



ALEXANDER ROAD HIGH SCHOOL

INFORMATION TECHNOLOGY GRADE 11 PAPER 2 (THEORY)

JUNE 2023

**Examiner: LO
Moderator: BL**

**Total: 140
Time: 3 hours**

INSTRUCTIONS AND INFORMATION

1. This paper consists of SIX sections subdivided as follows:

SECTION A : Multiple Choice & Short questions	(20)
SECTION B : System Technologies	(20)
SECTION C : Communications and Network Technologies	(24)
SECTION D : Data and Information Management	(18)
SECTION E : Solution Development	(38)
SECTION F : Integrated Scenario	(20)
2. Number the answers correctly according to the numbering system used in this question paper.
3. Leave a line between each answer and start each of the questions on a new page.
4. RULE A RIGHT-HAND MARGIN on every page you use.
5. Write neatly and legibly.
6. The mark allocation generally gives an indication of the number of facts/reasons required.
7. The paper consists of 9 pages in total.
8. Please hand in the question paper at the end of the examination. Do not staple the question paper to your answer set.

Surname, Name: _____

SECTION A: SHORT QUESTIONS

QUESTION 1

Various possible options are provided as answers to the following questions. Choose the most correct answer and write only the letter (A – D) CLEARLY next to the question number (1.1 – 1.10).

- 1.1 Which **ONE** of the following is **NOT** a characteristic of RAM?
- A. Non-volatile
 - B. Limited
 - C. Fast
 - D. Electronic
- 1.2 The technology that is used when the server sends a message to your phone informing you of an incoming message and delivers it to your phone automatically
- A. IM
 - B. DDR
 - C. Push
 - D. POP
- 1.3 Which type of connector is commonly used to attach storage devices, such as hard drives and solid-state drives, to a motherboard?
- A. USB
 - B. SATA
 - C. HDMI
 - D. VGA
- 1.4 Which **ONE** of the following devices is needed to allow communication between networks?
- A. Router
 - B. Hub
 - C. Switch
 - D. Hotspot
- 1.5 The following data types may be used in a Delphi CASE-statement:
- A. string, integer, boolean
 - B. string, integer
 - C. real, integer
 - D. char, integer, boolean
- 1.6 Which **ONE** of the following statements will calculate the bonus of a staff member correctly, if all staff members get a R5000 bonus and a further 5% of their salary for each year of service?
- A. $\text{Bonus} = \text{Salary} * 0.05 + \text{YearsOfService} + 5000$
 - B. $\text{Bonus} = (5000 + \text{YearsOfService}) * \text{Salary} * 0.05$
 - C. $\text{Bonus} = \text{YearsOfService} * \text{Salary} + 5000 * 0.05$
 - D. $\text{Bonus} = 5000 + \text{YearsOfService} * \text{Salary} * 0.05$

- 1.7 Renting out shared office space with a secretary, reception and meeting rooms etc. is known as running a:
- Home office
 - Mobile office
 - Virtual office
 - Coworking office
- 1.8 What is the purpose of the CMOS battery on a motherboard?
- It powers the CPU.
 - It provides power to the RAM.
 - It regulates the voltage supplied to the motherboard.
 - It maintains the system time and BIOS settings.
- 1.9 Which set of initial values assigned to variables X and Y will result in the while-loop never being executed?
- ```

X ←
Y ←
While (X < 2) OR (Y < 5) do
...
end loop

```
- X = 1 and Y = 5
  - X = 2 and Y = 4
  - X = 2 and Y = 5
  - X = -2 and Y = -5
- 1.10 The part of a computer is responsible for processing the instructions that create images on the computer monitor.
- RAM
  - GPU
  - HDD
  - CPU

(10)

**Choose a term from Column B that matches the description in Column A. Write only the letter (A-Q) next to the question numbers (1.11 to 1.20)**

| COLUMN A |                                                                             | COLUMN B           |
|----------|-----------------------------------------------------------------------------|--------------------|
| 1.11     | Quality of output is directly related to the quality of input.              | <b>A</b> ZIF       |
| 1.12     | Configuration of 2 or more HDDs designed to minimise data loss.             | <b>B</b> Firmware  |
| 1.13     | Prevents unauthorised access to a network.                                  | <b>C</b> Interrupt |
| 1.14     | Creating an entity that only exists in software.                            | <b>D</b> Cookies   |
| 1.15     | The total amount of data that can be transferred in a given period of time. | <b>E</b> GIGO      |
| 1.16     | A general term for conning techniques used to make email appear legitimate. | <b>F</b> Thrashing |
| 1.17     | Software that is permanently hard coded on a ROM chip.                      | <b>G</b> CAP       |
| 1.18     | An electronic alerting signal sent to the CPU from an external device       | <b>H</b> VM        |
| 1.19     | Socket on motherboard for connecting a CPU.                                 | <b>I</b> Driver    |
| 1.20     | Software that allows the hardware to communicate with the operating system. | <b>J</b> RAID      |
|          |                                                                             | <b>K</b> Spam      |
|          |                                                                             | <b>L</b> Firewall  |
|          |                                                                             | <b>M</b> Spoofing  |
|          |                                                                             | <b>N</b> Bandwidth |

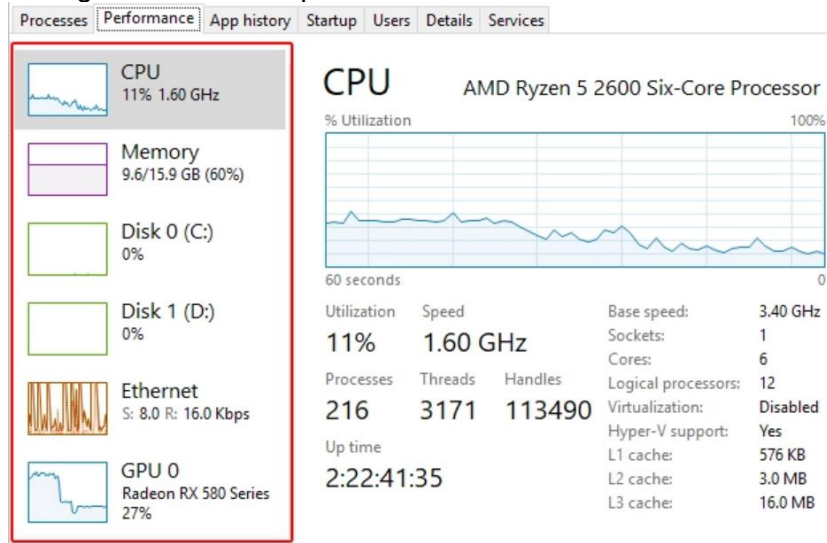
**TOTAL SECTION A: 20**

## SECTION B: SYSTEM TECHNOLOGIES

### QUESTION 2

You and your friend have decided to do some job shadowing at a computer company to gain insights into the world of hardware and software.

- 2.1 On the first day you were shown a few options for checking CPU and memory usage in the Windows Task Manager. Answer the questions that follow based on the information in the image.



- 2.1.1 Briefly explain what 'Threads' refer to in terms of processing when a program is executed. (2)
- 2.1.2 The speed of the processor with six cores is 1.6 GHz.  
Does the presence of six cores mean that tasks will be processed at six times the speed of the CPU? Explain your answer. (2)
- 2.1.3 The image indicates the sizes of L1 and L2 cache memory. Define cache memory and explain the purpose of caching. (3)
- 2.1.4 The machine cycle refers to a sequence of steps that a computer's CPU goes through to execute a single machine language instruction.  
You have been asked to list the first **THREE** steps of the machine cycle by filling in the missing parts in the steps below.
- a) Step 1: Fetch the data and instructions from \_\_\_\_\_.
  - b) Step 2: \_\_\_\_\_ the instructions.
  - c) Step 3: \_\_\_\_\_ the instructions. (3)
- 2.2 The Operating System manages processes and tasks; and makes use of various processing techniques.
- 2.2.1 Besides managing processes and tasks, list TWO additional functions of an operating system. (2)
- 2.2.2 Does the computer mentioned in question 2.1 makes use of multiprocessing? Motivate your answer. (1)
- 2.2.3 Explain what is meant by *multithreading*. (2)
- 2.3 Computers generally support plug and play which makes it easier to upgrade. Explain the term plug and play. (2)
- 2.4 Your friend mentions that his PC relies heavily on virtual memory.
- 2.4.1 Define virtual memory. (2)
- 2.4.2 Suggest a solution for your friend's problem. (1)

**TOTAL SECTION B: 20**

## SECTION C: COMMUNICATIONS AND NETWORK TECHNOLOGIES

### QUESTION 3

- 3.1 Modern networks often employ a mix of physical and logical topologies to optimise performance and meet specific needs.
- 3.1.1 Briefly explain what a *network topology* is. (1)
- 3.1.2 List **THREE** advantages of a star topology. (3)
- 3.1.3 Draw a simple diagram to illustrate a star topology (consisting of 4 computers and a switch). Label the components in your diagram. (3)
- 3.1.4 Explain the role of a switch in a network. (2)
- 3.2 Data transmission is governed by protocols.
- 3.2.1 Which protocol is used for a secure website? (1)
- 3.2.2 What is the function of VoIP? (2)
- 3.3 One of the reasons for setting up a computer network is to be able to share hardware resources. Give **THREE** other reasons why a business would setup a network. (3)
- 3.4 Every computer needs a NIC when a network is set up.
- 3.4.1 What does the acronym NIC stand for? (1)
- 3.4.2 What is the purpose of a NIC in a network? (2)
- 3.4.3 What does it mean if a NIC has a specification of 802.11? (1)
- 3.5 Location-based computing requires the technology to send the location from a device to the computer that is processing it.
- 3.5.1 Which technology is generally used for location-based computing? (1)
- 3.5.2 Suggest **ONE** possible advantage to a business if they use location-based computing. (1)
- 3.6 A company would like employees to be able to use the company's network from home. They have been advised to make use of a VPN. Briefly explain what a VPN is in this context. (3)

**TOTAL SECTION C: 24**

## SECTION D: DATA AND INFORMATION MANAGEMENT

### QUESTION 4

A local company has asked you to design a program which will help them to keep track of which employees have borrowed books from their resource centre. The following database tables have been designed to store data for the resource centre.

**tblResource**

| Field Name      | Example of data       |
|-----------------|-----------------------|
| ResourceID      | 001                   |
| Type            | Book                  |
| Title           | Networking Essentials |
| Author          | Kurose                |
| ReplacementCost | 599.00                |
| Availability    | Yes                   |

**tblEmployees**

| Field Name    | Example of data                               |
|---------------|-----------------------------------------------|
| EmployeeID    | 0001                                          |
| Name          | Simon Williams                                |
| Gender        | M                                             |
| Address       | 68 Western Road,<br>Durbanville,<br>Cape Town |
| ContactNumber | 821215687                                     |
| Permanent     | Yes                                           |

- 4.1 Fields are used in database tables.
- 4.1.1 Explain the difference between a field and a record. (2)
- 4.1.2 Define a primary key field. (1)
- 4.1.3 Identify a field from each of the two tables which could be used as a primary key.  
Write down the name of the table and next to it, the relevant field name. (2)
- 4.2 Explain how each of the following data validation techniques can be applied to the Gender field in the tblEmployees table.
- 4.2.1 Presence check (1)
- 4.2.2 Range check (1)
- 4.2.3 Data type check (1)
- 4.3 There are some shortcomings in the design of tblEmployees that need to be corrected. Identify **TWO** fields that have issues and suggest what needs to be done to improve the quality of the data that will be stored in this table. In each case provide a REASON why the changes need to be made. (4)
- 4.4 Which data type is suitable to use for the following fields in the tblResource table?
- 4.4.1 ResourceID (1)
- 4.4.2 ReplacementCost (1)
- 4.4.3 Availability (1)
- 4.5 Working with data that is not accurate can have undesirable consequences. Besides *accuracy*, list **THREE** other characteristics of quality data. (3)

**TOTAL SECTION D: 18**

## SECTION E: SOLUTION DEVELOPMENT

### QUESTION 5

5.1 Study the segment from a program shown below and answer the questions that follow:

```
begin
{1} Assignfile(tFile, 'NameDate.txt');
{2} Reset(tFile);
{3} Assignfile(nFile, 'New.txt');
{4} Rewrite(nFile);
{5} while NOT Eof(tFile) do
 begin
{6} readln(tFile, sLine);
{7} redOutput.Lines.Add(sLine);
{8} if copy(sLine, 1, 2) = '11' then
{9} writeln(nFile, sLine);
 end;
{10} closefile(nFile);
end;
```

5.1.1 Explain the significance of line:

- a) 1: Assignfile(tFile, 'NameDate.txt'); (2)
- b) 2: Reset(tFile); (2)
- c) 4: Rewrite(nFile); (2)

5.1.2 Which line of code {1} to {10} will write data to the file New.txt? (1)

5.1.3 When the program executes, the following message displays: *'File not found'*  
Give **TWO** reasons why an error message like this will be displayed. (2)

5.2 Study the following repeat loop code segment:

```
Repeat
 //code
Until (iNum1 >= 60) AND (iNum2 > 40)
```

5.2.1 Rewrite the code segment as a while loop. (5)

5.2.2 Explain what would cause an infinite loop. (2)

5.3 Arrays are used in many programming applications. An array element must have an index when referring to it in the program.

5.3.1 Define the term, Array. (2)

5.3.2 Explain what is meant by an *'element'* in an array? (1)

5.3.3 List **FOUR** ways of populating elements in an array. (4)

5.4 Give **TWO** advantages of storing data in a database as opposed to text files. (2)

5.5 Study the following code segment and answer the questions below:

```
{1}for m := isize downto 1 do
{2} for k := 1 to m-1 do
 begin
{3} if arrNum[k] < arrNum[k+1] then
 begin
{4} temp := arrNum[k];
{5} arrNum[k] := arrNum[k+1];
{6} arrNum[k+1] := temp;
 end;
 end;
```

5.5.1 Complete the trace table on page 8. (8)

5.5.2 Assuming arrNum consists of the elements: 

|   |   |   |
|---|---|---|
| 3 | 7 | 5 |
|---|---|---|

 write down the contents of arrNum after the code has been executed. (1)

5.5.3 Identify the algorithm in question 5. (1)

5.5.4 Explain the algorithm in your own words. You may not simply translate the Delphi code into English. (2)

5.5.5 What would the output be if the < in line {3} was changed to > ? (1)

## SECTION E: SOLUTION DEVELOPMENT

### QUESTION 5.5

Attach this trace table after Question 5.4

```

{1} for m := isize downto 1 do
{2} for k := 1 to m-1 do
 begin
{3} if arrNum[k] < arrNum[k+1] then
 begin
{4} temp := arrNum[k];
{5} arrNum[k] := arrNum[k+1];
{6} arrNum[k+1] := temp;
 end;
 end;
end;

```

| Step | Line | iSize | m | k | temp | True/False | arrNum |   |   |
|------|------|-------|---|---|------|------------|--------|---|---|
|      |      |       |   |   |      |            | 1      | 2 | 3 |
|      |      | 3     |   |   |      |            | 3      | 7 | 5 |
| 1    |      |       |   |   |      |            |        |   |   |
| 2    |      |       |   |   |      |            |        |   |   |
| 3    |      |       |   |   |      |            |        |   |   |
| 4    |      |       |   |   |      |            |        |   |   |
| 5    |      |       |   |   |      |            |        |   |   |
| 6    |      |       |   |   |      |            |        |   |   |
| 7    |      |       |   |   |      |            |        |   |   |
| 8    |      |       |   |   |      |            |        |   |   |
| 9    |      |       |   |   |      |            |        |   |   |
| 10   |      |       |   |   |      |            |        |   |   |
| 11   |      |       |   |   |      |            |        |   |   |
| 12   |      |       |   |   |      |            |        |   |   |
| 13   |      |       |   |   |      |            |        |   |   |
| 14   |      |       |   |   |      |            |        |   |   |
| 15   |      |       |   |   |      |            |        |   |   |
| 16   |      |       |   |   |      |            |        |   |   |
| 17   |      |       |   |   |      |            |        |   |   |
| 18   |      |       |   |   |      |            |        |   |   |
| 19   |      |       |   |   |      |            |        |   |   |
| 20   |      |       |   |   |      |            |        |   |   |
| 21   |      |       |   |   |      |            |        |   |   |
| 22   |      |       |   |   |      |            |        |   |   |
| 23   |      |       |   |   |      |            |        |   |   |
| 24   |      |       |   |   |      |            |        |   |   |
| 25   |      |       |   |   |      |            |        |   |   |
| 26   |      |       |   |   |      |            |        |   |   |
| 27   |      |       |   |   |      |            |        |   |   |
| 28   |      |       |   |   |      |            |        |   |   |
| 29   |      |       |   |   |      |            |        |   |   |
| 30   |      |       |   |   |      |            |        |   |   |

TOTAL SECTION E: 38



## SECTION F: INTEGRATED SCENARIO

### QUESTION 6

Your geography teacher has decided to take your class on an educational expedition to a rural area in Africa. Because of the remoteness of the area, there is no cellular reception, landline or cabled connectivity.

- 6.1 The school wants daily updates posted on the Internet showing the progress of the educational journey.
- 6.1.1 What is this type of daily updated website that functions as an online diary known as? (1)
- 6.1.2 What technology will have to be used to make a connection to the Internet? (1)
- 6.2 A significant amount of computer equipment will be used at the camp.
- 6.2.1 Some of the computing devices at the camp use SSDs as their main storage. Give the main advantage of SSDs over other types of storage. (1)
- 6.2.2 The camp's electricity will be supplied by a generator. What equipment should they have to help protect the database computer if the generator should suddenly stop working? (1)
- 6.2.3 You decide that the computers in the camp should use a wired network. What type of network cable should you use? (1)
- 6.3 Students will be working 12 hour shifts in marked areas. They need to be able to take photographs, make video recordings and accurately mark the location of items of interest.
- 6.3.1 What type of device would be best suited to do all these tasks? (1)
- 6.3.2 When they return to camp the data they have collected must be synchronised with the main database. What type of network should you set up to make it as easy as possible for them to synchronise their data? (1)
- 6.4 It is very important that scientific calculations and observations that are recorded and reported, should be accurate and correct.
- 6.4.1 What type of input will provide real-time and more accurate readings, rather than having people capture (type in) data manually e.g., temperature and humidity readings. (1)
- 6.4.2 Explain **TWO** ways how you would verify that the data captured at the site is correct and accurate. (2)
- 6.4.3 Malware is a threat to data and computers in general. List **THREE** precautionary steps that can be taken to reduce the risk of malware. (3)
- 6.4.4 The data is eventually going to be stored and analysed on computers at the school. How can the geography department ensure that the data stored on their computers will be able to be restored if it is lost because of fire or theft? (2)
- 6.5 Some of the data should only be accessible by the teaching staff.
- 6.5.1 What is the best general type of user identification security (excluding the use of passwords) that can be used to protect access to the data? (1)
- 6.5.2 Give **TWO** examples of this method of identification. (2)
- 6.6 An AUP is needed at the site. What does AUP stand for? (1)
- 6.7 Some of the teaching staff feel threatened by ICT. Discuss a factor that can lead to a fear of ICT. (1)

**TOTAL SECTION F: 20**  
**GRAND TOTAL: 140**