2022 SEC 4 COMPUTING PRELIM EXAM MARKING SCHEME

Qn 1	Marking Scheme / Answer	

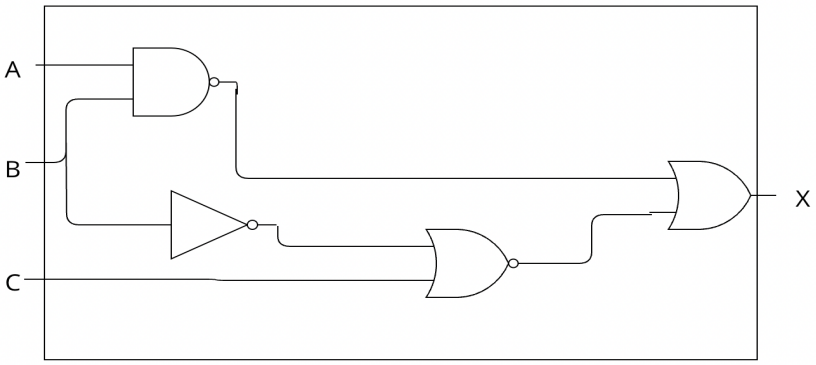
Draw a line to match the types of computer security threats with their respective descriptions.

Types of computer security threats
(a) Pharming
(b) Spyware
(c) Trojan horse
(d) Worm

Description
A computer program that runs automatically and attempts to spread by sending copies of itself to other computers without the need to attach itself to an existing program.
A hidden program that secretly collects personal information about its users and transmits this information to attackers without the users' knowledge.
The use of emails and fake websites that appear to be from reputable companies in order to steal personal information such as passwords and credit card numbers from users.
A computer program that pretends to be a harmless file or useful application. Once it is run, it does something harmful such as giving intruders unauthorised access to the computer instead.
The interception of requests sent from a computer to a legitimate website and redirection to a fake website to steal personal data or credit card details.
A computer program that attaches itself to a normally harmless program and modifies it.

Qn 2	Marking Scheme / Answer
(a)	Media Access Control
(b)	They allow all devices to be uniquely identified in a network.
(c)	First six digits: Manufacturer's identity number Last six digits: Device's serial number
(d)	$A_{16} = 1010_2$ $D_{16} = 1101_2$ $(AD)_{16} = 10101101_2$
(e)	$(BE)_{16} = 11 \times 16 + 14 \times 1$ $= 190$
(f)	Hexadecimal are used to store intensity values for red, green and blue in RGB colour codes. Hexadecimal are used to express the characters of ASCII/Unicodes. (No marks for just stating RGB or ASCII/Unicode)

Qn 3	Marking Scheme / Answer
	Advantages - Technology has enabled more exciting and engaging forms of entertainment. Many computer games have active online communities and mobile games have even managed to bring participants together in the real world through in-game incentives to meet or team up. - AI has also made it possible to provide more accurate recommendations for consumers based on collected data of their previous choices of entertainment. - Games, animation and media are areas of strong growth in the entertainment industry with new opportunities being opened up by the rise of high-quality virtual reality, augmented reality and motion-tracking technology. - Many businesses are also using monitoring technology and strategies from game design to provide rewards and incentives for work-related achievements. **Disadvantages** - Some people may be addicted to computer games or social networking sites - There is an increasing concern that such technology is causing people to become deficient in real-life social skills or abandon their responsibilities - AI has also made it possible for anyone to create doctored images and videos that appear remarkably convincing to the average viewer. While such images and videos have been used mostly for entertainment, they can also be used to cause public alarm or spread damaging falsehoods. - Many businesses are also using monitoring technology and strategies from game design, which may cause ethical issues.

Qn 4	Marking Scheme / Answer
(a)	
(b)	<table><tr><th>A</th><th>B</th><th>C</th><th>A NAND B</th><th>NOT B</th><th>NOT B NOR C</th><th>X</th></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table> X = (A NAND B) OR (NOT B NOR C)
(c)	X = NOT (A AND B AND C)

<table>
<tr><th>Qn 5</th><th>Marking Scheme / Answer</th></tr>
<tr><td>(a)(i)</td><td>102400</td></tr>
<tr><td>(a)(ii)</td><td>64 000</td></tr>
<tr><td>(b)</td><td>
<table>
<tr><th></th><th>Input device</th><th>Output device</th><th>Storage device</th></tr>
<tr><td>Touch screen monitor</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>ROM</td><td></td><td></td><td>✓</td></tr>
<tr><td>Scanner</td><td>✓</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>(c)(i)</td><td>The Control unit
● Follows instructions
● And decides when data should be stored, received or transmitted by different parts of the computer.</td></tr>
<tr><td>(c)(ii)</td><td>The address bus
● Transports required memory location (do not accept “address”)
● from processor to memory.</td></tr>
</table>

Qn 6	Marking Scheme / Answer
(a)	Advantages of a client-server network are: -Centralised control of data and resources -Easy to schedule backups of all shared files at regular intervals -Security may be enhanced with the use of specialised software or operating system features that are designed for servers.
(b)	Disadvantages of a client-server network are: -Higher initial cost due to the need for a server -Administrative costs needed for the maintenance of server and clients
(c)	- Wireless has higher mobility of users, who can move about freely within the range of the wireless network. - It is easier to add new devices to the network as the router can be easily configured. - Wireless is more organised without cables. - (If cost is cited as an advantage, need to elaborate) initially expensive due to the cost of wireless network equipment but becomes more cost effective as network grows in size
(d)	- Wireless is generally slower due to lower bandwidth and possible interference from radio waves or microwaves - Wireless is less secure and reliable due to intrusion by hackers. - (If cost is cited as an disadvantage, need to elaborate) initially cheaper but becomes more cost effective as network grows in size due to the cost of cables

Qn 7	Marking Scheme / Answer
(a)	The data packet has been corrupted. There are even number of "1"s in an odd-parity system, indicating that an error has occurred.
(b)	Errors will not be detected if they involve changes in an even number of bits. *OR* Errors can only be detected but not corrected.
(c)	Before transmission, the checksum for the data is first calculated from the bits of the data. The data and the checksum are then sent together. At the destination, the checksum is recalculated and compared to the sent checksum value. If the checksum value of the received data matches the sent checksum value, the data was transmitted correctly. If they differ, an error has occurred.

Qn 8	Marking Scheme / Answer
	switch bridge hub

Qn 9	Marking Scheme / Answer
(a)	The purpose of a check digit is to detect errors in **manual input**.
(b)(i)	Error 1: Line 4 Correction: `IF x modulo 2 == 0 THEN` Error 2: Line 14 Correction: `ELSEIF remainder == 1 THEN` Error 3: Line 17 Correction: `OUTPUT check`
(b)(ii)	Syntax errors are errors due to incorrect source code that does not follow the rules of the language. Run-time errors are errors that are detected while a program is running, usually causing the program to crash or hang.
(b)(iii)	Deploy code. *Any of the following descriptions* The code is rolled out to its intended audience. Users may be trained to use the program, or there might be a transition from the old program or system to the new one.

	The effectiveness of the program in solving the problem is evaluated and any changes that might increase its usability or effectiveness are considered.

Qn 10	Marking Scheme / Answer
(a)	A2: Text C2: Date
(b)	=MID(A2,4,4)
(c)	Bella will use the formula COUNTIF(E2:E7,"No") in cell E8. This formula will count the number of times the second argument, "No", appears in the range of cells E2 to E7, where information on whether the order has been fulfilled or not is stored. *Answers must describe the two arguments.*

Qn 11	Marking Scheme / Answer
(a)	

b	x	y	OUTPUT
[-1, -1, -1, -1]			
	0		
		-1	
	1		
		0	
[-1, 0, -1, -1]			
		-1	
	2		
		0	
[-1, 0, 0, -1]			
	3		
		1	
[-1, 0, 0, 1]			
	0	0	
	1		
		1	
	2		
		2	
	3		
		3	
			0
		1	
	4		
		2	
	5		
		3	
			2
		1	
		0	
		-1	
	6		
		0	
		-1	

		7		
			0	

(b) The algorithm searches for every occurrence of P in the string T…
…and outputs the index of the first character of each occurrence.

For further info:
Knuth-Morris-Pratt's (KMP) algorithm is a optimized string matching algorithm that makes use of the information gained by previous character comparisons. This is done by using a back table b[].

Qn 12	**Marking Scheme / Answer**
(a)	Length check. Check that the length of the input is exactly 4 characters long. *OR* Format check. Check that the input is entirely made of digits. *OR* Presence check. Check that the user has input a guess.
(b)	Depending on student's answer in part (a), the range of acceptable answers in part (b) may differ. Below are some examples of acceptable answers.

	Length check	**Format check**	**Presence check**
Normal	1234 (any string with 4 characters)	1337 (any string with all digits)	2345 (a non-empty string)
Error	123 (any string with more or less than 4 characters)	!EE7 (any string with some non-digit characters)	"" (an empty string)

(c)

a) Input of guess
b) Use of a nested loop to check for duplicate values…
c) … and output positions of the duplicate values if there are any
d) Do the following if the guess is valid
e) Initialisation of count variables to store the number of correct digits and number of digits in the wrong position
f) Use of loop to go through each digit in the guess
g) Condition to check if each digit in the guess is equal to the corresponding digit in the answer and increment the corresponding count if so
h) Condition to check if each digit in the guess is in the wrong position compared to the answer and increment the corresponding count if so
i) Output of the two counts with appropriate messages to distinguish between the two

Note: the point will not be awarded if student does not use appropriate flowchart or pseudo-code syntax.

```
valid = True
INPUT guess #a
FOR x = 0 to 3
    FOR y = 0 to 3 #b1
        IF x != y and guess[x] == guess[y] THEN #b2
            OUTPUT "The digits in indices " + x + "
and " + y + " are duplicated." #c
            valid = False
        ENDIF
    NEXT y
NEXT x

IF valid == True THEN #d
    correct = 0
    wrong_position = 0 #e
    FOR x = 0 to 3 #f
        IF guess[x] == answer[x] THEN
            correct = correct + 1 #g
        ELSEIF guess[x] in answer THEN
            wrong_position = wrong_position + 1 #h
        ENDIF
    NEXT x

    OUTPUT correct + " digit(s) guessed correctly."
    OUTPUT wrong_position + " digit(s) in the wrong
position" #i
ENDIF
```