INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION
NOVEMBER 2024

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 Indexed – the pages are non-indexed.

1.2 Allows – ransomware blocks/denies access.

1.3 Social media – should be online transactions **OR** banking **OR** credit card transaction **OR** financial information – is not needed to impersonate on social media **OR** main purpose – the main purpose of identity theft is to gain access to a person's banking records and credit score to purchase items under another's identity.

ANY correct answer in Question 1 that identifies and explains an error in the definition.

SECTION B SYSTEM TECHNOLOGIES

QUESTION 2 THEORY

2.1 2.1.1 A CPU has more than 1 core **OR** multiple CPUs on a motherboard.

2.1.2 Registers are part of the CPU that store the current instruction.

2.1.3 (a) Slower

(b) Cannot preload next instruction in a second set of registers **OR** it will take longer to context switch between processes.

2.2 2.2.1 The registers must be 64 bits.

2.2.2 The data bus/system bus must be 64 bits.

2.3 2.3.1 DRAM consists of capacitors.

2.3.2 The time taken for a component or device to respond.

2.3.3 DRAM will be refreshed when there is no request for data.

2.4 2.4.1 Processor cache stores the next few instructions and data to speed up access to slower RAM.

2.4.2 It is SRAM.
It does not need to be refreshed.
Executes at the same speed as the CPU.

ANY correct TWO.

2.5

Port	Device
USB 3.0 port	External hard drive (any high-speed device)
USB 2.0 port	Mouse, keyboard (any slow speed device)
Micro-HDMI port	Monitor/screen

2.6 2.6.1 Micro-SD Card

2.6.2 Open source **OR** freely available/no cost
Can adapt the code
Takes less storage space

Accept ANY correct TWO answers.

2.7 Store the data in the cloud.
Store the data on an external hard drive.
Store the data on a network server.

ANY correct TWO.

2.8 2.8.1 Interpreted – translates and executes source code line by line.

2.8.2 Object-oriented – designing code in encapsulated modules that can be reused **OR** using classes/object to sub divide code.

2.8.3 High-level – programming language closer to English/high level of abstraction.

SECTION C NETWORKING

QUESTION 3

3.1 3.1.1 Cross talk, Attenuation, EMI, Eavesdropping

ANY correct THREE.

3.1.2 Star

3.1.3 Bandwidth will not be shared with other devices **OR** LAN cable will transfer data faster.
The connection will be more reliable.

3.2 3.2.1 Each of the 4 numbers must be between 0 and 255.
400 is too big.

3.2.2

Address Type	Circle Packet OR Frame	Name an associated LAN Device
IP Address	Packet	Router
MAC Address	Frame	Switch, bridge/wireless bridge

3.3 3.3.1 DHCP **OR** Dynamic Host Configuration Protocol

3.3.2 ARP **OR** Address Resolution Protocol

3.4 3.4.1 DNS Domain Name System

3.4.2

Address 1: BD-BB-9A-03-00-22 (do not accept the Router address **34-AD-67-4D-9F-F1)**
Address 2: 78-AD-09-B0-12-5E
Address 3: 12.45.67.129 (must be the website address)
Address 4: 237.0.162.8

3.5 3.5.1 User's browser encrypts message with recipient's public key.
The data is sent to recipient.
Recipient decrypts with their private key.

3.5.2 The digital certificate is issued by a Central authority to prove identity.
Binds users public key to users' identity.
Uses SSL/TLS protocol/https.
OR Asymmetric encryption.

3.5.3 As the packet passes through each node on the network it is encrypted asymmetrically.
OR as the message passes through the network it is encrypted in layers and the public keys are exchanged.

SECTION D SOCIAL IMPLICATIONS

QUESTION 4

4.1 4.1.1 Devices that are Internet connected to share data.

4.1.2 UDP

4.2 4.2.1 Yes or No

4.2.2 Yes – The UserID is linked to the DeviceID so the video can be seen. **OR** allowing users to view other cameras. **OR** "The article states that about 1 500 users were able to view other camera's feeds".
No – The user's private key would not match the public key.

OR any other correct answer.
Do not allocate mark for Q4.2.1 if the reason in Q4.2.2 is incorrect.

4.3 Program that executes remotely/on the server to deliver user's web content.

4.4 User's video camera feed could be posted on social media causing embarrassment.
OR the physical home address of the user could be determined from the video camera feed and the user could be harassed.
OR layout of the home could be determined and used to burgle the house.
OR habits of the homeowner could be determined in order to burgle the house.

ONE mark for what can be done ONE mark for the effect.
ANY correct explained answer.

4.5

	Security measure	How will this measure protect Wyze clients?
1	Do not cache the UserID and DeviceID	Another user will be able to view a user's camera feed.
2	Encrypt user's details	If the server was hacked, the hacker cannot use the data.
	Install a firewall	Protect the data from unauthorised access.
	Install anti-malware	Protect data and applications, ensure data integrity and protect from attacks such as ransomware.

ANY valid measure and related explanation to the scenario.

SECTION E DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT

QUESTION 5

5.1 5.1.1 A field that has the same value for different records.

5.1.2 DeviceID **OR** CameraAccess

5.2 5.2.1 Repeated data due to one-to-many relationship **OR** repeating groups.

5.2.2 UserEmail **OR** UserSurname **OR** UserID

5.3 5.3.1 Any field that is dependent on a non-key field.

5.3.2 CameraAccess and CameraCharge

5.4 Device (DeviceID, CameraDescription)
User (UserID, UserSurname, UserEmail)
DeviceUser (DeviceID, UserID, CameraAccess)
CameraCost(CameraAccess, CameraCharge)

Accept other table/relation names.

QUESTION 6

6.1

Lightning
Fields: - distance : integer - time : Time - firstStrikeTime : Time
Methods: + Constructor (inDist : integer, inTime : Time) + Constructor (inDist : integer) + getFirstStrikeTime () : Time + timeDiff () : integer + toString () : string

- ONE mark for **distance**, **time** fields
- ONE mark for correct types
- ONE mark for type private
- TWO marks for **firstStrikeTime** field private and underlined (static) and typed
- ONE mark for correct default constructor
- ONE mark for correct overloaded constructor
- TWO marks for static **firstStrikeTime** accessor method
- ONE mark for **timeDiff** method
- ONE mark for toString method named and typed

6.2
```
public Lightning (inDist : integer)
begin
     dist ← inDist
     firstStrikeTime ← now
end
```

6.3 The constructor will create an object for the first strike using the current time and it must create a similar object when the alarm is already on and we only need the current distance of the strike.

OR the default constructor needs the distance and time and the overloaded constructor is used when only the distance is needed.

QUESTION 7

7.1 Use the following data: 12, 10:08 11,10:13 16,10:24 24,10:56

Line No	distance	time	distance <= 15?	long Alarm	short Alarm	first Strike	time Diff	while distance <= 15 OR timeDiff <= 30?	distance <= 15 OR longAlarm = true?	timeDiff <= 30?	distance > 15 AND timeDiff > 30?
1	12										
2		10:08									
3			T								
4				T							
5					F						
6						10:08					
7							0				
8								T			
9	11										
10		10:13									
11							5				
12									T		
13										T	
14						10:13					
8								T			
9	16										
10		10:24									
11							9				
12									T		
13										T	
14						10:24			X	X	
8								T			
9	24										
10	X	10:56				X X	X X				
11		X					32				
12									T		
13										F	
8								F			
15											T
16				F							X
17					T						

- ONE mark for correct **distance** values
- ONE mark for correct **time** values
- ONE mark for executing **while** loop correctly
- TWO marks for calculating **timeDiff** correctly
- TWO marks for updating **firstStrike**
- ONE mark for correct values **distance <= 15 OR longAlarm = true** condition
- ONE mark for correct values **timeDiff <= 30** condition
- ONE mark for correct value **distance > 15 AND timeDiff > 30** condition after the loop
- ONE mark for correct values for **longAlarm** and **shortAlarm** after the loop

7.2 7.2.1 Yes

7.2.2 The loop will need to execute at least once to input the next time and distance to determine of the alarm must change **OR** the while loop does not follow ITC where the change is the last line.

SECTION F DATA REPRESENTATION, LOGIC GATES AND BOOLEAN ALGEBRA

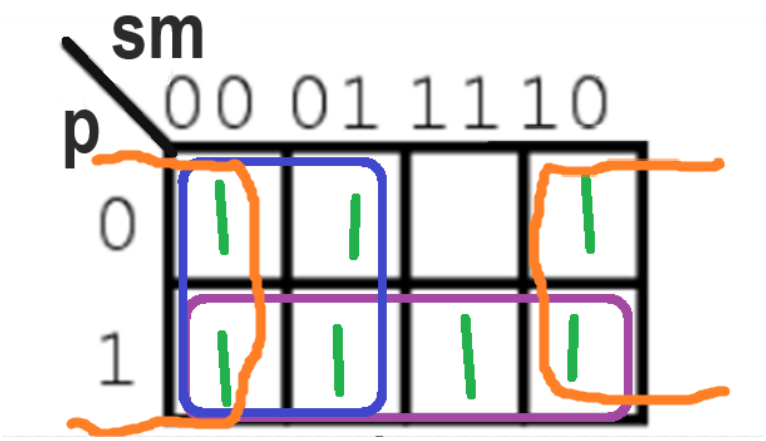
QUESTION 8

8.1 Using Boolean algebra, simplify the Boolean expression m' + s' to one term.

F(m,s) = m' + s'
= (m.s)'

Mark allocation:
1 mark for m' changed to m and s' to s
1 mark for + to .
1 mark for ' outside the brackets

8.2



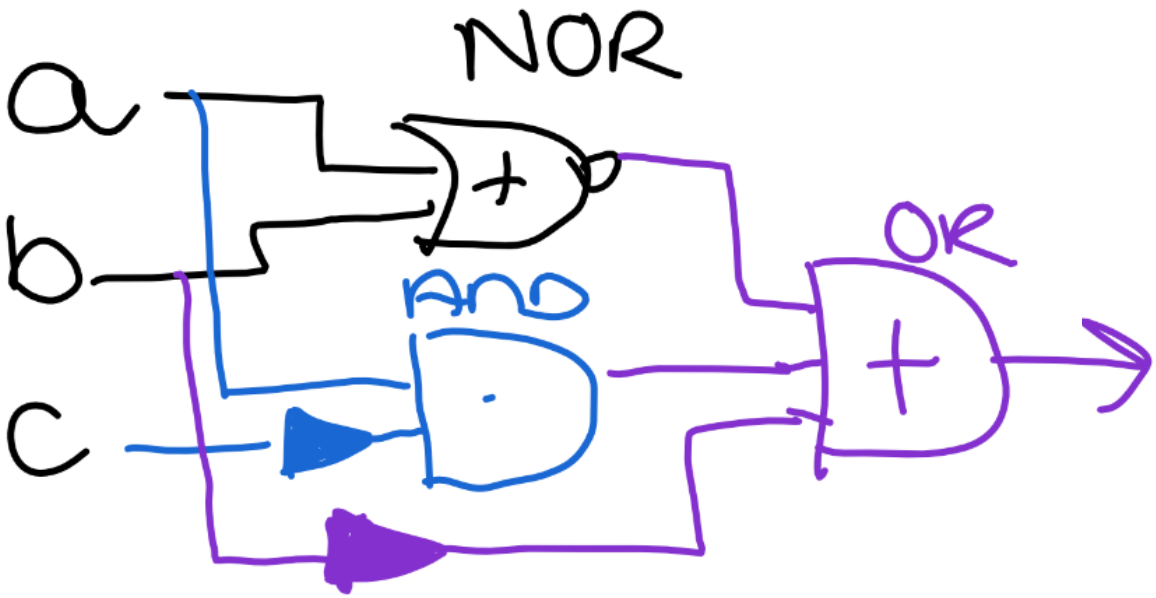
8.2.1 F(p,s,m) = m' + s' + p
ONE mark each for the blue, purple and orange grouping

8.2.2 *Brackets included to aid marker*

F(p,s,m) = (p's'm' + ps'm') + (p's'm + ps'm) + psm + (p'sm' + psm')

= (s'm' + s'm) + sm' + psm
= (s' + sm') + psm
= s' + (m' + psm)
= s' + m' + ps
= (s' + ps) + m'
= s' + p + m'

8.3



- ONE mark a and b enter NOR gate
- ONE mark for NOR gate (do not award marks for separate NOT and **OR**)
- ONE mark for c'
- ONE mark for AND gate
- ONE mark for b'
- ONE mark for correct three inputs to OR gate (accept 2 separate **OR** gates with 2 inputs)
- ONE mark for **OR** gate

Total: 150 marks