higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

SYSTEM ANALYSIS AND DESIGN
NQF LEVEL 3

(10041003)

17 November 2023 (X-paper)
09:00–12:00

Non-programmable calculators may be used.

This question paper consists of 16 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
SYSTEM ANALYSIS AND DESIGN
NQF LEVEL 3
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 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 This type of financing hardware technology allows an organisation to use a hardware asset for a short time or when it is unsure about the asset's future use.

A Rental
B Outright purchase
C Lease
D Hire purchase

1.1.2 Which of the following is one of the duties of a Chief Technology Officer (CTO)?

A Developing goals and strategies for product designers, developers and engineers
B Collaborating with vendors and suppliers to acquire the best business solutions
C Focus on improving the internal IT processes of an organisation
D Aim to increase the productivity of IT staff

1.1.3 Which ONE of the following options would be the reason why an organisation purchases laptop computers instead of desktop computers?

A Laptops are more expensive than desktops.
B Desktops are more prone to malware.
C Laptops are faster than desktops.
D Desktops are less prone to theft.

1.1.4 This element of a data flow diagram is named by using a noun phrase such as student information.

A Data flow
B Data store
C Process
D External agent

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1.1.5 Project outcomes should be specified as SMART objectives. SMART stands for…

A Simple, Measurable, Adding-value, Ready, To the point
B Specific, Measurable, Achievable, Realistic, Time-limited
C Simple, Model, Algorithm, Realistic, Timeframe
D System, Model, Achievable, Realistic, Time-boxed

1.1.6 Which ONE of the following data flow diagrams typically illustrates the use of a database?

A Context data flow diagram
B Simple data flow diagram
C Level-0 data flow diagram
D Level-1 data flow diagram

1.1.7 ONE of the main advantages of a command line interface is that it allows …

A troubleshooting an operating system
B an environment where a user interacts by means of only a touchscreen
C working in a word processing application
D inexperienced computer users to traverse an operating system's disk structure

1.1.8 According to Chen's notation, a … is represented by a double rectangular box.

A primary entity
B weak entity
C strong entity
D foreign entity

1.1.9 Which ONE of the following options best represents the advantage of a virtual server room?

A Less virus and spyware attacks
B Less software licenses are required
C Less physical space is used
D Less electrical power is used

1.1.10 A user interacts with a computer system by using a mouse to click and select.

A user interface
B user experience
C interface metaphor
D event procedure

(10 × 1) (10)

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1.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.2.1–1.2.10) in the ANSWER BOOK.

1.2.1 A responsive user interface design is when the interface adapts to a device's layout.

1.2.2 Managing data, backing up and ensuring the availability of the data produced and consumed by today's organisations via their IT systems is the responsibility of a Systems Administrator.

1.2.3 A system is characterised by its boundaries, which are the limits that identify its components and processes, and determine how it interfaces with another system.

1.2.4 A RichTextBox control is an advanced text box that offers text editing and advanced formatting features.

1.2.5 The objective of the preliminary investigation phase of the systems development life cycle is to determine if a current system needs to be developed further or if a new system needs to be developed.

1.2.6 A functional decomposition diagram is used to break the system up into logical pieces based on the functionality required.

1.2.7 Detailed reports contain condensed tables and graphs allowing an overview of information.

1.2.8 A key that consists of two or more attributes that uniquely identify an entity occurrence is known as a composite key.

1.2.9 Computers should be installed in a location with dedicated power outlets.

1.2.10 An intuitive-user interface design is all about creating a product that is easy to understand and that users can learn to use quickly.

(10 × 1) (10)

1.3 Write the following abbreviations in full:

1.3.1 UX

1.3.2 ERP

1.3.3 BCP

1.3.4 CLI

1.3.5 CASE

1.3.6 GUI

1.3.7 ROI

1.3.8 HCI

1.3.9 JIT

1.3.10 RFQ

(10 × 1) (10)

1.4 Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A–P) next to the question number (1.4.1–1.4.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.4.1	Comparing different installations to get an idea of how a product or technology will behave in an organisation's own environment	A	enterprise computing
		B	prototype
		C	agile methodology
1.4.2	Collection and manipulation of a large volume of data that are generated by an organisation's daily activities into easily understandable information	D	benchmarking
		E	information
		F	data processing
1.4.3	Complete computing platform used by different departments across an organisation	G	tactical
		H	system
1.4.4	Planning that provides specific ideas for implementing a strategic plan	I	event trigger
1.4.5	Used to determine the current value of the expected forecast returns of a project	J	decentralisation
		K	primary key
1.4.6	Declaration that the system is interested in a certain event and will respond to it accordingly	L	enterprise computing
		M	foreign key
1.4.7	Field that uniquely identifies a record in a database	N	net present value
		O	data modelling
1.4.8	Process to define and analyse a system's data and the related data requirements into a schema	P	level 1 DFD
1.4.9	Methodology prescribing quick development in a very short period		
1.4.10	When a context diagram is decomposed into multiple bubbles/processes		

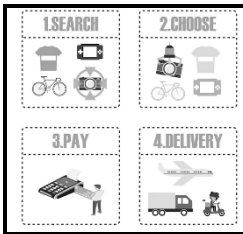
(10 × 1) (10)
[40]

TOTAL SECTION A: 40

SECTION B

QUESTION 2

2.1 Read the snippet below and answer the questions that follow.



A point-of-sale (POS) system refers to the combination of hardware and software required to accept and process different forms of digital payments. A POS is an example of a transaction processing system (TPS) used daily by organisations. The hardware includes a card acceptance machine and the software handles the remaining payment methods, the processing, and other peripheral value-added services.

2.1.1 Define the term *transaction processing system.* (2)

2.1.2 Differentiate between *online processing* and *batch processing* used for a transaction processing system. (2 × 2) (4)

2.2 Study FIGURE 1 below and answer the questions that follow.

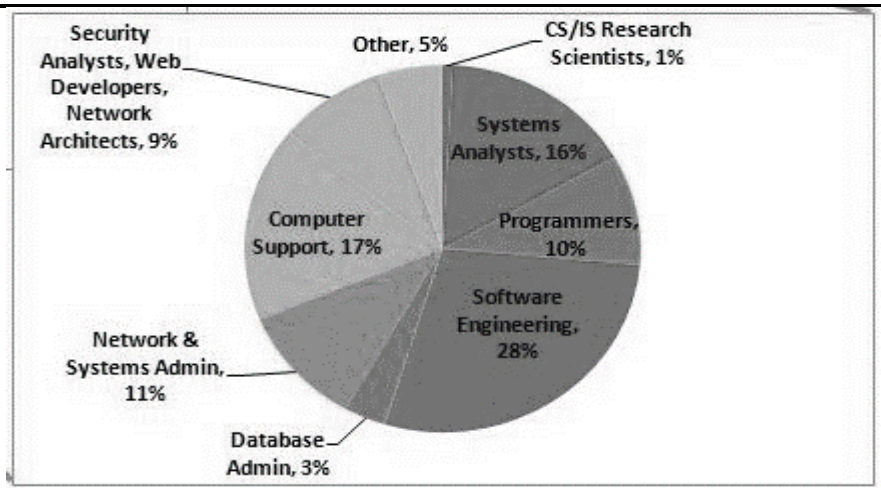


FIGURE 1: COMPUTING CAREER EMPLOYMENT

Information systems require people in almost every respect. People must not only envision, create and provide support for information systems, but also use information systems.

2.2.1 Name any TWO management positions in an information systems department. (2)

2.2.2 Explain the primary responsibilities of the following incumbents in an information systems department.

(a) Network administrator.
(b) Database administrator.
(c) Security analyst. (3 × 2) (6)

[14]

QUESTION 3

3.1 Define the term *agile methodology.* (2)

3.2 Read the following scenario and answer the questions that follow.

Mr Zulu is a senior lecturer in Information Technology & Computer Science at Mzansi TVET college. Although the college currently has a computer network and a legacy student information system, Mr Zulu wants a new system that will allow the college to keep the personal records and assessment marks of students, features which the legacy system does not have. He also wants a system that will allow students to use computers to improve their learning. Mr Zulu requests Mrs Thandeka Khumalo, a systems analyst, to design the new system. Mrs Khumalo prefers to adopt a waterfall approach to design the new information system.

3.2.1 Explain any TWO critical skills that Mrs Khumalo needs to function effectively as a systems analyst. (2 × 2) (4)

3.2.2 Explain the concept of the *Systems Development Life Cycle* (SDLC). (2)

3.2.3 Mr Zulu has asked you to draw a diagram that visually represents the phases of the SDLC when a waterfall approach is adopted. (6)

3.2.4 Suggest a reason why Mr Zulu has decided to embark on the development of a new system. (1)

3.2.5 Give any TWO reasons that might cause the development of such a system to fail. (2)

3.2.6 Mrs Khumalo has suggested that Mr Zulu look at the benefits of an agile methodology.

Identify THREE advantages of an agile methodology. (3)

[20]

QUESTION 4

4.1 Study the scenario below and answer the questions that follow.



Forever Tents Company would like to venture into online commerce. To this end, they have hired Solomon & Nkabinde Business Consultants (SNBC).

According to the lead systems analyst, the e-commerce application needs three important pages, namely a home page, a sign-up page and a login page, to go live.

FIGURE 2 below shows a list, compiled by the lead systems analyst, of all the tasks and sub-tasks to complete the project.

Forever Tents e-commerce application
1. Home page
1.1 Develop User Interface
1.1.1 Banners and Logo
1.1.2 Team Introduction
1.2 Develop content
1.2.1 Product Listing
1.2.2 Categorise Products
2. Sign-up page
2.1 Develop User Interface
2.1.1 Sign-up form
2.2 Database Design
2.2.1 Database Tables
3. Login page
3.1 Develop User Interface
3.1.1 Login form
3.1.2 Forgot password

FIGURE 2: FOREVER TENTS' E-COMMERCE APPLICATION TASK LIST

Based on the task list in FIGURE 2, create a work breakdown structure (WBS) for the Forever Tents e-commerce application. (7)

4.2 The diagram below (FIGURE 3) indicates the functions that the development team will perform to create a website for the Forever Tents e-commerce application.

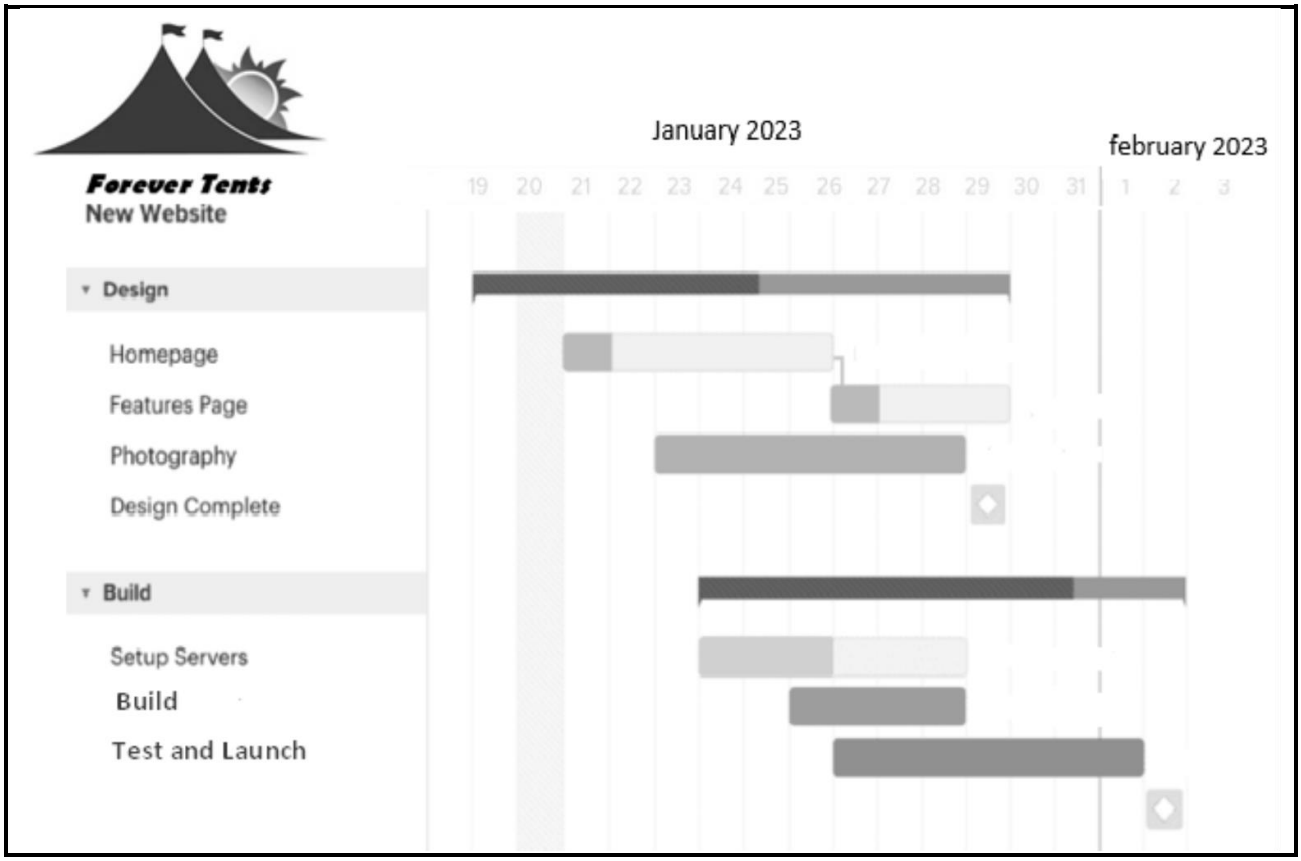


FIGURE 3

4.2.1 Identify the diagram indicated in FIGURE 3. (1)

4.2.2 Explain the purpose of the diagram identified in QUESTION 4.2.1. (1 × 2) (2)

4.2.3 Identify the phases in the diagram above. (1)

4.2.4 Which TWO tasks are concurrent tasks? (1)

4.3 The lead systems analyst compiled a list of activities in preparation for the launch of the web application for Forever Tents, as shown in the table below.

Forever Tents

Activity	Description	Immediate predecessor	Estimated completion time (days)
A	Arrange remote website hosting	-	7
B	Design home page	-	5
C	Register domain name	-	7
D	Configure remote webserver	A	3
E	Designing the logo	B	5
F	Advertise website address on social media channels	C	8
G	Design ERD for database	C	4
H	Upload logo to home page	E, F	7
I	Develop database tables	D	7
J	Upload code to webserver	H, G	4

Draw a PERT chart using the information given the in the table above. Indicate all activities and their duration. (11)
[23]

QUESTION 5

Study the scenario below and answer the questions that follow.

Forever Tents

Forever Tents Company has put aside an investment amount of R80 000. The table below indicates the financial figures related to the development of the website that will allow customers to purchase tents online.

YEAR	TOTAL BENEFITS	DISCOUNT FACTOR	PRESENT VALUE
0	-R80.000	1	A?
1	R40.000	0.91	B?
2	R30.000	0.83	C?
3	R40.000	0.75	D?
	Discount Rate 10%	NPV=	E?

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5.1	Write the acronym CBA in full.		(1)
5.2	Provide the formula for calculating the discount factor.		(2)
5.3	Calculate the present values A to D in the table above.	(4 × 2)	(8)
5.4	Calculate the net present value (NPV) represented by E in the table above.		(2)
5.5	Should the company invest in this project?		(1)
5.6	Motivate your answer for QUESTION 5.5.	(1 × 2)	(2)
5.7	Differentiate between a *cost advantage* and a *differentiation advantage*.	(2 × 2)	(4)
5.8	Define the term *payback period.*		(2)

[22]

QUESTION 6

6.1 Study the sentences below and identify the type of event that an organisation's information system must respond to.

6.1.1	Create monthly management report.		(1)
6.1.2	Customer places order.		(1)
6.1.3	Letter sent to the customer whose account is in arrears.		(1)
6.1.4	Explain each of the event types you have identified in QUESTION 6.1.1 to 6.1.3.	(3 × 2)	(6)

6.2 Study the scenario below and answer the questions that follow.

Forever Tents

The lead systems analyst of SNBC has requested you to help finalise the entity relationship diagram (ERD) so that the database tables for the e-commerce application can be created. The analyst has provided you with FIGURE 4 and other relevant information.

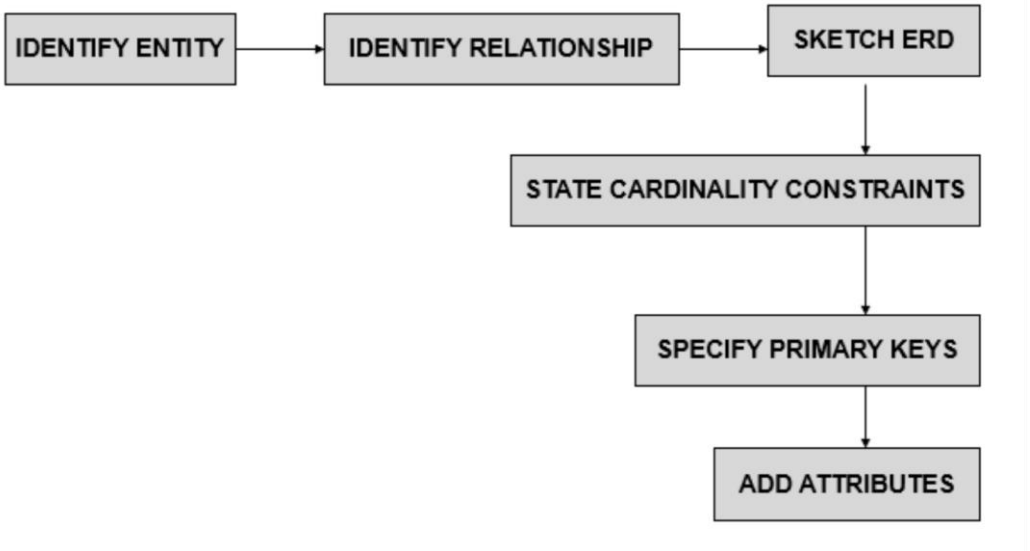


FIGURE 4

All customers who will use the e-commerce application will have a unique customer identity. The e-commerce application will also store the customer's name, address and contact details. When a customer places an order, a unique number is assigned to the particular order. The system also records the date and total of the order. Each order contains several items of a particular product and the system records its quantity. Each product is assigned a unique number. The product name, description and unit price are stored.

Use the information in the scenario to draw an entity relationship diagram (ERD) using crow's foot notation. Indicate all entities, non-key attributes, primary keys, foreign keys, relationships and cardinalities. (21)

[30]

QUESTION 7

7.1 Study the scenario below and answer the questions that follow.

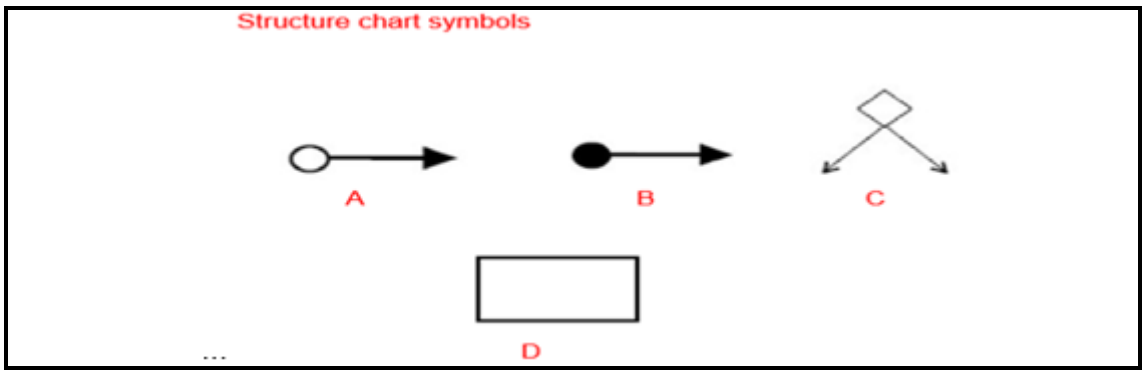
Forever Tents

The new Forever Tent system will require the customer to supply his/her personal details to create an account. The customer will then be able to log in with his or her username and password. To place an order, the customer will select an item (tent) and the system will check if it is available. The system will then send the customer a message indicating item availability and generate a shipping order to the warehouse. The customer will then pay for the order and an invoice will be sent to the customer. The system will also send scheduled reports to management on a regular basis.

7.1.1 Draw a context data flow diagram for the scenario above. (14)

7.1.2 List FOUR common errors to avoid when drawing a level-1 data flow diagram. (4)

7.2 Study the diagram in FIGURE 5 below and answer the questions that follow.



[Source: https://www.powermockup.com/libs/wireframe-and-mockup-shapes/touch-gestures]

FIGURE 5

7.2.1 Identify the structure chart symbols labelled (A–D). (4)

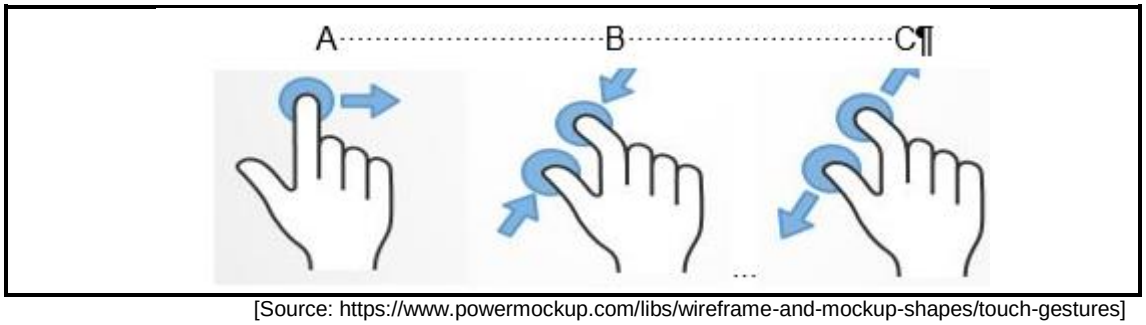
7.2.2 Briefly describe the purpose of each of the structure chart components identified in QUESTION 7.2.1. (4)

7.3 Define the term *functional decomposition.* (2)

[28]

QUESTION 8

8.1 Study the diagram in FIGURE 6 below and answer the questions that follow.



[Source: https://www.powermockup.com/libs/wireframe-and-mockup-shapes/touch-gestures]

FIGURE 6

8.1.1 Identify the touchscreen hand gestures labelled A, B and C. (3)

8.1.2 Discuss TWO disadvantages of a touchscreen interface. (2 × 2) (4)

8.2 Differentiate between the following terminologies.

8.2.1 Touchscreen interface and voice interface. (2 × 2) (4)

8.2.2 Text box control and check box control. (2 × 2) (4)

[15]

QUESTION 9

9.1 Differentiate between the lease and rental of computer equipment. (2 × 2) (4)

9.2 List TWO advantages of renting computer equipment. (2)

9.3 Name TWO circumstances that will make an organisation acquire computer technology. (2)

[8]

TOTAL SECTION B: 160
GRAND TOTAL: 200

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