basic education

Department:
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SENIOR CERTIFICATE EXAMINATIONS/
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INFORMATION TECHNOLOGY P2

MAY/JUNE 2024

MARKS: 150

TIME: 3 hours

This question paper consists of 15 pages.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of SIX sections:

        SECTION A: Short Questions   (15)
        SECTION B: Systems Technologies   (25)
        SECTION C: Communication and Network Technologies   (25)
        SECTION D: Data and Information Management   (22)
        SECTION E: Solution Development   (22)
        SECTION F: Integrated Scenario   (41)

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   A storage device that typically uses flash memory to store data, instructions and information:

        A   Optical disk
        B   Solid-state drive
        C   Hard disk
        D   Google Drive   (1)

    1.1.2   A text-based name that is linked to the IP address of the server that hosts a website:

        A   HTTP
        B   POP
        C   URL
        D   ISP   (1)

    1.1.3   A data structure that allows for the permanent storage of information:

        A   Text file
        B   Variable
        C   Array
        D   Object   (1)

    1.1.4   What will be the value of X if the following code is executed?

```
X = Trunc(6.9) + Floor(6.3);
```

        A   11
        B   12
        C   13
        D   14   (1)

    1.1.5   A … is a web service that allows users to post short text messages, usually containing between 100 and 200 characters.

        A   wiki
        B   portal
        C   microblog
        D   podcast   (1)

        Please turn over

1.1.6 A process whereby an infected file is isolated on the hard drive until the infection can be removed:

A Buffering
B Quarantine
C Clustering
D Blocking (1)

1.1.7 A type of mobile application that overlays media or information, over an image on the screen:

A Screen capturing
B Video display
C Augmented reality
D Artificial intelligence (1)

1.1.8 A small amount of purpose-specific memory inside a processor:

A Register
B ALU
C Bus
D RAM (1)

1.1.9 Software that is permanently stored onto a ROM chip:

A Driver
B App
C Firmware
D Hardcode (1)

1.1.10 Which ONE of the following data types is an ordinal data type?

A String
B Real
C Character
D Double (1)

1.2 Give ONE word/term for each of the following definitions. 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 A compromised computer or device whose owner is unaware that the computer or device is being controlled remotely by malware (1)

    1.2.2 A processing model that consists of software components running on multiple computers but working as a single, powerful system (1)

    1.2.3 A data-searching technique which interprets the intent and contextual meaning behind search phrases to deliver more relevant results (1)

    1.2.4 A field in a table that can contain duplicate values and is linked to the primary-key field of another table (1)

    1.2.5 A protocol that was designed to support one-way e-mail synchronisation, which allows users to only download e-mails from a server to a client (1)

TOTAL SECTION A: 15

SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

> **SCENARIO**
>
> The annual provincial video and music awards ceremony is scheduled to take place later in the year. An IT team has been tasked with integrating the power of systems technologies to make the event possible.

2.1   An audio-visual team is responsible for creating and editing a promotional video for the event as a part of the marketing campaign.

The notebook below, with the specifications provided alongside, has been purchased for each member of the audio-visual team.

Specifications:
- 14-inch LED 1920 x 1080 (full HD) 144 Hz
- Intel 11th Generation Core i7 5.0 GHz
- 16 GB DDR4
- NVIDIA GeForce RTX 3060
- Windows 11 Home

2.1.1   Name the amount of RAM that the notebook has, according to the specifications listed above.   (1)

2.1.2   The notebook has a 14-inch LED 1920 x 1080 (full HD) 144 Hz screen.

What does 144 Hz refer to?   (1)

2.1.3   Indicate which specification of the notebook refers to the dedicated graphics processing unit.   (1)

2.1.4   Explain why the increased resolution and corresponding improvement in display graphics quality will be beneficial to the user of the notebook.   (1)

2.1.5   State why an SSD will be the most suitable storage medium to be used, taking into consideration the purpose of the device.   (1)

2.2   Discuss the merit of using mobile devices at the award ceremony by referring to the advantages of using mobile devices rather than fixed workstations/PCs.   (3)

2.3 The members of the team who will be capturing footage during the event will need to add peripherals to their notebooks.

    2.3.1 Give the term used when the operating system (OS) automatically configures a peripheral when connected to a computer system. (1)

    2.3.2 What is the software program called that controls a specific hardware device attached to a computer? (1)

2.4 A team member reported that there was ransomware on his device.

    2.4.1 Explain what *ransomware* is. (2)

    2.4.2 State TWO ways in which a computer system can be protected from ransomware. (2)

2.5 The team will be trained on how to keep the data on their notebooks safe.

    2.5.1 One of the team members uses an external hard drive to save files.

        State TWO benefits of using an online service as a suitable alternative to an external hard drive. (2)

    2.5.2 Different kinds of backups can be performed on a computer system to keep data safe.

        Discuss a disadvantage of using a full backup compared to using an incremental backup. (2)

2.6 Data projectors will be used to display footage on stage during the event.

    2.6.1 State TWO advantages of using data projectors for this purpose. (2)

    2.6.2 Suggest a suitable method of connecting the data projector to a notebook and motivate your choice. (2)

2.7 One of the team members wants to load new software onto his notebook and noted the recommended system requirements of the software.

Explain the difference between the *minimum* and *recommended* system requirements and how these impact on the functionality of the software. (3)

TOTAL SECTION B: 25

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

> You have recently been appointed as an administrator at a cutting-edge gaming studio. The studio is renowned for creating innovative and captivating gaming experiences for players worldwide.

3.1 Networks are used at the studio to allow for fast and efficient communication to take place.

State ONE other reason for using a network, apart from fast and effective communication. (1)

3.2 The gaming studio will require efficient and secure file transfer.

Explain the process of transferring data using SSL. (4)

3.3 Many companies have created 'all-in-one' devices for consumers to be able to connect to the internet. These 'all-in-one' devices contain a switch, router and modem.
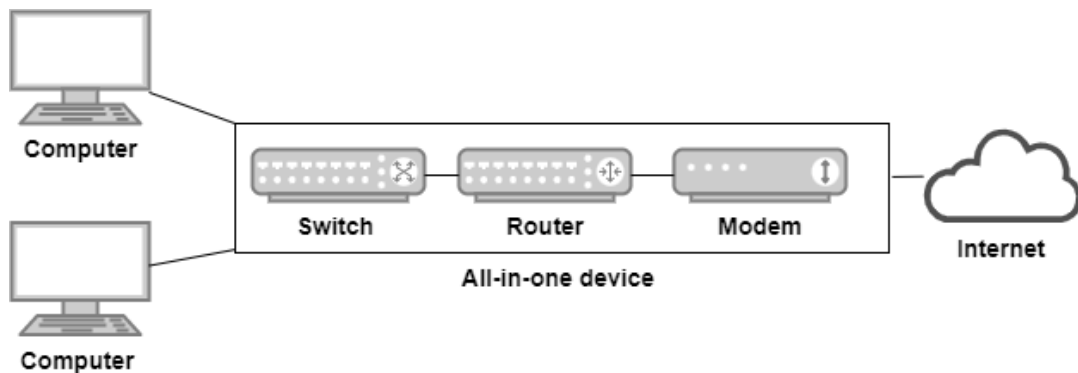
3.3.1 Describe the function of the following individual devices in this context:

(a) Switch (2)

(b) Router (2)

(c) Modem (2)

3.3.2 Companies are strongly advised to install a firewall when a connection to the internet is required during gaming sessions.

Motivate this recommendation by explaining how a firewall can protect a computer from potential malicious internet traffic. (2)

3.4   The gaming studio receives new demos of upcoming games directly from the developers.

      3.4.1   The gaming studio has a server facility. Motivate why a peer-to-peer network may be more suitable for the transfer of the demo games.   (2)

      3.4.2   Explain how the FTP protocol is used in this regard.   (2)

3.5   The gaming studio wants to manage the available bandwidth to meet the extensive internet usage demand of their customers.

      Discuss *shaping* and *throttling* and explain how EACH can be used to effectively manage and ensure fair bandwidth availability.   (4)

3.6   The Internet of Things (IoT) is a technology that is used widely for a wide range of purposes in many different scenarios.

      3.6.1   Explain the concept of the IoT.   (2)

      3.6.2   Name TWO possible applications of the IoT in a gaming studio.   (2)

TOTAL SECTION C: 25

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

A database is used to save details of artists and their shows during the provincial video and music awards ceremony.

4.1 The data for the awards ceremony has been saved in a database consisting of two tables, **tblArtists** and **tblShows**. The structure of the tables is shown below.

	tblArtists		
	Name of field	**Data type**	**Description**
PK	ArtistID	Autonumber	Unique artist number
	ArtistName	Text	Name of the artist
	Genre	Text	Genre of the artist
	Country	Text	Country of origin of the artist
	Website	Text	Website of the artist
	NumberOfShows	Number	The number of shows that the artist performs in

	tblShows		
	Name of field	**Data type**	**Description**
PK	ShowID	Autonumber	Unique show number
	ShowTitle	Text	Title of the show
	ShowDate	Date/Time	Date that the show takes place
	ShowDuration	Number	Duration of the show in minutes
	StageLocation	Text	Location of the stage where the show takes place

4.1.1 Explain the concept of database normalisation in the design of a database. (2)

4.1.2 A relationship needs to be created between the **tblArtists** and **tblShows** tables.

(a) This relationship should allow each show to be performed by one artist, and each artist has to be able to perform in many shows.

Explain how this one-to-many relationship can be properly created by implementing the appropriate primary key/foreign key relationship in the design of the tables. (2)

(b) Identify the redundant field in **tblArtists** and motivate your answer. (2)

4.1.3 Validation techniques can assist in ensuring the logical integrity of data in a database.

Explain what is meant by the term *logical integrity*. (1)

4.2   Each attendee at the awards function was provided with an armband equipped with an embedded RFID chip.

Name TWO useful practical applications of RFID at the awards ceremony.   (2)

4.3   An application uses a centralised database to connect a large number of users over a large geographical area.

4.3.1   Critique the use of a centralised database system for this application.   (2)

4.3.2   Name a suitable alternative database management model that will eliminate the problems identified in QUESTION 4.3.1.   (1)

4.4   There are many people involved in the design and maintenance of a database. One such person is a system analyst.

Name ONE other person involved in database design and management, and state the person's role.   (2)

4.5   The data of all the previous video and music awards are archived.

Differentiate between a *database* and a *data warehouse* regarding the storage of data.   (4)

4.6   Databases are especially vulnerable to a hacking technique known as an SQL injection attack.

4.6.1   Briefly describe how an *SQL injection attack* works.   (2)

4.6.2   Recommend TWO ways in which a database can be protected against an SQL injection attack.   (2)

TOTAL SECTION D: 22

SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1   You have been asked to assist in creating an application to control a smart television set (TV). The GUI below has already been designed.
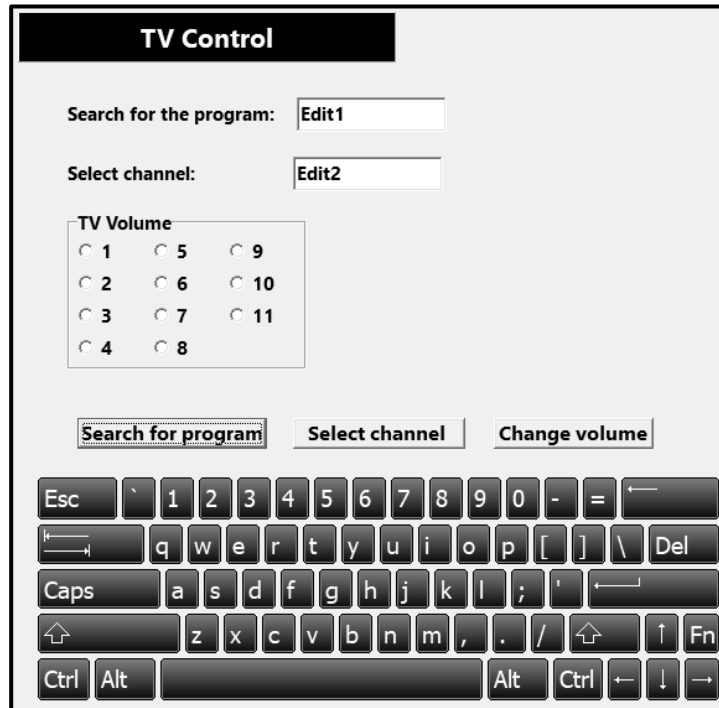
Identify TWO different types of components on the GUI above which can be replaced with more suitable components and motivate why.   (4)

5.2   Study the following segment of code:

Segment of code to *read from a file*	Output:
```Assignfile(tFile,'countries.txt');``` ``` Reset(tFile);``` ``` While not eof(tFile) do``` ``` begin``` ``` Readln(tFile,sCountry);``` ``` redOutput.Lines.Add(sCountry)``` ``` end;``` ``` ``` ``` CloseFile(tFile);```	Sweden Italy Japan Germany Greece

5.2.1   Explain the purpose of the Assignfile-statement with specific reference to the two arguments tFile and 'countries.txt'.   (2)

5.2.2   Explain why an error will occur if the Reset(tFile) in the given code is replaced with Append(tFile).   (1)

5.2.3   Explain why no output will be displayed if Reset(tFile) in the given code is replaced with Rewrite(tFile).   (1)

5.3 The first two steps of the pseudocode to calculate and display the HCF (highest common factor) of two numbers entered by the user are:

```
Step 1: Input iLower (smaller number)
Step 2: Input iUpper (bigger number)
```

Complete the pseudocode by writing down the remainder of the steps to solve the problem.

NOTE: The HCF is the biggest number that divides into both numbers entered without a remainder. (7)

5.4 You have been supplied with the following segment of code:

Array declaration and initialisation:	
`arrNames: array [1 .. 5] of String =` `('Sam','Phillip','Adam','Steve','Ziaan');`	
Line No.	**Sort code:**
1	`bChanged := True;`
2	`while bChanged do`
3	`begin`
4	`bChanged := False;`
5	`for i := 1 to length(arrNames) - 1 do`
6	`begin`
7	`if (arrNames[i] > arrNames[i + 1]) then`
8	`begin`
9	`sTemp := arrNames[i + 1];`
10	`arrNames[i + 1] := arrNames[i];`
11	`arrNames[i] := sTemp;`
12	`bChanged := True;`
13	`end;`
14	`end;`
15	`end;`

Study the code provided above and answer the questions below.

5.4.1 The code provided above sorts the names in the array in alphabetical order.

Which line of code will ensure that the names are sorted in alphabetical order? Write down the line number. (1)

5.4.2 Explain why a runtime error will occur if the value of 1 is not subtracted from the length of the array in Line 5. (2)

5.4.3 Discuss the purpose of **line 9 to line 11** of the provided code by explaining what the code does. You may use a diagram or simple illustration to support your answer. (4)

TOTAL SECTION E: 22

SECTION F: INTEGRATED SCENARIO

QUESTION 6

Mr Jones, who is one of the teachers at the school, started a video-editing club at the school. The purpose of the club is to create videos of events such as the matric farewell and sports activities. Learners who join the club are encouraged to gain knowledge about computer hardware and software.

6.1 Describe TWO functions of an operating system. (4)

6.2 A club member will need a computer with eight cores for video editing.

6.2.1 Define the following terms:

(a) Cores (2)

(b) Threads (2)

6.2.2 When a computer with eight cores is used, which processing technique would deliver the best results? Motivate your answer. (3)

6.2.3 A GPU will improve the performance of the computer. Justify this statement by explaining why the GPU improves the performance of a computer. (2)

6.3 During the process of deciding on the best available software to use for video editing, the club members decided to use virtual machines. Justify the use of virtual machines in this context. (4)

6.4 The existing computers at the club are running slow as the result of excessive use of virtual memory.

Explain the concept of virtual memory and what needs to be done to solve the problem mentioned above. (4)

6.5 The club will use a SaaS model for the video-editing software.

6.5.1 Explain what *SaaS* is. (2)

6.5.2 Explain at least THREE benefits of SaaS by analysing how it can be used in the video-editing club. (3)

6.5.3 Except for the software and a computer to use the software, what else will be an essential requirement to use SaaS software? (1)

6.6 The club members often visit websites for guidance on video editing.

    6.6.1 Some of the online training videos can only be streamed. Name ONE advantage of streaming a video. (1)

    6.6.2 Mr Jones told the club members not to trust all the information published, especially not information on wiki sites.

        Discuss TWO criteria that may be used to evaluate the reliability of the contents of a website. (4)

6.7 A video that was recorded by Mr Jones at one of the school events was saved on a hard drive.

    6.7.1 Describe the term *intellectual property*. (1)

    6.7.2 One of the club members decided to upload this video onto social media. Discuss the ethics of what he did. (2)

6.8 Club members will attend a free video-editing software webinar presented by a leading expert from the United Kingdom (UK).

    6.8.1 Briefly explain what a *webinar* is. (2)

    6.8.2 State ONE advantage of a webinar. (1)

    6.8.3 Club members will need to upload compressed video files during the webinar.

        Distinguish between the different compression techniques and propose the best technique to be used by the club members for this purpose. (3)

TOTAL SECTION F: 41
GRAND TOTAL: 150