basic education

Department:
Basic Education
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GRADE 12

INFORMATION TECHNOLOGY P2

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MARKS: 150

TIME: 3 hours

This question paper consists of 17 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX sections:

SECTION A:	Short Questions	(20)
SECTION B:	Systems Technologies	(25)
SECTION C:	Communication and Network Technologies	(26)
SECTION D:	Data and Information Management	(24)
SECTION E:	Solution Development	(22)
SECTION F:	Integrated Scenario	(33)

2. Read ALL the questions carefully.

3. Answer ALL the questions.

4. The mark allocation generally gives an indication of the number of facts/reasons required.

5. Number the answers correctly according to the numbering system used in this question paper.

6. Write neatly and legibly.

SECTION A: SHORT QUESTIONS

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

1.1.1 … is the loss of signal strength caused by internal or external factors.

A Electromagnetic interference
B Eavesdropping
C Attenuation
D Crosstalk (1)

1.1.2 An e-mail protocol that downloads messages to the e-mail client is known as ...

A FTP.
B POP3.
C SMTP.
D VoIP. (1)

1.1.3 Embedded wires that allow data to travel in and out of the CPU are called ...

A bridges.
B arrays.
C streams.
D buses. (1)

1.1.4 Which type of software will allow users access to the code of an application by default?

A Open-source
B Shareware
C Proprietary software
D Freeware (1)

1.1.5 What is the role of a compiler in software development?

A Compresses source code files
B Translates source code into machine code
C Encrypts and decrypts source code
D Updates and adds source code (1)

1.1.6 What is the resulting data type of the DIV operator in Delphi programming?

A Float
B Boolean
C Integer
D String (1)

1.1.7 The following statements are given:

```
iNumber := 1;
for iRow := 1 to 4 do
  for iCol := 1 to 2 do
    inc(iNumber);
```

The value of `iNumber` after the execution of the provided code:

A 7
B 8
C 9
D 11 (1)

1.1.8 A distributed database with a growing list of records linked together, using cryptography, is known as ...

A bitcoin.
B backbone.
C blockchain.
D BitTorrent. (1)

1.1.9 … is memory that loses its contents when the power is switched off.

A EEPROM
B RAM
C ROM
D SSD (1)

1.1.10 … is a programming language that is used to define the structure and content of a web page and adds dynamic behaviour to the web page.

A Hypertext mark-up language (HTML)
B Extensible mark-up language (XML)
C JavaScript
D Structured query language (SQL) (1)

1.2 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 Computer.

1.2.1 An instruction given to a DBMS to reverse a transaction and restore the database back to its previous state (1)

1.2.2 A technique used by the operating system where tasks and processes are split up between the different CPU cores of a computer to be processed in parallel (1)

1.2.3 A type of printer that uses filament/thermoplastic that melts when heated and turns solid when it cools down (1)

1.2.4 A type of technology that allows a host operating system to run other operating systems on the same device at the same time (1)

1.2.5 The collection and storage of extremely large, diverse amounts of data over time that need to be processed, using complex algorithms (1)

1.3 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK. Correct the statement if it is FALSE by writing down the correct term.

NOTE: NO marks will be awarded for FALSE without the correct term.

1.3.1 A zombie is a network of computers that are remotely controlled by malware and then used by criminals to install and run malicious software. (1)

1.3.2 Green computing is the study and design of the workplace and the equipment that is used for the comfort and safety of people. (1)

1.3.3 A hyperlink is a built-in connection to another web page, indicated as text underlined in blue, or as a graphic with a blue outline. (1)

1.3.4 A patch is a collection of updates combined into one package. (1)

1.3.5 The WHERE clause in an SQL statement is used to test a condition that uses an aggregate function. (1)

TOTAL SECTION A: 20

SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

SCENARIO

Athletes from around the globe compete in a Global Marathon Series. The use of embedded ICT systems ensures a smooth and efficient experience for participants, organisers and spectators at a marathon.

2.1 The amount of memory in a computer system is crucial to ensure optimal performance.

2.1.1 Explain the function of primary memory (RAM) in a computer system. (2)

2.1.2 Discuss what *cache memory* is and how the use of cache memory contributes to the efficient functioning of a computer system. (3)

2.1.3 Explain why the use of virtual memory impacts negatively on the performance of a computer. (2)

2.2 Computers that are used to view a live marathon event are slow. It was suggested that a graphics processor unit (GPU) is installed in each of these computers.

Name TWO key factors that determine the computational power of a GPU. (2)

2.3 A computer technician at the event suggested that the computer used for the event should have a modular design with up-to-date software in the BIOS.

2.3.1 State TWO advantages of the modular design of a computer. (2)

2.3.2 State TWO functions of the BIOS. (2)

2.3.3 Explain why the BIOS is stored on non-volatile memory. (2)

2.4 All the electronic devices used during a marathon event are connected to a network.

2.4.1 Name a hardware component in a desktop computer that enables the computer to connect to a network. (1)

2.4.2 Besides hardware and software, what is another requirement for connecting a local network to the internet? (1)

2.5 Cloud computing will be utilised at the marathons.

2.5.1 Define *cloud computing*. (2)

2.5.2 Motivate how the use of cloud computing will reduce the hardware requirements of the computers used during a marathon. (2)

2.6 The organisers of international marathons want to use virtual reality during the Global Marathon Series.

2.6.1 Define *virtual reality*. (2)

2.6.2 Justify the use of virtual reality by giving TWO practical examples of how athletes can benefit from using this technology. (2)

TOTAL SECTION B: 25

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

The finish line of one of the marathons will be at a sports stadium. A set of networked computers will be used to help manage the marathon.

3.1 Networks can be classified according to topology, architecture and geographical reach.

3.1.1 State the name of a cabled network that covers a limited geographical area, such as a sports stadium. (1)

3.1.2 Define the term *bandwidth* in the context of a network. (2)

3.1.3 State the unit of measurement of bandwidth in a network. (1)

3.1.4 Each computer on the network is assigned an IP address.

Discuss the purpose of an IP address. (2)

3.1.5 A star topology has been suggested for this network.

Motivate why a star topology will be a suitable layout for this network. (2)

3.2 Users need to connect wirelessly to the network.

3.2.1 State TWO technologies that can be used to connect to a wireless network. (2)

3.2.2 Briefly describe how a person can connect to a wireless network from their device. (2)

3.2.3 A laptop's built-in wireless adaptor has been damaged.

Name the peripheral device that can allow the laptop to still access the network wirelessly. (1)

3.3 A website has been developed for the marathon event. The website allows participants to upload images and videos and share their experiences of the marathon.

3.3.1 Explain why a static website will not be a suitable choice for this website. (2)

3.3.2 Users will be requested to accept cookies when they visit the website.

Explain what a *cookie* is and state TWO ways in which it can be used to benefit the user. (3)

3.4 A ticketing system has been designed for the spectators at the event. Each ticket has an image similar to the one shown below.

3.4.1 What is this type of image called? (1)

3.4.2 Describe TWO benefits of having such an image on the spectators' tickets. (2)

3.5 The marathon can be streamed live or viewed on demand.

3.5.1 Differentiate between *live streaming* and *view on demand*. (2)

3.5.2 The server providing the streaming services has become unresponsive.

(a) State the term used for an attack that makes a website inaccessible by using a large number of computers to request data from the site at the same time. (1)

(b) Suggest TWO ways to prevent the server from becoming unresponsive in this context. (2)

TOTAL SECTION C: 26

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

4.1 The school is organising a marathon. The entries of all the athletes are saved in a table called tblAthletes.

4.1.1 Give TWO reasons why it would be more suitable to use a Google form rather than a printed entry form for the athletes to register for the marathon. (2)

4.1.2 The table below is an extract from the results of 12 500 athletes that were captured after completion of the marathon.

AthleteNum	NameAndSurname	EmailAddress	CellNumber	MarathonType	RaceTime	Position
A001	Koos Nel	NelK@gmail.com	627688255	Half-marathon	56	2
A008	John Smith	JohnS@outlook.com	728854173	Full marathon	205.55	3
A023	Andrew Khumalo	KhumaloAndrew@hotmail.com	832250170	Full marathon	215	7
A066	Herbert Kleyn	KleynH@gmail.com	638827795	Half-marathon	62.5	9
A082	James Green	GreenJ@gmail.com	924171321	Half-marathon	55	1
A091	John Baloi	BaloiCleverJohn@outlook.com	849638547	Half-marathon	82	34
A098	Rose Msiza	RoseMsiza@gmail.com	764147332	Full marathon	201.19	2

(a) An alphabetical list of data, sorted according to the athletes' surnames, is required by the school.

Give a reason why this cannot be accomplished with the current design of the table and provide a solution to the anomaly. (2)

(b) The data in the **CellNumber** field is not correct due to the first digit being omitted.

Suggest a change in the design of the table to save the cellphone numbers correctly. (1)

(c) Identify a redundant field in the table and motivate why it is redundant. (2)

(d) State TWO fields from the table provided that will be used to identify the winner of the half-marathon. (2)

(e) Two characteristics of quality data are accuracy and consistency.

(i) Define the term *accuracy* and give an example using the **RaceTime** field from the table above. (2)

(ii) Define the term *consistency* and give an example using the **AthleteNum** field from the table above. (2)

4.2 Data integrity is a common term associated with database design and operations.

4.2.1 Explain what *physical data integrity* refers to. (1)

4.2.2 State TWO hardware devices that can be used to ensure the physical integrity of data. (2)

4.3 Give ONE term for EACH of the following definitions:

4.3.1 The process of refining the structure of a database to minimise redundancy and improve integrity (1)

4.3.2 A field containing unique values that could be used as the primary key, but is not currently set as the primary key (1)

4.4 Explain how metadata adds value to data. (2)

4.5 There are different types of computer systems used in knowledge intensive organisations.

Justify the use of an expert system, rather than a decision-support system, in such an organisation. (2)

4.6 A user's digital footprint is created through invisible data collection.

Give TWO examples of where a digital footprint can be used. (2)

TOTAL SECTION D: 24

SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1 The date of a marathon is assigned to a string variable in the format dd/mm/yyyy:

```
sDate := '15/10/2024';
```

5.1.1 Which ONE of the following options (A or B) is the correct code to extract the month from the `sDate` variable?

A
```
sMonth := copy(sDate,4,5);
```

B
```
sMonth := copy(sDate,4,2);
```
(1)

5.1.2 The variable sMonth has been declared as a string variable and has been used to extract the month correctly from the date referred to in QUESTION 5.1.

A syntax error in Line 1 of the CASE statement below will prevent the code from being executed:

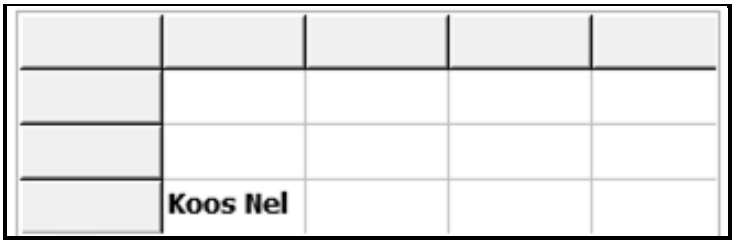
```
Line 1:   case sMonth of
          // correct code to display month name
          end;
```

(a) Give a reason why a syntax error will occur in Line 1 of the above code. (1)

(b) Explain how Line 1 can be changed to make the code correct. (1)

5.2 A StringGrid component in Delphi is an effective way of presenting data in rows and columns.

Write code that will display the text "Koos Nel" in the correct cell of the StringGrid component **stgData**, as shown in the screenshot below.



(2)

5.3 Determine the value of D in the following expression:

D = (C = B MOD 5) AND NOT E OR (A – C = 1)

where

A = 5, B = 12, C = -4, E = FALSE

NOTE: Show ALL the steps. (4)

5.4 An array named **arrNames** has been declared to store up to eight names. The array currently contains seven names. The variable **iNumElements** stores the number of names stored in the array.

1	Sammy
2	Brian
3	Claire
4	Thabiso
5	Thomas
6	Katleho
7	Dean
8	

A new name must be inserted at any index/position of array **arrNames**.

A partially completed pseudocode algorithm to do such an insertion has been provided below.

```
sName ← Input name to be inserted into array
iPosition ← Input index in array to insert the name

if (iPosition > 8) OR (iPosition < 1)
    Display error message
else

    // write pseudocode to complete this part of the
       algorithm
```

Complete the pseudocode using a **loop** to insert the name at the position that was entered, without losing any of the names currently stored in the array.

Example of output when the name 'Ezio' is inserted at index/position 2 of the array:

1	Sammy
2	Ezio
3	Brian
4	Claire
5	Thabiso
6	Thomas
7	Katleho
8	Dean

(7)

5.5 The following code is an extract of an object class **Runner_U.pas**:

```
type
 TRunner = class(Tobject)
   private
     fRunnerNO: integer;
     fName: String;
     fQualify: boolean;
     fNumMarathons: integer;
   public
     constructor Create(iRunnerNO: integer; sName: String;
        iNumMarathons: integer);
     procedure setQualify(bQualify: boolean);
     function getName: String;
     function toString: String;
   end;
```

Answer the following questions based on the code above:

5.5.1 Which keyword in the class definition above indicates that the attributes are not accessible outside the class? (1)

5.5.2 Which method will be called to instantiate the Runner object? (1)

5.5.3 The code provided shows some methods that describe the behaviour of the Runner object.

(a) One of the accessor methods has already been declared.

Write the declaration of any other accessor method that can be added to the class. (2)

(b) Identify a mutator method in the code above and explain the purpose of a mutator method. (2)

TOTAL SECTION E: 22

SECTION F: INTEGRATED SCENARIO

QUESTION 6

In preparation for a marathon, the organising committee has implemented an integrated information and communications technology (ICT) system to streamline various aspects of the event.

6.1 A website has been developed for athletes to register for the marathon.

6.1.1 Name TWO ways to determine whether a website is secure or not. (2)

6.1.2 Describe how data is encrypted and decrypted using SSL. (4)

6.2 The organisers of the marathon issue an RFID tag to each athlete.

6.2.1 Explain how an RFID tag can be used to determine the time it took the athlete to complete the marathon. (2)

6.2.2 A few of the athletes are doubtful about the use of RFID tags.

Briefly discuss how athletes can benefit from using RFID technology. (2)

6.3 Study the properties and features of the TechGlow Pro and Fitflex Ultra wearable devices below and answer the questions that follow.

TECHGLOW PRO	**FITFLEX ULTRA**
Sleek design: Slim and stylish to seamlessly integrate into your daily wardrobe **Advanced fitness tracking:** Monitors heart rate, sleep patterns, steps and calories burned with precision **Immersive display:** Crystal clear, touch-sensitive OLED screen for instant access to your health metrics **Smartphone compatibility:** Syncs effortlessly with your smartphone for calls, messages and app notifications on the go. **Long-lasting battery:** Enjoy extended use without worrying about frequent recharges	**Durable and waterproof:** Built tough to withstand any workout, and waterproof for swimming and rainy runs **Multi-sport functionality:** Ideal for various activities with specialised tracking modes like running, cycling and even yoga! **GPS connectivity:** Accurately analyse your outdoor workouts with integrated GPS **Health at your fingertips:** Keep an eye on your health with real-time data on your heart rate, blood oxygen and stress levels **Customisable bands:** Personalise your FitFlex Ultra with interchangeable bands to match your style

6.3.1 The FitFlex Ultra has GPS connectivity.

(a) Discuss how GPS technology works. (2)

(b) State TWO ethical issues related to wearing a device with GPS technology. (2)

6.3.2 The TechGlow Pro device is compatible with a smartphone.

State which wireless technology will make this connection possible. (1)

6.3.3 These wearable devices are able to measure items such as heart rate, sleep cycles, steps and calories burned.

Name the technology inside wearable devices that make all these measurements possible. (1)

6.3.4 These wearable devices have limited processing power, but have access to the internet.

Describe how the power of distributed computing can supplement the processing power of the wearable devices. (4)

6.4 The organisers of the marathon have decided to create a wiki website.

6.4.1 State TWO advantages of a wiki site. (2)

6.4.2 Explain how content providers can improve the quality of the contributions made to a wiki site. (2)

6.5 The advancements in mobile computing has made the internet and information easily accessible to everyone.

Explain the term *information overload* and motivate why it could pose a challenge to some individuals. Give a well-explained example as part of your answer. (4)

6.6 It is the responsibility of the marathon organisers to ensure that the marathon statistics and other information are kept safe.

6.6.1 Explain the term *spoofing*. (2)

6.6.2 Ransomware is malware that encrypts files until a ransom amount has been paid.

Why do criminals prefer the ransom amount to be paid in cryptocurrency? (1)

6.7 Software updates should always be downloaded and installed on a device to ensure that an application has the latest features.

What are TWO possible disadvantages of enabling automatic updates for software applications on a device? (2)

TOTAL SECTION F: 33
GRAND TOTAL: 150