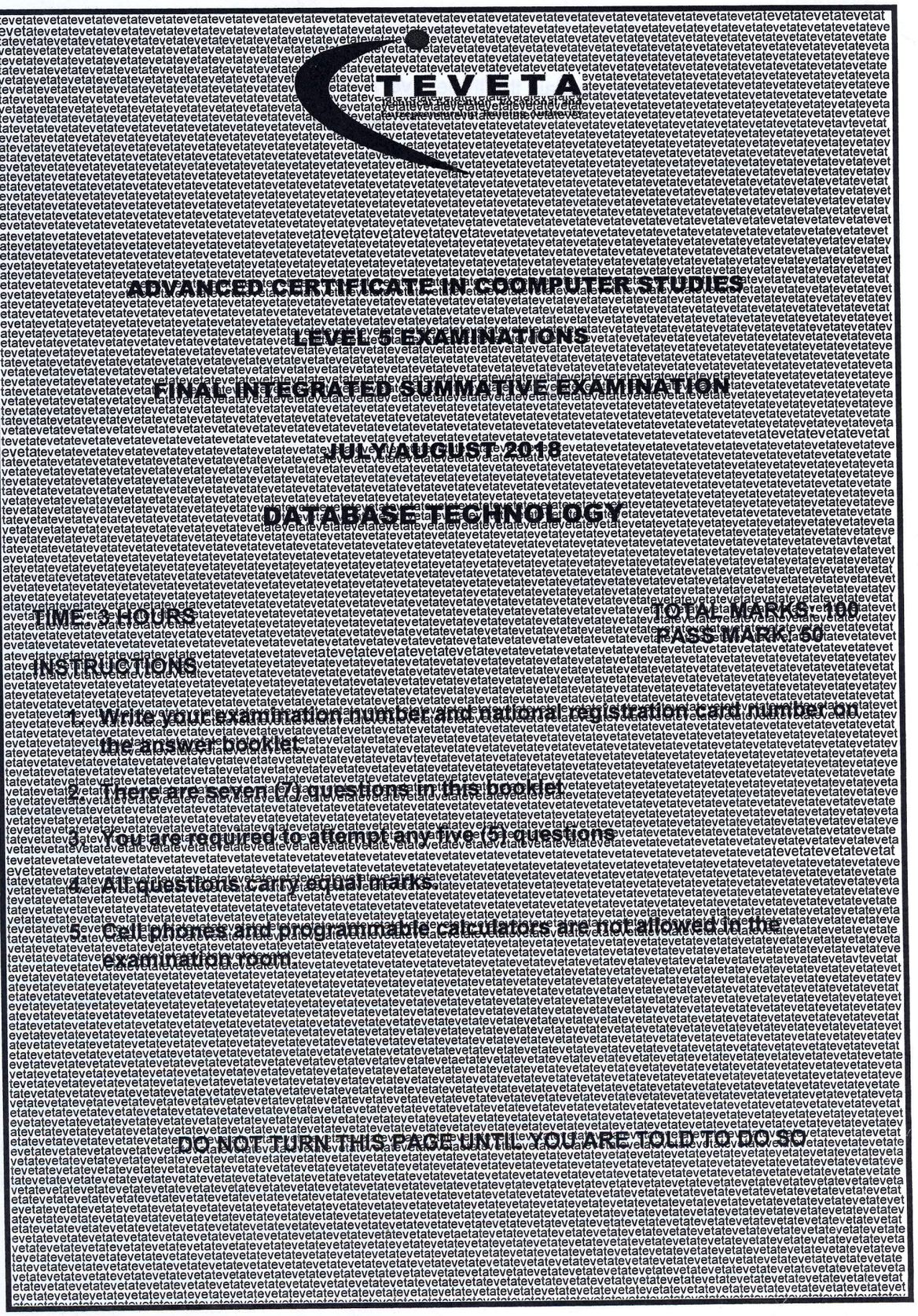
TEVETA
ADVANCED CERTIFICATE IN COMPUTER STUDIES
LEVEL 5 EXAMINATIONS
FINAL INTEGRATED SUMMATIVE EXAMINATION
JULY/AUGUST 2018
DATABASE TECHNOLOGY
TIME: 3 HOURS
TOTAL MARKS: 100
PASS MARK: 50
INSTRUCTIONS
1. Write your examination number and national registration card number on the answer booklet
2. There are seven (7) questions in this booklet
3. You are required to attempt any five (5) questions
4. All questions carry equal marks
5. Cellphones and programmable calculators are not allowed in the examination room
DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

Question 1

(a) Distinguish between the Database Schema and the Subschema. **(4 marks)**

(b) Using an illustration, explain the three-level ANSI-SPARC Architecture of the database. **(12 marks)**

(c) The objective of the three-level architecture is data independence. Explain the concept of data independence. **(4 marks)**

[Total: 20 Marks]

Question 2

(a) Confidentiality, Integrity and Availability are key issues in database security. Show your understanding of these concepts. **(12 marks)**

(b) Explain the following relational terminologies:

(i) Cardinality

(ii) Domain

(iii) Relational database

(iv) Relational database schema **(8 marks)**

[Total: 20 Marks]

Question 3

(a) Explain the following relational algebraic operations

(i) Set difference **(2 marks)**

(ii) Cartesian product **(2 marks)**

(iii) Semi join **(2 marks)**

(iv) Aggregate **(2 marks)**

(b) The Structured Query Language (SQL), the language used when working with database is divided into Data Manipulation Language (DML) and Data Definition Language (DDL).

Distinguish between the two languages giving two example commands of each. **(12 Marks)**

[Total: 20 Marks]

Question 4

A schema describing theatres, cities where they are located and shows is defined as follows:-

CITY (Name, State, Country)
THEATRE (Name, City, State, Capacity)
SHOW (Title, Artist, Hall, Attendance)

Write the following queries in SQL

(a) Find names of artists who performed before at least 5000 people, together with cities where those performances took place. **(5 marks)**

(b) Find all states in Zambia where Mr. X has performed. **(5 marks)**

(c) List all artists who never played in Kitwe. **(5 marks)**

(d) Find the name of theatres in Livingstone whose capacity exceeds 5000. **(5 marks)**

[Total: 20 Marks]

Question 5

(a) Database design is divided into logical and physical design. Describe each of these phases. **(6 marks)**

(b) Determine the multiplicity of the staff to branch and vice versa in the diagram below.

(4 marks)

a) Suppose you are given the following requirements for the National Netball League (NNL):

- The NNL has many teams
- Each team has a name, a city, a coach, a captain, and a set of players
- Each player belongs to only one team
- Each player has name, position (e.g. defender, shooter), a skill and a set of injury records
- A team captain is also a player

- A game is played between two teams (referred to as host_team and guest_team) and a date played and a score

(i) Construct an ER diagram for the NNL database using the Chen notation.

(6 marks)

(ii) Clearly indicating the cardinality mappings as well as any role indicators in your ER diagram. **(4 marks)**

[Total: 20 Marks]

Question 6

(a) Normalisation is a key concept in database design.

(i) State the key steps that must be carried to move a relation from one normal state to another up to 3NF **(6 marks)**

(ii) Consider the relation and explain why it is not in the second normal forms. **(2 marks)**

(iii) Normalise the relation up the 3NF **(6 marks)**

(b) Explain how the following are used in DBMS to enforce database security

(i) Access control

(ii) Views

(iii) Encryption **(6 marks)**

[Total: 20 Marks]

Question 7

(a) List the stages involved in query processing **(4 marks)**

(b) State any five (5) advantages of a DDBMS **(10 marks)**

(c) Describe any three (3) causes of database failure **(6 marks)**

[Total: 20 Marks]

disk failure
- power failure
- ~~space~~ system error
- media failure

improved db access
improved & error free
improved security
improved & correct db