



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

SYSTEM ANALYSIS AND DESIGN NQF LEVEL 4

(10041004)

**1 March 2018 (Y-Paper)
13:00–16:00**

Nonprogrammable calculators may be used.

This question paper consists of 13 pages.

**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. Write neatly and legibly.
-

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 Among the attributes of a professional, the following are essential:

- i Knowledge of the organisation
- ii An analytical mindset
- iii The ability to communicate verbally
- iv Excellent mathematical skills

Which ONE of the following is correct:

- A i, ii
- B i, ii, iii
- C i, ii, iv
- D i, iii, iv

1.1.2 The scope creep of a project refers to ...

- A all deliverables the project will achieve.
- B the actual scope of the project.
- C changes in the scope of the project.
- D the deadline date of the project.

1.1.3 Three major categories of risks are ...

- A business risks, personnel risks, budget risks.
- B project risks, technical risks, business risks.
- C planning risks, technical risks, personnel risks.
- D management risks, technical risks, design risks.

1.1.4 'Interviews should never be a surprise.' means ...

- A the interviewee should be familiar with the questions.
- B one should not be interviewed in an unfriendly manner.
- C the interviewee should be informed of the interview and its objectives in time.
- D the interview should not be a panel interview.

1.1.5 Analysts using all of their senses to examine users in the system environment, are an example of this information gathering technique:

- A Observation
- B Interview
- C Questionnaire
- D Reporting

1.1.6 A logical system model ...

- i documents the business entities the system manages.
- ii describes the system and includes implementation details.
- iii is independent of the technology that implements the system.
- iv is used by a software engineer to gain an understanding of the business.

Which ONE of the following is correct:

- A ii, iii, iv
- B i, ii, iii
- C i, ii, iv
- D i, iii, iv

1.1.7 The process of checking information being entered into a system to ensure it conforms with the data requirements of the system:

- A Verification
- B Validation
- C Communication
- D Navigation

1.1.8 Examining the source code of an entire information system is referred to as ...

- A system testing.
- B unit testing.
- C dynamic testing.
- D static testing.

1.1.9 ... is a measure of how long an information system takes to deliver output.

- A Response time
- B Throughput
- C Availability
- D Resource usage

1.1.10 The ... test is a measure of the ability of a machine to exhibit intelligent behaviour.

- A artificial intelligence
- B robot
- C Turing
- D synapse

(10 × 1) (10)

1.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.2.1–1.2.10) in the ANSWER BOOK.

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

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

1.2.3 Individual team members in a project can make their own estimates for a risk probability and then develop a consensus value.

1.2.4 An interview should not be longer than 15 minutes because the interviewee might struggle to stay focused.

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

1.2.6 Software engineering entails writing a technical description of software that will meet user requirements.

1.2.7 The ASCII encoding scheme can be used to represent international languages such as Japanese.

1.2.8 Data migration is the process of transferring data from one system to another.

1.2.9 User acceptance testing is also referred to as beta testing.

1.2.10 An expert system is a system of programs and data structures that imitate the operation of the human brain.

(10 × 1) (10)

- 1.3 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–O) next to the question number (1.3.1–1.3.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.3.1	Set of rules or a promise that limits access or places restrictions on certain types of information	A	interrogation
		B	entity
1.3.2	Course of action designed to help an organisation respond to risk	C	contingency plan
		D	preventative maintenance
1.3.3	Unique form of identification and access control	E	interviewee
1.3.4	Example of an unfriendly interview	F	corrective maintenance
1.3.5	Collection of individuals having some common interest and are used to gather feedback	G	confidentiality
1.3.6	Designs and implements systems to meet organisational goals and objectives	H	robot
		I	performance
1.3.7	Means by which computer systems and an individual interact	J	biometrics
		K	simulator
1.3.8	Diagnosing and fixing errors in an operational information system	L	programmer
1.3.9	Aspect of a system that can be improved which may require the need for maintenance	M	focus group
		N	user interface
1.3.10	Virtual reality environment used to train individuals	O	system analyst

(10 × 1)

(10)

1.4 What does each of the following acronyms stand for:

1.4.1 BSA

1.4.2 AUP

1.4.3 PIN

1.4.4 URS

1.4.5 DDL

1.4.6 SRS

1.4.7 DOS

1.4.8 SDLC

1.4.9 UAT

1.4.10 VR

(10 × 1) (10)
[40]

TOTAL SECTION A: 40

SECTION B

QUESTION 2

Read the following snippet and answer the questions.

You have been appointed as a senior system analyst heading an IT team of junior system analysts at Imaginary TechCompany Inc. The senior management of the organisation has tasked you with establishing equal opportunities in the workplace.

- 2.1 Describe FOUR measures you would put into place to ensure that you adhere to establishing equal opportunity at your workplace. (4 × 2) (8)
- 2.2 List FOUR qualities you would look for in junior team members for them to be regarded as professionals. (4)
- 2.3 Motivate, why from a career perspective it would be beneficial for you to have membership of a professional IT body such as the ITA or IITPSA. (4)
[16]

QUESTION 3

3.1 Read the following snippet and answer the questions.

DHA security below standard

Information technology has been emphasised as being an important security element at the Department of Home Affairs (DHA). The department presented on progress in security matters to the parliamentary portfolio committee. The committee members said security of the IT systems is a priority and there is a need to improve IT systems in order to get clean reports. Castro Khwela, the deputy director general for counter-corruption and security services at the DHA, said a risk assessment of DHA offices was done and many were found to be below the required minimum standards, as per the requirements of the Minimum Information Security Standard. The DHA also said its online verification system or the Home Affairs National Identification System (HANIS) is in the early stages of implementation and has the largest fingerprint database in the world.

[Adapted from: https://www.itweb.co.za/index.php?option=com_content&view=article&id=58911]

- 3.1.1 Identify the main security control measure that the HANIS system uses to safeguard sensitive information. (1)
- 3.1.2 Briefly describe what a risk assessment entails. (2)
- 3.1.3 The Department of Home Affairs received a quote for the development of the HANIS system which amounted to R1 000 000,00. An additional R250 000,00 will be required for the setup of a sever room which includes labour and other network requirements.
- The senior analysts estimated that the project has a 25% chance of failure.
- (a) Calculate the consequence of failure. (1)
- (a) Calculate the expected impact of failure. (2)
- (c) Calculate the probability of success. (1)
- (d) Calculate the expected impact of success (2)
- (e) Would you recommend the DHA to go ahead with the implementation of the system or not? Motivate your recommendation. (2)
- 3.1.4 List FIVE steps in the risk assessment process that the department can undertake to ensure they have a sound risk management plan. (5)
- 3.1.5 State TWO possible reasons that could threaten the successful implementation of the HANIS system. (2 × 1) (2)

3.2 Read the following snippet and answer the questions.

The TVET college where you study uses a database management system (DBMS) to store all information regarding enrolled students. The DBMS is installed on a server that forms part of the college's local area network (LAN). Amongst other things, the system stores assessment marks for all students. The college's administration data must be kept safe on their network due to the sensitive nature of the information. Another area of concern is that the college does not have any rules regarding any persons using the college systems in an unacceptable manner.

- 3.2.1 State TWO possible ways in which the data could be tampered with on the college's LAN. (2)
- 3.2.2 Suggest ONE precautionary measure that could be taken in each case stated in QUESTION 3.2.1 to prevent such occurrences. (2 × 1) (2)
- 3.2.3 Explain the purpose of security controls within the college's software environment. (2)
- 3.2.4 Suggest a penalty that any person can be liable for in terms of unacceptable usage of the college's ICT system. (1)

3.3 File security is based on establishing a set of permissions that describe the right a user has to any file or directory on a computer system.

List FIVE file permissions.

(5)
[30]

QUESTION 4

Read the following snippet and answer the questions.

You have been appointed as a systems analyst in a large company called Spreadsheet Gear. There is 305 employees employed at the head office with between 20 to 30 people at each of their 15 branches. The company is phasing out an old system they have been using. Every branch has its own manager and IT support personnel. You want to gather information on how the old system has been operating, what challenges the users, including the management of each branch and the head office experienced and what new features the users want to see in the new system. The Chief Information Officer wants to take every possible measure to ensure the successful implementation of the new system including having the proposed designs and requirements to be in place.

4.1 You decided to use a questionnaire to gather information.

Motivate why you selected to use a questionnaire as the most appropriate information gathering tool. Relate your motivation to the scenario. (4 × 2) (8)

- 4.2 Closed-ended questions enable analysts to control the interview and obtain the information they need. Answers to the questions require only a short answer of one or two words.
- 4.2.1 Differentiate between THREE types of closed-ended questions. (3 × 2) (6)
- 4.2.2 Design one applicable closed ended question of each of the types you mentioned in QUESTION 4.2.1.
(1 mark will be allocated for your design and 1 mark for the relevance toward the scenario) (3 × (1+1)) (6)
- 4.3 Differentiate between questions used in interviews and questions used in questionnaires. (3 × 1) (3)
- 4.4 List any THREE documents within the company that you can examine to gather more information about the system. (3 × 1) (3)
- 4.5 If you were to use the interview method instead, state any THREE important aspects that can be learnt or derived about the system by using this method. (3 × 1) (3)
- [29]**

QUESTION 5

Read the following snippet and answer the questions.

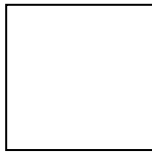
- 5.1

The TVET college where you are studying has decided to change the process of registering new students for the 2018 academic year. In addition to its usual registration process, there will first be a preadmission process, which will be done online. A student will fill in an online application form to begin the preadmission process, by selecting a course and supplying his/her details. The system will then generate a list of documents, which will also be sent via email to the student. The student must then submit these electronically by uploading the documents. If the student has submitted valid documentation, the system will generate a provisional acceptance letter on the screen, which will also be sent via e-mail to the student. If some of the documents are missing or invalid, the student is notified that it must be resubmitted. The student will only be provisionally accepted once all the required documents are submitted and validated. Once the student has received the acceptance e-mail, the usual registration process begins.

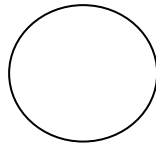
Use the information from the snippet, to draw a process flow diagram (PFD) which shows the steps to complete the preadmission process. (14)

5.2 Indicate what each of the following shapes represent in a data flow diagram:

5.2.1



5.2.2



or



5.2.3



(3 × 1) (3)

5.3 The college pre-admission system will allow the college administration department to obtain statistical data of prospective enrolments and possible course selections by students. The administration department also validates the documents uploaded by the student. The management are be able to set the number of possible enrolments allowed based on the preadmission data

Using this information as well as the description from the snippet in 5.1. Draw an applicable context diagram, to model the main data flows of the college Pre-admission system.

(10)

5.4 List any THREE tasks of a systems analyst.

(3)

[30]

QUESTION 6

6.1 List FOUR reasons for users to be involved when designing an input interface for an information system.

(4)

6.2 The primary objective of any form of data input is to enter or update error-free data into the system.

List FOUR best practices that can help to reduce input errors.

(4 × 1) (4)

6.3 Name FOUR typical processes as part of data entry.

(4)

[12]

QUESTION 7

7.1 Adoption/Implementation is the process of switching from an old information system to a new information system.

Tabulate ONE advantage and ONE disadvantage for each of the FOUR types of adoption/implementation strategies.

Use the following column headings:

ADOPTION STRATEGY	ADVANTAGES	DISADVANTAGES
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(4 + (4 x 2)) (12)

7.2 List THREE factors to consider when performing a post-implementation review. (3 x 1) (3)

7.3 Differentiate between black-box testing and white-box testing. (3 + 3) (6)

7.4 Define *Alpha testing* (2)

7.5 Performance of the system components can be measured using performance measurement criteria. Resource usage is the measure of hardware resources the system uses whilst running.

List FOUR examples of such resources. (4) [27]

QUESTION 8

8.1 Artificial intelligence is used in the daily operation of a factory to ensure maximum profit without losses to the company.

Study the picture below and answer the questions.



- 8.1.1 List FOUR typical activities performed by artificial intelligence in the manufacturing industry. (4)
 - 8.1.2 List THREE business areas where artificial intelligence is applied, other than production/manufacturing. (3)
 - 8.2 List FOUR components of an expert system. (4)
 - 8.3 Briefly describe FIVE real-world applications where virtual reality can be of benefit. (5)
- [16]**

TOTAL SECTION B: 160
GRAND TOTAL: 200