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SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

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

(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