



INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION
NOVEMBER 2022

COMPUTER STUDIES: PAPER II

MARKING GUIDELINES

Time: 3 hours

150 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

SECTION A**QUESTION 1**

1.1 B

1.2 C

1.3 B

1.4 A

1.5 D

1.6 B

1.7 D

1.8 A

1.9 C

1.10 B

QUESTION 2

2.1 2.1.1 Virtual Community (Accept Social Networking, Blogging, Digital Internet, Online Community)

2.1.2 Defragmentation/Disk Defrag/Defrag

2.1.3 Synchronising/Synching

2.1.4 Virtual Reality

2.1.5 Device Driver/Driver

2.2	2.2.1	F
	2.2.2	G
	2.2.3	P
	2.2.4	L
	2.2.5	J

2.2.6	A
2.2.7	K
2.2.8	M
2.2.9	O
2.2.10	D

SECTION B**QUESTION 3 SYSTEM TECHNOLOGIES**

- 3.1 Any **TWO** advantages of 2-in-1 laptops over traditional laptops:
- Touch screen and physical keyboard.
 - Merged portability, i.e., combining laptop and tablet.
 - Better battery performance due to lower power requirements.
 - The screen can swivel into multiple angles.
- 3.2 3.2.1 (a) Any **ONE** of the following:
The SSD connects directly to an M.2 socket on the motherboard without cables **OR** is designed for high-performance storage in thin devices like a 2-in-1 device **OR** notably faster than SATA.
- (b) Any **ONE** of the following:
The SSD connects via the PCI-express slot **OR** produces a significant increase in speed.
- 3.2.2 Any **TWO**: Name Describe
- **External hard drive** – portable, data is stored magnetically, large storage space used to save files permanently, can be used on multiple devices, connects via USB.
 - **Optical drives DVD** – portable, laser beams are used to record and retrieve data, can be used to store up to 4.7 GB of data, relatively cheap, data is read by an optical drive.
 - **Flash drives** – portable, data is stored using flash memory, small and does not require its own power supply, increasing storage capacity, connects via USB, transferring files.
 - **Memory cards** – portable, electronic flash memory, data is read by a memory card reader.
 - **Cloud storage** – online, accessible anytime and anywhere, large storage capacity.
- 3.3 3.3.1 Any **TWO** input devices from the specifications:
- Microphone
 - Keyboard
 - Touchpad
 - Camera
 - Touch screen/display
- 3.3.2 Any **TWO** additional input devices:
Mouse, Keyboard, Controller, Joystick, Scanner, Webcam, Stylus, Touch screen, Touchpad
- 3.4 3.4.1 (a) 14.0-inch is the monitor size measured by the distance from one corner of the screen's viewable area to the diagonally opposite corner.
- (b) FHD (1920 × 1080) is Full High Definition is the **resolution** the **number of pixels** a display has in width × height format.

3.4.2 (a) HDMI

(b) Transmits **high-definition** digital **video and audio** OR multimedia over a single cable OR fast data transfer.

3.5 3.5.1 The required (lowest) specifications of the computer system. The software will not run without these minimum specifications.

3.5.2 Yes

Any **ONE** suitable justification:

- The computer meets all minimum required specifications.
- CPU 4.7 GHz/1.6 GHz
- 4 GB RAM/4 GB RAM
- 256 GB SSD/4 GB available space
- 1920 × 1080/1280 × 768 or higher

If the learner answers "No", do not award the mark. You can still allocate one mark for a suitable justification.

3.5.3 When a program is run, it is temporarily loaded into memory (RAM). The operating system determines how much memory the program requires and allocates enough memory to hold the program and resources in memory.

OR

When a program is run, it is temporarily loaded into RAM. Data can be accessed quickly when required.

OR

Including RAM will affect the CPU speed. A bottleneck will be avoided when data is transferred between RAM and the CPU.

QUESTION 4 INTERNET AND NETWORK TECHNOLOGIES

- 4.1 4.1.1 High-speed line that forms the fastest path through a network.
- 4.1.2 Any **TWO** advantages of making use of fibre-optic cables:
- **Greater bandwidth** – more data transmitted at once.
 - **Faster** – carries signals at high speeds.
 - **Long distances** – can carry signals over long distances.
 - **Reliability** – immune to temperature changes, is not affected by electromagnetic interference (EMI), at least a ten-year life span.
 - **Thin and sturdy** – thin, light in weight, and less prone to damage and breakage.
 - **Secure** – data is more secure as almost impossible to tap into, does not carry electric/electromagnetic signals, uses light to transfer data.
- 4.2 Router/fibre optic-to-Ethernet converter box (Do not accept modem)
- 4.3 **Bandwidth** – the maximum amount of data transmitted over an Internet connection in a second/time period.
Internet speed – how fast it will take to upload or download data on your Internet connection.
- 4.4 4.4.1 **Throttling** – slowing down the speed of your Internet connection.
- 4.4.2 **Shaping** – restricting the performance of certain types of traffic, such as torrents, on your Internet connection / giving preference/priority to certain types of traffic.
- 4.5 4.5.1 **Desktop applications**: an application that runs locally on a device such as a laptop or desktop without interacting with any other software.
- Web-based applications**: applications run on a web browser over an Internet connection. Most web-based applications run on a remote server.
(Answer must mention local and remote. The second answer cannot be the negative of the first answer.)
- 4.5.2 Any **TWO** examples of online government services:
- Traffic licences
 - Identity documents
 - Tax submissions, e.g. e-filing
 - Education, e.g. e-learning
 - Labour, e.g. project development
 - TV licences
 - Postal services
 - Government loans
 - Vaccine registration
 - Community surveys/Census
- (Do not accept online shopping, banking)

4.6 Google: Any ONE:

- Google Workspace
- Cloud SQL
- Google Distributed Cloud
- Google Meet
- Chrome Enterprise
- Google Docs
- Google Drive
- Google Maps
- Google Chrome
- Google Photos
- Gmail

Facebook: Any ONE:

- Messenger
- WhatsApp
- Instagram
- Marketplace
- Facebook Lite

4.7 Any TWO methods to avoid fake news:

- Check the source of the story.
- Check the entire article, not just the headline.
- Check other reputable news outlets and look for references.
- Check that the published dates are correct.
- Check your own biases.
- Check whether the story is just a joke or "too good to be true".
- Check for sensational or misleading headlines or clickbait.
- Check for contradicting coverage.
- Check if the news outlet is different to the majority of other public news sites.
- Check website links for authentic websites or clickjacking.
- Check the relevance of the website and if it is up-to-date.
- Check that the website is not a type of Wiki and cannot be edited by anyone.
- Check for reliable comments.

(Do not accept HTTPS, safe search, install anti-virus)

QUESTION 5 INFORMATION MANAGEMENT

5.1 5.1.1 Any **TWO** methods of how people are using smartwatches to monitor their health:

- Monitor blood pressure.
- Monitor heart rate.
- Monitor temperature.
- Provide doctors with immediate and up-to-date data providing more personalised attention.
- Remind patients to show up for their medical appointments and take their medication.
- Remotely monitor sleep and exercise.
- Detection of seizures.
- Monitor chronic health conditions.
- Measure and monitor calories.

5.1.2 (a) Any **ONE** point regarding data processing with comparison:

- Compare blood pressure to normal blood pressure.
- Compare heart rate to regular heart rate.
- Compare temperature to average temperature.
- Check appointment calendars and medication times.
- Compare sleep and exercise over a certain period.
- Compare seizures over a certain period.
- Compare food intake to regular food intake.

(b) Any **ONE** output: with detail:

- Blood pressure too low, normal, or too high/visit doctor.
- Heart rate too low, average, or too high/visit doctor.
- Temperature too low, normal, or too high/visit doctor.
- Send emails to patients to remind them of appointments and medication times.
- Summary of sleep and exercise patterns.
- Summary over time of seizures to detect whether medication is having an effect.
- Summary of fitness levels, weight levels and calories.

5.2 5.2.1 Artificial intelligence (AI) is concerned with building smart machines capable of performing tasks/making decisions that typically require human intelligence.

5.2.2 Any **ONE** suitable example with justification:

- **Precision medicine** – predicting what treatment protocols are likely to succeed on a patient based on patient data.
- **Mechanical computations** – sorting and searching through patient data efficiently and reliably, 24/7.
- **Aid in decision making** – making treatment decisions based on a large volume of data probably provides treatment outcomes.
- **Surgical robots** – improve surgeons' ability to be more precise and perform standard surgical procedures, at times from a distance.

QUESTION 6 SOCIAL IMPLICATIONS

6.1 Cryptocurrencies only exist in digital or electronic form and not in physical form OR applies to everybody OR applies to every country in the world.

6.2 6.2.1 Any **TWO** reasons why blockchain technology is used:

- No single point of failure.
- Public digital ledger to create trust.
- Stored data cannot be changed without the consensus of peers.
- Mostly secure and reduces fraud.

6.2.2 Any **TWO** potential applications (uses) in African countries:

- Cross-border trade.
- International commerce.
- Financial transactions (online banking).
- Stabilise unstable currencies.
- Charity and social good.
- Car licensing.
- Counting of votes.
- Criminal records.

6.3 Any **TWO** techniques used by criminals:

- Ransomware
- Scamming
- Hacking
- Theft
- Social engineering/phishing/pharming/clickjacking
- Keylogging

6.4 6.4.1 Any **ONE** comparison between Deep web and Dark web:

Deep web: made up of non-indexed pages and cannot be accessed by a search engine, requires sign-in, about 90% of the Internet, only a tiny portion accessible via a standard browser.

Dark web: not indexed by search engines, uses masked IP addresses, accessible via a particular web browser, about 5% of the Internet, a hub for illegal activity.

6.4.2 Any **ONE** reason:

- The dark web makes it easier to commit crimes using cryptocurrency to pay for the crime.
- Cryptocurrencies provide a convenient way of hiding identities and transaction details.
- Use of Bitcoin or digital wallets to hide any trace of transactions.

QUESTION 7 SOLUTION DEVELOPMENT

- 7.1 **C3** changes to **C4**, which is correct.
C7 changes to **C8**, which is incorrect as it should remain constant (absolute cell reference).

OR

C7 remains static/absolute cell reference.

There is no value in cell **C8**, so there is a division by 0.

- 7.2 Wrap text

- 7.3 Any **ONE** feature or function:

- Format
- ROUND
- INT
- ROUNDUP
- ROUNDDOWN
- TRUNC
- Decreasing Decimals

- 7.4 =SMALL (D3:D6,2) (Range and parameter must be correct to get the second mark)

- 7.5 <a href = <https://bit.ly/AfricanElephant>>Elephant Estimates

- 7.6 7.6.1 Named range

7.6.2 Region unique value (Accept no duplication)

- 7.7 7.7.1 Plagiarism

- 7.7.2 Any **ONE**:

- citations
- bibliography
- endnotes
- footnotes
- referencing/reference list

SECTION C**QUESTION 8 INTEGRATED SCENARIO**

8.1 8.1.1 (a) Samsung Galaxy 20 MP has a higher quality camera than Huawei 8 MP camera.

(b) Each CPU has eight cores on a single chip. Many processes can execute at the same time, improving performance. (Accept faster but for one mark only)

8.1.2 (a) Refresh rate is the number of times per second the display draws a new image.

(b) Hertz

8.1.3 Students would not be able to access Play Store, Google Chrome, Google Maps, Google search engine or any other Google products.

8.1.4 Samsung/Huawei
(A reason must be given to get the first mark)

Any **TWO** suitable reasons:

- Samsung is smaller in size than Huawei.
 - Samsung has a more up-to-date operating system than Huawei.
 - Samsung has a more powerful CPU than Huawei.
 - Samsung has Google services and Huawei doesn't.
 - Huawei has a slightly larger screen than Samsung.
 - Huawei has a fingerprint sensor for more security.
 - Huawei has more powerful graphics than Samsung.
- (5G comparison not accepted)

8.2 8.2.1 Convergence

8.2.2 (a) An electronic (digital/online/soft copy) version of a printed book that you can read on a device. (Do not just accept the expanded acronym "electronic book")

(b) Any **TWO** reasons:

- Portable
- Lightweight
- One device (multi-platform), many books
- Saves space in bag and device
- Accessible everywhere
- Shareable content
- Easy on the eyes
- Read aloud features
- More affordable
- Environment-friendly option
- Interactive elements

(Do not accept damaged/lost)

8.3 8.3.1 Any THREE points:

- A cellular phone network consists of many signal areas or cells that overlap to create coverage over a large area.
- A mobile device connected to the network can move across cells without losing connection.
- Within each cell is a base station or tower, which sends and receives transmissions.
- A mobile device will connect to the nearest or least congested base station.
- The connection is handed over to the next cell tower if the user moves out of the tower's range

8.3.2 Any TWO benefits connecting via 5G:

- Can connect more devices to the Internet per antenna.
- Fast data speeds.
- Less latency or delay
- Better security.
- Higher bandwidth.

8.3.3 (a) Any ONE piece of hardware:

- Satellite dish
- Satellite modem
- Satellite receiver
- Satellite antennae

(b) Any TWO disadvantages:

- High latency (delay) connection due to long distances signals must travel between Earth and the orbiting stations.
- Internet speeds are moderate.
- The signal is often affected by the weather.
- Hardware is expensive to install.

8.3.4 A Wi-Fi hotspot is a site that offers Internet access over a wireless LAN with the use of a router or wireless access point connected to a link to an ISP.

OR

Allows a user to connect to a Wi-Fi network using their own device.

OR

Allows a user to connect to a Wi-Fi network within a range.

QUESTION 9 INTEGRATED SCENARIO (continued)

9.1 9.1.1 Line

9.1.2 Line charts show information that changes **over time** OR trends.

9.1.3 The graph shows that the number of children not attending school throughout Africa has substantially decreased from 2000 to 2019 (over time).

9.2 9.2.1 Any **TWO** benefits:

- More images can be saved on the smartphone – smaller images take up less space.
- Reduces time required for images to be downloaded from the web or transferred over the Internet.
- Significant cost savings as less bandwidth is used.

9.2.2 (a) Interface between the user and the computer hardware OR runs programs.

(b) Any **ONE** comparison mobile vs desktop operating system:

Feature	Mobile	Desktop
Storage	Flash drive	Hard drives and flash drives
RAM	Minimum	Large amounts
Main function	Cellular and Wireless	Software and Hardware
Devices	Touchscreen	Mouse, keyboard
Booting time	Faster	Slower
Power	Low power	More power
Tasks	Limited tasks	Variety of tasks

(c) Any **TWO** useful apps with educational reasons:

- eReader, e.g., Snappify, Kindle – to read eBooks.
- QR code reader and scanner, PDF reader – to scan links and read books and resources.
- YouTube/Khan academy – to watch educational videos.
- Note taking, e.g., Evernote – to take notes for book reviews.
- Sharing apps, e.g., WhatsApp, Google Drive, Dropbox – share data and files.
- Communication, e.g. WhatsApp – communicating with teachers.
- Learning apps, e.g. Office packages, Google Classroom, Zoom – long distance learning, preparing assignments.
- Security software, e.g. anti-virus, lock app, clean-up utility app to protect devices from malware, free up disk space.

- Digital well-being apps – use phone to reduce screentime.
- Utility apps, e.g. calculator – used in all subjects requiring calculations.
- Language learning apps, e.g. Duolingo – used in studying languages.
- Web browser, e.g. Google Chrome – for research.

9.3 9.3.1 Any **TWO** points:

Increase the number of visitors/traffic to their website OR gain visibility/credibility for the organisation OR more relevant/popular/rank higher

9.3.2 Any **TWO** HTML Tags with reasons:

- TITLE tag defines the web page title and describes the content.
- META tag provides data about the content of the website.
- Heading tags <h1>...<h6>, , provides content structure and order.
- Internal links <a> link to other content, making for easier navigation.
- Image tag , images names and ALT attributes provide a text description of the image.

9.3.3

FIELD NAME	DATA TYPE
DonorCompanyName	(a) Text/Short Text
DonationAmount	(b) Currency/Number/Decimal
TaxCertificateRequired	(c) Yes/No/Boolean

9.4 Any **THREE** ways:

- Access to the Internet/at lower cost.
- Access to devices.
- Reading education for children.
- Access to books.
- Access to free software.

Total: 150 marks