INFORMATION TECHNOLOGY: 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   Bridge
1.2   Hybrid
1.3   Bluetooth
1.4   Asymmetric/ADSL
1.5   GPS/LBS
1.6   Lossless
1.7   Reverse Image Search
1.8   SEO

SECTION B   SYSTEM TECHNOLOGIES

QUESTION 2   THEORY

2.1   A
2.2   C
2.3   D
2.4   B
2.5   C
2.6   B
2.7   D
2.8   C
2.9   A
2.10   B

QUESTION 3   APPLICATION

3.1   3.1.1   Intel/Apple/Motorola/AMD.

        3.1.2

Component	Function
Registers	Used to store functions used by the CPU
ALU	Performs arithmetic/logical operations required by the CPU
CU	Regulates/integrates the operations of the computer

        3.1.3   A CPU with 64-bit registers will allow twice the number of bits to be sent to the CPU for processing at any one time, effectively doubling the rate at which the CPU can receive data.

3.2   3.2.1   (a)   TRUE

                (b)   The data stored in a cache tend to be made up of a small number of bits and there are only ever very few of these stored there at one time, whereas RAM needs to store many complex items at once, OS/Applications, which are much larger.

                (c)   In theory, CPU 2 should have an overall better performance when looking at level 2 cache, as each core has its own cache, CPU 1 shares the same-sized cache between all cores.

3.2.2 (a)   CPU 2
Hit ratio = 64/(64+2) = 64/66 = 0,97
Miss ratio = 1 – 0,97 = 0,030
As a percentage: 3,0%

Mark allocation
miss ratio calculation, percentage

(b)   CPU 2 shows a better miss ratio.
NB: Assess candidate's answer here, depending on the answer for Question 3.2.2 (a) – CPU 2 might not be the right answer every time.

(c)   Reason 1: Larger Level 1 cache in CPU 1
Reason 2: CPU 2 has Level 2 not shared.

3.3   3.3.1   **Reason 1:** 3D images require a lot of calculations/processing to manipulate them as they are complex images/files compared to a WP document.

Reason 2: 3D images will have a much larger file size than a WP document, requiring greater resources (RAM/CPU).

3.3.2   Component 1: CPU
Component 2: RAM
Component 3: Graphics card
Accept any THREE correct answers.

3.4   3.4.1   The practice of increasing the clock rate of a computer to exceed that certified by the manufacturer.

3.4.2 (a)   This is where one or two individual components have their performance changed/are overclocked.

(b)   The performance of every component in the system is changed/overclocked.

3.4.3

Factor	YES	NO
Performance increases	X	
Heat increases	X	
More RAM required		X
Greater cooling required	X	
Less cache needed		X
Hard drive access time increases		X
Risk of component failure	X	
Greater power consumption	X	

SECTION C   INTERNET AND COMMUNICATION TECHNOLOGIES

QUESTION 4   THEORY

4.1   B
4.2   C
4.3   A
4.4   C
4.5   A
4.6   B
4.7   C
4.8   A
4.9   B
4.10   A

QUESTION 5   APPLICATION

5.1   5.1.1   **Header:** Packet length; Synchronisation; Packet number: Protocol; Destination address; Source address.
Accept any ONE valid answer.

Payload: The body/data of the packet

5.1.2   (a)   UTP. Accept STP

(b)   **Function 1:** Connects devices together
Function 2: Enables communication between devices
Accept any TWO correct functions.

(c)

Destination MAC	Source MAC	Destination IP	Source IP
00:0b:67:4f:66:90 Accept: 00:0c:33:4a:34:3f	00:0a:95:9d:68:16	192.168.100.25	192.168.100.10

If candidate inverts source/destination details: max 2 marks
If candidate confuses MAC with IP – no marks

(d)   MAC addresses are used to route traffic/frames within a network while IP addresses are needed for traffic that leaves the network OR accept traffic that traverses the Internet or another network.

(e)   The company's ISP (Internet Service Provider)

5.2   5.2.1   YES/NO

        5.2.2   Video calls, especially to many people at once, generate a lot of traffic. Sharing content out from AJ's desktop in the webinar will add to the traffic.
OR can explain that most of the bandwidth is video provider dependent: you have only one stream which they send to everyone.
ONE valid reason

        5.2.3   (a)   BOTH

                (b)   UDP

                (c)   UDP

                (d)   TCP

5.3   5.3.1   HTTPS

        5.3.2   (a)   UPS: will provide power from batteries for a short time when the power fails. Allows the user to save files and shutdown until the power is restored.

                        Redundant Power Supply: This is a second power supply built into the same device so that if one of them fails, the other will take over the task of providing power to the device.

                (b)   A redundant power supply will ensure that the computer that hosts the website will keep running should there be an electrical failure with the actual power supply, but it will not assist should there be a failure of the mains supply; this is what the UPS will be needed for.

SECTION D   SOCIAL IMPLICATIONS

QUESTION 6

6.1   **Example 1:** Music
Example 2: Movies/Books/Podcasts/Vodcasts
Accept any TWO correct examples.

6.2

	Example of data generated	IoT device
1	Location, driving style, speed	Internet-enabled car
2	Music listened to, time of day when used Heart rates, blood pressure	Internet-enabled radio Smartwatches/Smart clothes

Accept any TWO correct devices and examples but must be devices that are IoT devices.

6.3   6.3.1   Yes/No

6.3.2   Depends on type of digital media: photographs you have taken might not be a problem, digital music or movies downloaded will be a problem as the licence was between the provider and you personally.

Candidate must provide a reasoned justification in line with their Yes/No answer. If no answer/blank for Question 6.3.2 or it doesn't match Question 6.3.1, no mark for Question 6.3.1 or Question 6.3.2.

6.4   **Technique 1:** Switch off GPS/Location data gathering
Technique 2: Use a private browser.
Accept any two correct options. The options may not be similar.

6.5   If a person had a particularly bad medical history/medical condition, finding out this information could be used to decline health insurance to descendants as they could have the same medical conditions.

6.6   6.6.1   Yes/No

6.6.2   If you can access the key which secures the Bitcoin Wallet you will be able to access the funds, otherwise not.
Candidate's justification must match the Yes/No given as an answer, and support it, otherwise no marks allocated.

SECTION E   DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT

QUESTION 7

7.1   **Decomposition:** Understand the problem; break down into smaller parts; Separate interface/working code; identify storage; goals/sub-goals. Any TWO.

Abstraction: Reduce complexity; decide on the best data structures; design classes; make use of information hiding. Any TWO.

7.2   7.2.1   (a)

Customer
Fields: - name : string   - contactNumber : string   - servicesUsed : string   - gardener : Gardener
Methods: + Constructor (n : string, cN : string, sU : string, g : Gardener, nS : integer)   + getName() : string   + getGardener() : Gardener   + setServicesUsed(sU : string)   + setGardener(g : Gardener)   + toString : string

⇑

VideoCustomer
Fields: - date : Date   - title : string
Methods: + Constructor (n : string, cN : string, sU : string, g : Gardener, d : Date, t : string)   + getDate() : Date   + getTitle() : string   + setDate(d:Date)   + setTitle(t:string)

Mark allocation:
Fields private, named and typed correctly in both classes
Methods public in both classes
Customer Class: for Gardener type, for correct Constructor for all accessors and mutators, for toString() with correct type
VideoCustomer Class: for Constructor with parent fields and child fields in addition
for showing inheritance relationship correctly. (arrow, open)

(b)
```
public VideoCustomer ((n : String,
cN : String, sU : String, g : Gardener,
d : Date, t:string )
{
    super (n,cN,sU,g);
    date = d;
    title = t; (for both additional fields)
}
```
OR
```
constructor TVideoCustomers.Create (n : String;
cN : String; sU : String; g : Gardener;
d : Date; t :String;);
begin
    Inherited Create (n,cN,sU,g);
    date := d;
    title := t; (for both additional fields)
end;
```

7.2.2 (a)   Accessor method provides a mechanism to retrieve the private fields of an object

        Constructor methods are used to instantiate objects and assign values to the objects' fields.

(b)   This method would be used when a customer changes the services that he/she makes use of from the list of options that AJ Garden Services provide.

7.2.3 Yes **OR** No

      Yes – the fields of the class are set as protected, therefore cannot be accessed from outside of the class, except from a class that inherits from the class.

      NO – there are accessor and mutator methods for both fields.

7.2.4 No

      The methods all act on objects instantiated in the class and are therefore non-static.

7.3   7.3.1

L	E	P	E OR P	L AND (E OR P)	RESULT True/False
0	0	0	0	0	False
0	0	1	1	0	False
0	1	0	1	0	False
0	1	1	1	0	False
1	0	0	0	0	False
1	0	1	1	1	True
1	1	0	1	1	True
1	1	1	1	1	True

Mark allocation:
Column E OR P: for 1,1,1 patterns, for 2 × 0
Column L AND (E OR P): for 1,1,1 pattern, for 0,0,0,0,0 pattern
Column RESULT: for True, for False

7.4

Line	skills	newSkill	flag	size	k	skills[size] = newSkill	flag = false	Output
1	lwp							
2		e						
3			False					
4				3				
5					0			
6						F		
5					1			
6						F		
5					2			
6						F		
10							True	
11	e							
12								New skill added
13								Full skill list: e

Mark allocation: for correct initial values against correct line numbers
                   for correct values of k
                   for F each time skills[size] = newSkill
                   for True NOT flag
                   for two correct output lines
                   for all correct line numbers from first line 5 downwards.

7.5   7.5.1 Pairs/Key Pairs

7.5.2

```
{

        "Gardeners":  [
                {
                        "name" : "Simo",

                        "skills" : "wep"

                },

                {

                        "name" : "Wilbert",

                        "skills" : "lwe"

                },

                {

                        "name" : "Simone",

                        "skills" : "ep"

                }
                ]

}
```

Mark allocation: for array open and close (square brackets)
                  for three pairs correct formatting of " "
                  for pairs enclosed in { }

Total: 150 marks