



# basic education

Department:  
Basic Education

**REPUBLIC OF SOUTH AFRICA**

## **SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS**

**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)

- 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 11<sup>th</sup> 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.

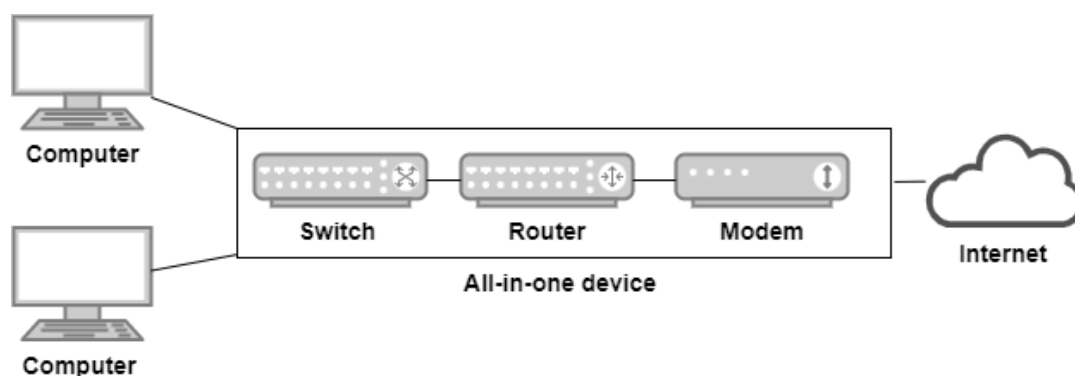
- 3.1 Networks are used at the studio to allow for fast and efficient communication to take place.

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)

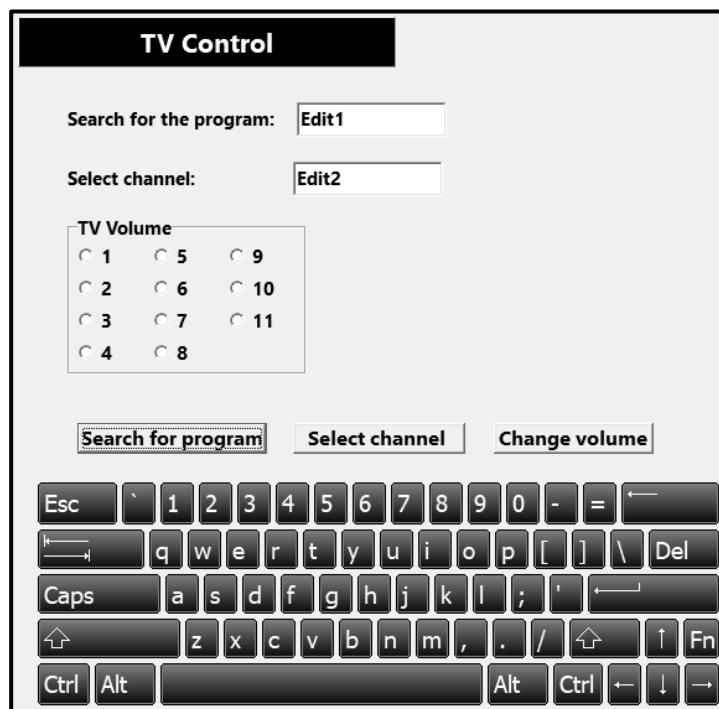
- 4.2 Each attendee at the awards function was provided with an armband equipped with an embedded RFID chip.  
Name TWO useful practical applications of RFID at the awards ceremony. (2)
- 4.3 An application uses a centralised database to connect a large number of users over a large geographical area.
- 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:                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| <pre>Assignfile(tFile, 'countries.txt'); Reset(tFile); While not eof(tFile) do begin   Readln(tFile, sCountry);   redOutput.Lines.Add(sCountry) end;  CloseFile(tFile);</pre> | <pre>Sweden Italy Japan Germany Greece</pre> |

- 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 =<br>('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**



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**INFORMATION TECHNOLOGY P2**

**MAY/JUNE 2024**

**MARKING GUIDELINES**

**MARKS: 150**

**These marking guidelines consist of 16 pages.**



## SECTION A: SHORT QUESTIONS

### QUESTION 1

|     |        |                         |                   |     |
|-----|--------|-------------------------|-------------------|-----|
| 1.1 | 1.1.1  | B ✓                     | Solid-state drive | (1) |
|     | 1.1.2  | C ✓                     | URL               | (1) |
|     | 1.1.3  | A ✓                     | Text file         | (1) |
|     | 1.1.4  | B ✓                     | 12                | (1) |
|     | 1.1.5  | C ✓                     | Microblog         | (1) |
|     | 1.1.6  | B ✓                     | Quarantine        | (1) |
|     | 1.1.7  | C ✓                     | Augmented reality | (1) |
|     | 1.1.8  | A ✓                     | Register          | (1) |
|     | 1.1.9  | C ✓                     | Firmware          | (1) |
|     | 1.1.10 | C ✓                     | Character         | (1) |
| 1.2 | 1.2.1  | Zombie / Bot ✓          |                   | (1) |
|     | 1.2.2  | Distributed computing ✓ |                   | (1) |
|     | 1.2.3  | Semantic search ✓       |                   | (1) |
|     | 1.2.4  | Foreign key ✓           |                   | (1) |
|     | 1.2.5  | POP ✓ or POP3           |                   | (1) |

**TOTAL SECTION A: 15**

## SECTION B: SYSTEMS TECHNOLOGIES

### QUESTION 2

- 2.1      2.1.1      16 GB ✓ of RAM (1)
- 2.1.2      The refresh rate ✓ of the monitor. (1)
- 2.1.3      NVIDIA GeForce RTX 3060 ✓ (1)
- 2.1.4      *Any ONE reason why the increased resolution and corresponding improvement in display graphics quality will be beneficial to the user of the notebook: ✓*
- Makes it possible to practically work with more content on the same screen
  - Better accuracy when working on intricate details and precise adjustments (photo and video editing)
  - Enhanced 3D performance / graphics (1)
- 2.1.5      *Any ONE reason why an SSD will be the most suitable storage medium to be used: ✓*
- Small – less dimension – suitable for a mobile device
  - Use less power than conventional hard drives
  - Less possible damage – no moving parts
  - The transfer rate of data is much faster on SSD (1)
- 2.2      *Discuss any THREE merits of using mobile devices by referring to the advantages of using mobile devices rather than fixed workstations/PCs: ✓✓✓*
- Mobile devices can rely on battery life when there is no power available. (Always on)
  - Mobile devices can use LTE instead of relying on a Wi-Fi connection. (Always connected)
  - Mobile devices are more portable and can easily be carried around.
  - Supports convergence (many functions built into one device)
  - Convenience of direct input / no need to carry around separate input devices (3)
- 2.3      2.3.1      Plug and play ✓ (1)
- 2.3.2      Driver ✓ (1)

- 2.4      2.4.1      Ransomware is malware that prevents access to data / encrypts / locks data. ✓  
The victim must then pay the ransom ✓ to have their data decrypted/unlocked. (2)
- 2.4.2      *Any TWO examples regarding ways in which a computer system can be protected from ransomware: ✓✓*
- Use Antivirus/Anti-malware
  - Use firewall
  - Keep software updated
  - Educate employees and users
  - Block known malicious websites
  - Email protection
- Also ACCEPT any TWO examples linked to the options above. (2)
- 2.5      2.5.1      *Any TWO benefits of using an online service as a suitable alternative to an external hard drive: ✓✓*
- Ubiquity / Allows you to access your data anywhere/any time
  - Frees up physical storage space on storage devices
  - A reliable way to back up data
  - Data stored online can be shared more easily
  - Prevents data loss in case hardware is stolen/damaged - acts as an offsite back up
  - Scalability / Capacity of size or resources to be changed
  - Enables collaboration
  - Can be accessed on multiple devices
  - Online storage presents advantages of synchronisation of files (2)
- 2.5.2      *Discuss any ONE disadvantage of using a full backup compared to using an incremental backup:*
- More time consuming ✓ to perform a full backup/system restore. ✓
  - Requires more storage space (1) to perform a full backup/system restore. (1)
  - Stores a complete copy of data (1) as compared to incremental which stores multiple copies of data. (1) (2)
- 2.6      2.6.1      *Any TWO advantages of using data projectors: ✓✓*
- Display caters for an audience over a large area
  - Screen size/display is adjustable
  - Less expensive than a large screen
  - Can be projected onto existing structures
  - Data projectors allow for portability (2)

2.6.2

| Any ONE connection method: ✓ | Any ONE motivation: ✓                                                                                                                                                                                                  |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HDMI                         | <ul style="list-style-type: none"> <li>• Can transmit video and audio signals in a single cable</li> <li>• High quality display</li> <li>• Universal port in modern devices</li> <li>• Faster transfer rate</li> </ul> |
| DisplayPort                  |                                                                                                                                                                                                                        |
| USB Type C                   |                                                                                                                                                                                                                        |
| Wireless connection          | <ul style="list-style-type: none"> <li>• Mobility</li> <li>• No cable cost</li> </ul>                                                                                                                                  |
| Wi-Fi                        |                                                                                                                                                                                                                        |
| VGA                          | <ul style="list-style-type: none"> <li>• Cheaper than HDMI cable</li> </ul>                                                                                                                                            |

(2)

2.7

Minimum system requirements are the minimum specifications required for software to be able to run ✓, but performance may be poor. ✓

Recommended system requirements are the specifications required to ensure optimal performance from the software. ✓

OR

Recommended system requirements have higher specifications (1) to ensure optimal performance from the software. (1)

Minimum system requirements are the minimum specifications required for software to be able to run, but performance may be poor. (1)

(3)

**TOTAL SECTION B: 25**

## SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

### QUESTION 3

3.1 Any *ONE* reason for using a network, apart from fast and effective communication: ✓

- Sharing of hardware resources
- Centralisation of data
- Transfer of files
- Increase control and security
- Flexible access
- Leisure

(1)

3.2 Any *FOUR* of the following regarding the process of transferring data using SSL: ✓✓✓✓

- Encryption makes data unreadable to outsiders
- Browser obtains public key from secure site
- Digital certification of site is checked
- Session key/data is encrypted with public key
- The secure site holds a private key that is mathematically tied to public key
- Private key is never sent over network
- Session key/data is decrypted using private key
- All data transferred is encrypted – using session key

(4)

3.3 3.3.1 (a) *Switch:*

Connects devices in a network to a central location ✓ so that communication can occur. ✓

Any **TWO concepts:**

- Connects devices to a central point
- It directs traffic
- Allows communication to take place

(2)

(b) *Router:*

A device that makes it possible for networks/devices to communicate over the internet ✓, by directing the data to its correct destination. ✓

(2)

(c) *Modem:*

A device that converts the data or signal ✓ from a computer to a format that can be transmitted over a specific communication medium. ✓

(2)

- 3.3.2 A firewall acts like a barrier between your computer and the internet. ✓. The firewall check which programs are trying to access your computer through the internet, or trying to access the internet through your computer, and blocks the access where it is not approved ✓

**Concepts:**

- Monitors communication between network and Internet.
- Blocks unwanted communication/threats to the network. (2)

- 3.4 3.4.1 *Motivate why a peer-to-peer network may be more suitable:*

Direct communication between two devices (peer devices) without relying on a central server. ✓

Any ONE of: ✓

- the load is distributed across multiple connections, reducing strain on the studio's servers
- speeding up the transfer process (2)

- 3.4.2 *Explain how the FTP protocol is used:*

Files are transferred using FTP by establishing a connection between a client and a server ✓, where the client sends commands to request and receive files from a server over a network. ✓

OR

File Transfer Protocol (FTP) is a client/server protocol used for transferring large files or folders (1) using a secure method to access the FTP site. (1) (2)

- 3.5 **Shaping:** Prioritise specific services over others ✓ to prevent crucial services from experiencing a delay. ✓

**Throttling:** Limit the speed or rate of data transmission for certain activities ✓ to prevent network excessive/unfair data use/network congestion. ✓ (4)

- 3.6      3.6.1      Multiple devices are connected to the internet. ✓  
These devices can independently communicate with each other ✓  
and make 'intelligent'/ rule-based logic decisions based on the input  
received.

**Concepts:**

- A range of devices are connected to the internet (1)
- These devices can independently communicate (1) (2)

- 3.6.2      *Any TWO of the following (or any other suitable application) possible  
applications of the IoT in a gaming studio:✓✓*

- Lighting
- Air conditioning
- Security devices
- Projectors/monitors
- Sound/Audio (2)

**TOTAL SECTION C:      25**

## SECTION D: DATA AND INFORMATION MANAGEMENT

### QUESTION 4

- 4.1      4.1.1      Database normalisation is the process of organising data in a database/adapting design ✓ in order to eliminate anomalies / data redundancy. ✓ (2)
- 4.1.2      (a)      Create a foreign key ArtistID in tblShows ✓ that references the primary key field of tblArtists. ✓ (2)
- (b)      NumberOfShows ✓ because the number of shows can easily be derived/calculated using existing data. ✓ (2)
- 4.1.3      Logical integrity refers to how accurate and consistent the data in a database is. ✓  
              OR  
              Logical integrity refers to the correctness of data in a database. (1) (1)
- 4.2      *Any TWO useful practical applications of RFID at the awards ceremony: ✓✓*
- Access control and security
  - Attendee tracking
  - Cashless payments
  - Interactive experiences
  - Inventory management/control
- Also accept other relevant and correct examples. (2)
- 4.3      4.3.1      *Any TWO critiques of the use of a centralised database system: ✓✓*
- When the centralised database is offline, potentially no users can work with / access the database (Single point of failure)
  - Concentration of traffic can slow down performance
  - Large amounts of traffic can lead to large data costs (2)
- 4.3.2      Use of a distributed database system. ✓ (1)
- 4.4      *Any ONE person ✓ and role: ✓*
- Database administrator, manages the access rights and security
  - Database developer, designs the structure of the database
  - Database programmer, create the database and queries
  - Database project manager, manages and supervises all aspects relating to a specific database
  - Database analyst, ensures optimisation of databases (2)



4.5

| Database                                    | Data warehouse                                                  |
|---------------------------------------------|-----------------------------------------------------------------|
| A collection of data / one or many tables ✓ | A collection of a large amount of data/ one or many databases ✓ |
| Contains current data ✓                     | Contains current/historical data ✓                              |

(4)

4.6      4.6.1      *SQL injection attack:*

Data that is entered by the user (hacker) is manipulated to change the meaning of the SQL ✓ providing access to data in the database that should not be allowed. ✓ (2)

4.6.2      *Any TWO ways in which a database can be protected against an SQL injection attack: ✓✓*

- Validating user input
- Implementing access rights
- Using restrictive GUI components/selection components
- Using parameters in the SQL instruction
- Regular software updates

(2)

**TOTAL SECTION D:      22**

## SECTION E: SOLUTION DEVELOPMENT

### QUESTION 5

- 5.1 Any TWO components ✓✓ with correct motivation. ✓✓
- Edit box (Select channel) replaced with a combo box (or spin edit) (1) so that the users can't type in the wrong values. (1)
  - The radio group (TV volume) can be replaced with a spin edit (or slider) (1) to save space/provide more space on the GUI. (1)
- (4)
- 5.2 5.2.1 *Purpose of the Assignfile-statement with specific reference to the two arguments tFile and 'countries.txt':*
- With the Assignfile-statement the internal file tFile/file variable ✓ is linked to the external file 'countries.txt' ✓ on disk/storage.  
OR any other correct explanation. (2)
- 5.2.2 *Explain why an error will occur if the Reset(tFile) in the given code is replaced with Append(tFile):*
- The EOF-marker will not be available since the Append(tFile) statement will open the file for adding onto the file/writing and the file marker will be at the end of the file. ✓  
OR  
Use of WriteLn statement instead of ReadLn (1)  
OR any other correct explanation. (1)
- 5.2.3 *Explain why no output will be displayed if Reset(tFile) in the given code is replaced with Rewrite(tFile):*
- The text file will be empty. ✓  
OR any other correct (more technical) answer is provided. (1)
- 5.3 Input iLower & Input iUpper
- Loop ✓ K from 1 to iLower ✓
- Test if (iLower mod K = 0) ✓ AND ✓ (iUpper mod K = 0) ✓
- iTempHCF ← K ✓
- Display iTempHCF ✓ (7)

5.4      5.4.1      Line 7 ✓ (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.*

In the code, the current array item is compared to the next item in the array. ✓

If the for loop runs to the last item in the array the comparison will exceed the size of the array/compare with an item that does not exist/get(show) an “array index out of bounds” error. ✓

**Concepts:**

- A comparison of adjacent items in the array
- Loop will exceed the size of the array / Causing “array index out of bounds” error

(2)

5.4.3      *Discuss the purpose of line 9 to line 11 of the provided code by explaining what the code does:*

The given code performs a swapping algorithm ✓ using a temporary variable ✓ to swap two adjacent elements ✓ in an array. ✓

OR

- It stores the value of the element at arrNames[i + 1] in the array (1) in a temporary variable called sTemp. (1)
- Then the element at arrNames[i] in the array is overwritten/swapped (1) by the value of element at arrNames[i + 1] in the array
- The name stored in sTemp is now retrieved and written back to arrNames[i]. (1)

**NOTE:** Any of the steps above could be supported with a diagram. (4)

**TOTAL SECTION E:      22**

## SECTION F: INTEGRATED SCENARIO

### QUESTION 6

6.1 ANY TWO well described functions of an operating system: ✓✓✓✓

- **It provides an interface:** (1)  
The interface allows users to interact with the computer and with programs on the computer. (1)
- **Process and task management:** (1)  
It manages the CPU and how it runs programs – i.e. which programs and tasks can use the CPU and for how long. (1)
- **Memory management:** (1)  
Controls how programs use the memory (RAM). (1)
- **Input/output management:** (1)  
Controls how programs use the input and output devices. (1)
- **Disk and storage management:** (1)  
How the data is organised on the storage device and how or when programs access the storage device. (1) (4)

6.2 6.2.1(a) Cores are processing units ✓ that is placed on a CPU. ✓  
OR  
A processing core can support 2 pipelines (1) in each core that supports hyperthreading. (1) (2)

6.2.1(b) A thread is a smaller part ✓ of a single program. ✓ (2)

6.2.2 Multiprocessing: ✓  
Processes more than one program/thread on separate cores ✓ at the same time making processing faster. ✓  
OR  
The operating system divides the programs into threads or processes. (1) The operating system splits these processes between the separate cores inside the CPU chip. (1) (3)

6.2.3 The GPU manipulates and controls the display of graphics ✓ which makes the CPU more available for other tasks to be performed. ✓  
OR  
The GPU processes graphic intensive tasks (1) which makes the workload for the CPU less. (1) (2)

6.3 *Justify the use of virtual machines:*

A single device ✓ used to test software in multiple operating systems ✓, using different hardware configurations. ✓

Any ONE advantage: ✓

- Save on hardware costs
- Saves time
- Convenient
- Protecting your host operating system

(4)

6.4 Virtual memory is an area of disk space ✓ which is set aside so that the operating system can temporarily store data ✓ that cannot be loaded into memory when memory starts filling up.

Adding more RAM ✓ to your system will reduce the need of virtual memory. The process of writing data between RAM and virtual memory takes time ✓ and that is the reason why the computer is running slower.

**Concepts:**

- Where is virtual memory (1)
- Used by operating to save data when RAM is limiting (1)
- Solved by adding more RAM (1)
- Why it affects the speed (1)

(4)

6.5 6.5.1 SaaS refers to applications that are hosted in the cloud ✓ and that users pay a monthly subscription to access. ✓

(2)

6.5.2 *Any THREE benefits of SaaS by analysing how it can be used in the video-editing club: ✓✓✓*

- The club will not need to spend a large amount of money on software initially
- They will always have the latest version of the software
- The hardware requirements will be lower as processing takes place in the cloud
- It will be easier for the club members to collaborate
- Club members can work from home / anywhere on the video editing projects

(3)

6.5.3 Fast/stable Internet connection ✓

(1)

- 6.6      6.6.1      *Any ONE advantage of streaming a video: ✓*
- Can watch immediately
  - Do not need storage space
- (1)
- 6.6.2      *Discuss any TWO criteria that may be used to evaluate the reliability of the contents of a website: ✓✓✓✓*
- Authority (1) – check who the author is – what credentials and/or affiliation. (1)
  - Accuracy (1) – cross reference the data or information with other sites and sources, including those given on the site. (1)
  - Currency (1) – check whether the information (and links) on the web page is up to date. (1)
  - Objectivity (1) – does the information appear unbiased (not one-sided)? (1)
- (4)
- 6.7      6.7.1      Intellectual property is property created by someone's mind or intellect, including literary and artistic works etc. ✓
- (1)
- 6.7.2      *One of the club members decided to upload this video onto social media. Discuss the ethics of what he did:*
- Any TWO of: ✓✓*
- He does not have permission to share the work of somebody else
  - He needs to give credit to the producers of the video.
  - The people that were photographed did not give permission (POPI act)
  - Privacy of the learners
- (2)
- 6.8      6.8.1      Webinars are events, video presentations, workshops, seminars, training sessions, or classroom lectures hosted and delivered online ✓ using webinar software. ✓
- (2)
- 6.8.2      *Any ONE advantage of a webinar: ✓*
- The club members can attend the webinar without having to travel to the United Kingdom
  - Reaching a wider audience
  - Cost effective for presenters and attendees
  - Can be recorded
- (1)

- 6.8.3 A higher quality compression technique compresses data without losing any data. ✓ It allows the exact original data to be reconstructed.  
A lower quality compression technique loses insignificant parts of the data. ✓ It works because the detail that is lost is not perceptible to human senses.  
A higher quality compression technique is proposed. ✓ (3)

**TOTAL SECTION F: 41**  
**GRAND TOTAL: 150**