypher.* (2)

2.2.2 Explain how encryption facilitates secure authentication in computer systems. (4 × 1) (4)

2.2.3 Decrypt the following message using the Caesar Cipher with a: LEFT SHIFT of 5. (2)

Message:

F	U	U	Q	J

Alphabet

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

TIP – The F in the message will become an A.

[15]

QUESTION 3

3.1 Define the following terms in relation to information gathering:

3.1.1 Interviewee (2)

3.1.2 Population (2)

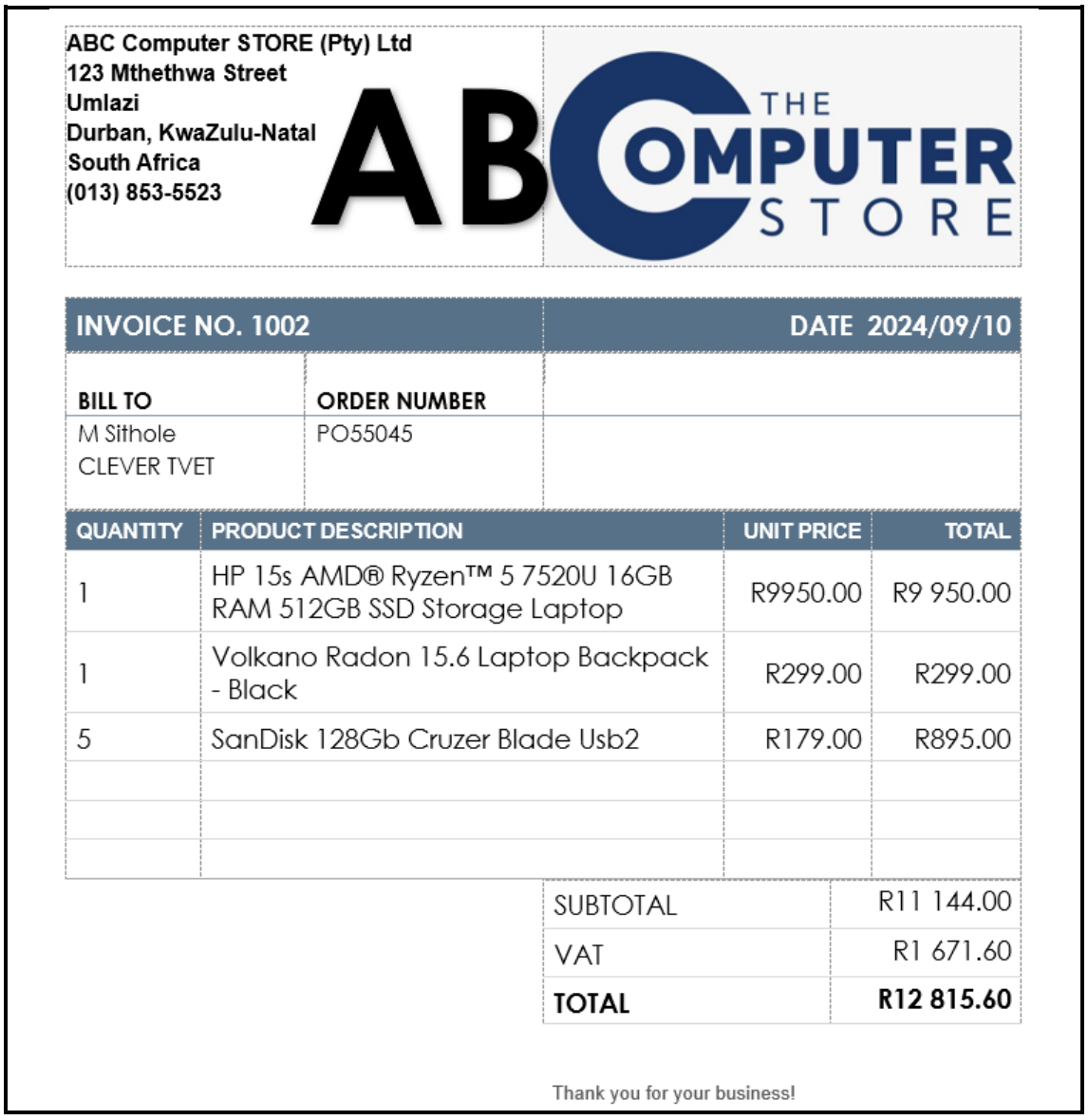
3.2 At which stage of the System Development Life Cycle (SDLC) does the system analyst use a questionnaire as one of the data-gathering techniques? (1)

3.3 Motivate your answer for QUESTION 3.2 by providing one reason. (1 × 2) (2)

3.4 Explain TWO advantages of using a questionnaire to gather data. (2 × 2) (4)

3.5 Other than a questionnaire, list FOUR other common data-gathering techniques employed by systems analysts. (4)

3.6 Study the following diagram (FIGURE 1) of an example of a source document and answer the questions that follow.



ABC Computer STORE (Pty) Ltd
123 Mthethwa Street
Umlazi
Durban, KwaZulu-Natal
South Africa
(013) 853-5523

THE COMPUTER STORE

INVOICE NO. 1002		DATE 2024/09/10
BILL TO	ORDER NUMBER	
M Sithole CLEVER TVET	PO55045	

QUANTITY	PRODUCT DESCRIPTION	UNIT PRICE	TOTAL
1	HP 15s AMD® Ryzen™ 5 7520U 16GB RAM 512GB SSD Storage Laptop	R9950.00	R9 950.00
1	Volkano Radon 15.6 Laptop Backpack - Black	R299.00	R299.00
5	SanDisk 128Gb Cruzer Blade Usb2	R179.00	R895.00

SUBTOTAL	R11 144.00
VAT	R1 671.60
TOTAL	**R12 815.60**

Thank you for your business!

FIGURE 1

3.6.1 Define the term *data dictionary*. (2)

3.6.2 Identify the business process that the source document shown in FIGURE 1 belongs to. (1)

3.6.3 Identify FOUR entities and ONE applicable data element/field per entity from the source document (FIGURE 1). Clearly indicate the name of the entity and the name of an applicable element/field. (4 + 4) (8)

3.6.4 List TWO examples of a source document other than an invoice. (2)

[28]

QUESTION 4

Read the following scenario and answer the question.

Mzansi Lodge is a recently built hotel. They are in the process of designing a website and a software system for their hotel where people can book rooms. Using the website, guests can pick the dates they want to stay and the type of room they need. If guests have used the website before, their details will be saved to make booking faster. If not, they'll have to register as new customers before booking a room.

Each reservation is given a unique reservation code. Before guests arrive, they can use the reservation code to look up their reservation, change/amend it, or cancel it.

The reservation code is used by reception when guests arrive to facilitate the check-in process. Sometimes, the receptionist can also use the reservation code for the check-out process. A receptionist can make a reservation, change/amend a reservation, cancel a reservation, print a customer invoice, and assist the guest with the check-in and check-out process.

At the end of their stay, the receptionist checks the guests out, and the system validates their payment through a third-party payment system. Guests can also request a printed invoice from the receptionist.

The hotel manager can view monthly reports.

4.1 Use the information given in the scenario to draw a UML use case diagram for Mzansi Lodge. (19)

NOTE: Show all actors, use cases, associations and relationship dependencies.

Read the following scenario and answer the question.

The Mzansi Lodge has also had a multimedia designer create tourism and information videos for potential guests who wish to stay in the rooms.

A guest will log in to the video service as a user via a Login page. If the user is registered, he/she will be directed to the Video list page, where they can select a video to view.

If the user/guest is not registered, the user will be redirected to an Unknown User page. The unknown user page will then present the user with the option to sign up or not. After the user has signed up, he/she will be directed to the Login page. If the user decides not to sign up, their activity on the system will terminate.

On the Video list page, the user can either play a video or get information on the video. After the video has played or the information has been displayed, the user will be taken back to the Video list page, where they can decide to log out. Their activity on the system will then also terminate.

4.2 Draw an activity diagram that captures the sequential steps involved in the process above, including any decision points or alternative paths. (15)

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Read the following scenario and instruction.

The systems analysis and design lecturer at the CLEVER TVET College showed you a partial snippet of a UML class diagram, as shown in FIGURE 2 below. The class diagram relates to the different types of guests the Mzansi Lodge can accommodate.

Study the diagram (FIGURE 2) below and answer the questions.

4.3

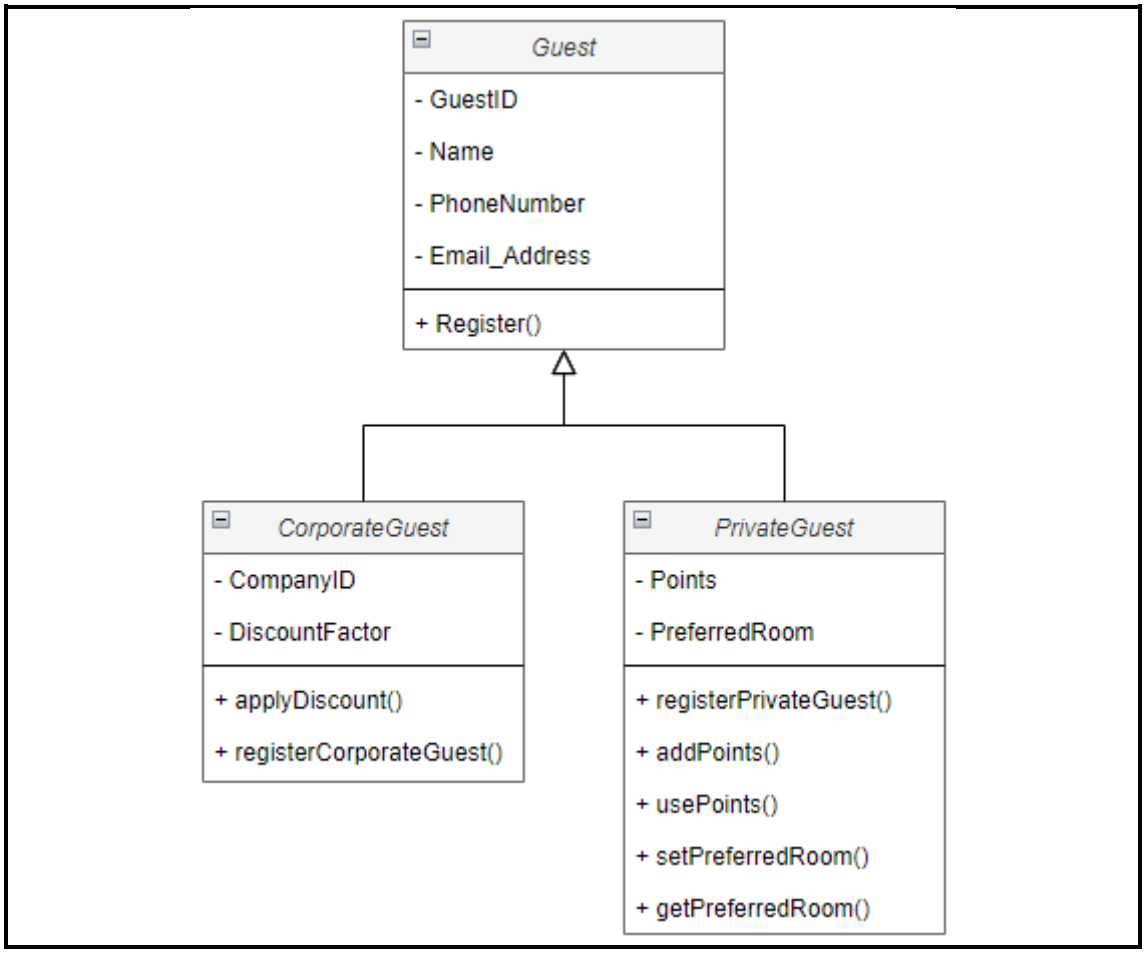

FIGURE 2: Partial UML Class Diagram

4.3.1 Identify the type of class represented by *Guest*. (1)

4.3.2 Identify the type of class represented by the *CorporateGuest* and *PrivateGuest* classes (1)

4.3.3 What does the '+' in the diagrams indicate? (1)

4.3.4 Explain the purpose of a class diagram. (1 × 2) (2)

4.3.5 Identify ONE attribute and ONE method from the *PrivateGuest* class. Clearly indicate which is a method and which is an attribute in your answer. (2)

Read the following scenario and answer the question.

Mzansi Lodge wants to expand its hotels and services by developing a comprehensive hotel management system. The envisaged system should handle various aspects of hotel management, including:

- Guest Management**:**
  - The system should allow guests to make room reservations and confirm their bookings.
  - Guests can make reservations directly through the hotel's website or via third-party booking platforms.
- Room Management**:**
  - Hotel administrators should be able to view the information on rooms that are booked as well as that of customers.
- Billing and Payments

The system should handle guest billing. It should integrate with the customer's bank to request payments and validate the payments.

4.4 Use the information provided above to draw a context data flow diagram for the hotel management system. (13)

Read the following scenario and answer the question.

The hotel management wants to develop a database system to efficiently manage guest reservations, room assignments, billing, and other operations.

The database must store important information about guests, such as their ID, name, surname, and the city where they are from.

It must also store details about their reservation, such as the reservation number, which guest has reserved which room, the number of guests and their check-in and check-out dates.

The system also has to record details about the rooms, such as the room number, type, maximum number of guests and the rate of the room.

4.5 Use the information provided in the scenario to draw an entity relationship diagram data model using the crow's foot notation. Clearly indicate all primary and foreign keys as well as the relationship types. (12)

[66]

QUESTION 5

Read the following scenario and answer the questions that follow.

A user interface is the part of the system with which users interact. It includes the screen displays that provide navigation through the system, the screens and forms that capture data, and the reports the system produces. A systems analyst and designer created the following user interface (UI), labelled as FIGURE 3, for use as part of the Mzansi TVET college administration system to manage the data of their students.

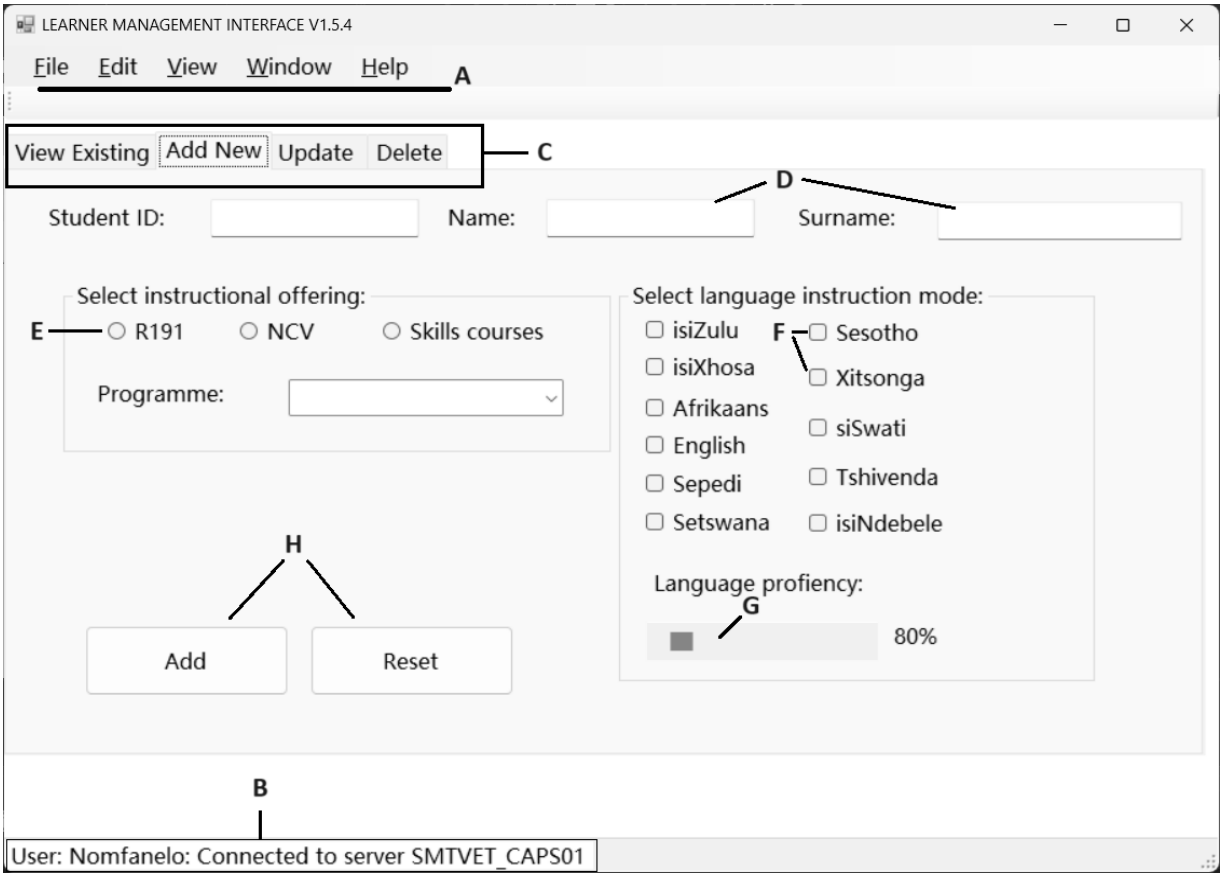

FIGURE 3

5.1 Define the following terms in relation to user interface design:

5.1.1 Aesthetics

5.1.2 Whitespace

(2 × 2) (4)

5.2 Identify the components labelled A to H, as indicated in FIGURE 3. Write down the letters A to H, followed by the component's name. (8)

5.3 Differentiate between user-interface design and system-interface design.

(2 × 2) (4)

5.4 Name FIVE design principles that the designer of the interface would have followed in creating the user interface (FIGURE 3). (5)

5.5 The designer of the user interface, as presented (FIGURE 3), used the following interface icons in their design.

Identify the actions that the following interface icons will perform:

5.5.1 

5.5.2 

5.5.3 

(3 × 1) (3)
[24]

QUESTION 6

Read the following excerpt and answer the questions that follow.

Rising Software Testing Trends for 2024

Software testing is undergoing substantial change in the IT outsourcing services sector, and recent trends indicate that continuous testing is becoming the standard.

To assure quality assurance management, development teams are implementing best practices, and the emphasis is shifting to enhancing the user experience of software products. The QA team and software testers are essential to the success of software development life cycles due to the rising demand for software products and the adoption of Agile approaches. This rise is the result of firms quickly embracing cutting-edge technology. Software quality is becoming increasingly important since it is the main conduit between designers and consumers.

Software teams also attempt to maintain calmness while delivering high-quality, bug-free products in ever-faster cycles. Therefore, software testing must adopt new methods to stay current.

[Adapted from: *https://medium.com/@theitlion/testing-revolution-rising-software-testing-trends*]

6.1 List THREE benefits of software testing. (3 × 1) (3)

6.2 Explain the function of each of the following levels of testing:

6.2.1 Unit testing (2)

6.2.2 Integration testing (2)

6.2.3 System testing (2)

6.3 Differentiate between *corrective maintenance* and *adaptive maintenance*. (2 × 2) (4)

[13]

QUESTION 7

Read the following snippet and answer the questions.

Agile development is important because it helps to ensure that development teams complete projects on time and within budget. It also helps to improve communication between the development team and the product owner. Additionally, agile development methodology can help reduce the risks associated with complex projects. It allows development teams to make changes quickly and easily without affecting the overall project timeline.

7.1 Define the term *agile development.* (2)

7.2 List FOUR different types of agile methodologies. (4 × 1) (4)

7.3 Discuss FOUR benefits of the agile development methodology. (4 × 2) (8)

[14]

TOTAL SECTION B: 160
GRAND TOTAL: 200

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