



INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION
NOVEMBER 2022

COMPUTER SCIENCE: 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 SHORT QUESTIONS**QUESTION 1 DEFINITIONS**

- 1.1 M.2
- 1.2 Hardware Interrupt – Do NOT accept interrupt
- 1.3 Virtual Memory
- 1.4 Machine Cycle
- 1.5 Latency
- 1.6 ARP (Address Resolution Protocol)
- 1.7 Cookie

SECTION B SYSTEM TECHNOLOGIES**QUESTION 2**

- 2.1 2.1.1 ALU, CU, Registers, processor cache
- 2.1.2 Store next few instructions and data to be processed.
OR Stores next few instructions and data to reduce CPU idle time
OR to hopefully provide the processor with the next instructions and data more quickly than RAM can.
- 2.2 2.2.1 Hyperthreading simultaneous multithreading
- 2.2.2 CPU can switch between different processes quickly as processes already loaded into registers.
OR CPU can preload the next instructions to be processed into the second set of registers while processing the instructions loaded into the first set.
- 2.3 2.3.1 Multitasking Accept Multithreading
- 2.3.2 Each application can have more than one thread.
- 2.3.3 Any processor intensive task such as:
- compiling a program
 - playing a graphics intensive game
 - editing a large picture/image
- 2.3.4 (a) Overclocking or clock multiplication
- (b) The user is not running processing intensive tasks.
- 2.4 2.4.1 Operating system Kernel, Compiler, Anti-virus program
Accept any TWO correct answers.
- 2.4.2 She has a lot of programs/applications open, but is only running a few.
OR she has a lot of programs/applications open, but they are not processor intensive.
OR the programs she opened uses a lot of data, but not intensive processing.
- 2.5 2.5.1 Process/render images stored in the RAM of the graphics card. OR process images so the CPU can perform other tasks while this is happening.
- 2.5.2 The 8 GB of RAM is the main RAM.

2.6

Description	Term
The process that translates the original code to executable form, creating a separate file.	Compile
The original code written in Java.	Source Code
A compiled version of the original code that is portable and can be used with different operating systems.	Object Code/Bytecode DO NOT accept exe file
A programming code that is close to machine code.	Assembler/assembly code Object Code

SECTION C NETWORKING**QUESTION 3**

3.1 3.1.1 Attenuation, Cross talk, eavesdropping, EMI, susceptible to lightning
ANY TWO

3.1.2 Switch

3.2 3.2.1 Wi-Fi

3.2.2 Range is further, faster data transfer

3.2.3 (a) **Peer-to-peer** – No central server, all machines can offer services/all machines are equal.

(b) This scenario has no server OR each machine will act as a print server.

3.3 Hotspot offers access to Internet that can be provided by a cell phone or any networkable device, WAP a device that offers access to a network but not necessarily the Internet.

3.4 3.4.1 Yes OR No. Only allocate a mark here if the reason is justified in Question 3.4.2.

3.4.2 If YES: All family members can access shared data, can access from any device, save space on local machines.

If NO: Need internet access, security issues, vendor lock in, latency of cloud storage higher than local, Ariel will have to be around to hotspot whenever the family needs to access data.

ANY TWO

Do NOT award marks for reasons that contradict Question 3.4.1.

3.5 HTTPS, VOIP, UDP, TCP/IP, IP
ANY THREE

3.6 3.6.1	Frame Header	Destination address: ac:d5:64:6d:79:fa Source address: fd01::34d7:520b:b2aa:4f3c
	Packet Header	Destination address: 192.168.0.30 Source address: 192.168.0.4

3.6.2 Detect errors in the frame.

- 3.7 3.7.1 Peers transfer data to each other.
Files split into smaller parts.
To allow pieces of the same file to be downloaded from multiple peers.
Once the peer has the complete file it becomes a seed.
ANY TWO
- 3.7.2 (a) The dark web is also a part of the Internet that is not indexed by search engines.
The dark web is intentionally hidden from search engines.
Uses masked IP addresses.
Is accessible only with a special web browser.
ANY TWO
- (b) BitTorrent – peer to peer
BitTorrent can be found with a browser
BitTorrent is for distributing files
ANY CORRECT ONE
- Dark Web - file is not split up
Dark Web - Device will not act as a seed
Dark Web - is also for browsing web pages
ANY CORRECT ONE

SECTION D SOCIAL IMPLICATIONS**QUESTION 4**

- 4.1 4.1.1 A blockchain is a decentralised, distributed database, across large peer-to-peer networks with no single point of failure. Accept no entry can be made without consensus of many devices.
- 4.1.2 Since the NFT is digital, need to ensure that copies of the NFT cannot be made.
- 4.1.3 Photos, videos, blog post, journey shown on Google maps, ANY digital item related to touring in a campervan scenario.
- 4.2 4.2.1 A user "signs" a document by encrypting data with their private key, if the document can be decrypted with the matching public key, then the document can be proved to be sent by the user.
- 4.2.2 A digital certificate validates the identity of an entity and a signature validates the contents of information an entity has provided.
- 4.3 4.3.1 Printer cartridges, computer, cell phones, printers.
ANY CORRECT TWO
- 4.3.2 Refill printer cartridges, upgrade/repair devices instead of replacing, try to use a device for longer, only print if necessary.
ANY CORRECT TWO

SECTION E DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT**QUESTION 5**

5.1

Event
<p>Fields:</p> <ul style="list-style-type: none">- email : string- eventDate : Date- location : string- photo : PhotoObj- description : string- type : integer <ul style="list-style-type: none">- <u>count : integer</u> <ul style="list-style-type: none">+ <u>INDIVIDUAL : integer = 1</u>+ <u>FAMILY : integer =2</u>
<p>Methods:</p> <ul style="list-style-type: none">+ Constructor (inE : string, inD : Date, inL : string, inP : PhotoObj, inDesc : string, inT : integer) + getPhoto () : PhotoObj+ getLocation () : string+ <u>getCount () : integer</u> + toString () : string

- ONE mark for email, eventDate, location, photo, description, type private
- ONE mark photo is of type PhotoObj
- TWO marks for count field private and underlined (static)
- TWO marks for INDIVIDUAL and FAMILY public, capitals, and underlined (static)
- ONE mark for correct constructor
- ONE mark for agetPhoto and getLocation accessors
- ONE mark for underlined getCount() accessor
- ONE mark for correct toString

5.2 5.2.1 Composition.

5.2.2 The photo object is a field of the Event class.
OR PhotoObj doesn't extend/inherit from Event.
ANY ONE

5.3 It belongs to the class, it will be incremented/get its value when an object is created.

5.4 `System.out.println (Event .getCounter());`

5.5

```
{  
  "email": "mom@smith.co.za",  
  "date":"26 June 2022",  
  "description":"Kimberley Big Hole"  
  "type":1  
}
```

- ONE mark for opening and closing curly brackets
- ONE mark for field names in quotes
- ONE mark for correct field names
- ONE mark for correct values
- ONE mark for type value not in quotes

]

QUESTION 6

6.1

Line No	ev	size	i	i <= size-1?	eArr[i].getLocation() = ev.getLocation()	eArr[0]	eArr[1]	eArr[2]	eArr[3]	eArr[4]	Value returned from method
	location: PQR					location: ABC	location: DEF	location: XYZ	location: MNO		
	photo: pic5					photo: photo9	photo: img23	photo: pic7	photo: pic3		
		4									
1			0	T							
2					F						
1			1	T							
2					F						
1			2	T							
2					F						
1			3	T							
2					F						
1			4	F							
4										PQR pic5	
5		5									
6											true

- ONE mark for correct line numbers
- ONE mark for size changing to 5
- ONE mark for values of i
- ONE mark condition $i \leq \text{size}-1$? related to i
- TWO marks for `eArr[i].getLocation() = ev.getLocation()`
- ONE mark for `eArr[4]`
- ONE mark for value returned

- 6.2 If the condition in line 3 is true (i.e. the photo location exists) then the method will exit like a while loop i.e. the loop may not run to completion.

QUESTION 7

- 7.1 7.1.1 No primary key, repeating groups/data redundancy.
- 7.1.2 It means no person can upload more than one photo on the same date.
- 7.2 7.2.1 Repeated data produced by 1NF from repeating groups.
- 7.2.2 Update, delete, insert.
- 7.3 Person (email, name)
Location (LocationGPS, LocationName)
Photo (email, LocationGPS, date, photoName, description, type)

SECTION F BOOLEAN LOGIC**QUESTION 8**

8.1 8.1.1 Largest number in 8 bits = $2^7 - 1 = 127$
 Smallest number in 8 bits = $-2^7 = -128$

8.1.2 $125 + 10 = 135$ which is larger than 127
 OR when 10 is added to num the result is too large to store in 8 signed bits
 producing overflow into negative numbers.

8.2 $F(A,B,C) = ((A + B').C)'$

8.3 $F(A,B,C) = A'B + ABC' + AB$
 $= B(A' + AC' + A)$
 $= B(A' + AC' + A)$
 $= B(1 + AC')$
 $= B$

8.4

A	B	$(A'B + A)B$ WORKINGS	$(A'B + A)B$	B
0	0	$(0'.0 + 0).0 = (0 + 0).0 = 0.0$	0	0
0	1	$(0'.1 + 0).1 = (1 + 0).1 = 1.1$	1	1
1	0	$(1'.0 + 1).0 = (0 + 1).0 = 1.0$	0	0
1	1	$(1'.1 + 1).1 = (0 + 1).1 = 1.1$	1	1

- TWO marks for correct substitutions
- ONE mark for each correct calculation × 4

8.5

		C D			
		00	01	11	10
A B	00	1	1	1	1
	01		1	1	
	11		1	1	
	10	1	1	1	1

$$F(A,B,C,D) = B' + D$$

TWO marks for correctly placing variables of the map.

Total: 150 marks