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SUBJECT	Information Technology	DATE	November 2021
GRADE	Grade 11	MARKS	125
EXAMINER	D Kench	DURATION	2.5 hours
MODERATOR			

NAME	MEMO
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INSTRUCTIONS**PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:**

1. Fill your name in the space above
2. This paper consists of pages. Please check that your paper is complete.
3. Answer ALL questions.
4. Read each question carefully. Answer to the question. Give specific relevant points for each mark.
5. Write the answers in the space provided.

QUESTIONS	MARK ALLOCATION	ACTUAL MARK
QUESTION 1 – SYSTEMS TECHNOLOGIES	33	
QUESTION 2 – NETWORKING AND ICT	36	
QUESTION 3 – SOCIAL IMPLICATIONS	13	
QUESTION 4 – DATA REPRESENTATION AND BOOLEAN LOGIC	19	
QUESTION 5 – SOLUTION MANAGEMENT	24	
TOTAL	125	

SCENARIO

You recently entered a competition and were lucky enough to win the first prize of a new laptop computer. You wish to donate your old gaming computer to an under privileged nursery school. Your old computer was purchased 3 years ago and is still reliable and in good working order.

QUESTION 1**HARDWARE AND SOFTWARE****33 MARKS**

The specifications of the old desktop computer are:

Processor	Intel Quad Core 3.3 GHz
RAM	8GB DDR4 2133MHz
Storage	1TB HDD
Graphics Card	Nvidia GeForce GTX 1060

1.1 How many cores are there on the processor? (1)

4✓

1.1.1 What is the term given to processors with more than core? (1)

Multiprocessing✓ / Multiprocessor

1.2 The processor is also hyperthreaded. What does hyperthreading mean? (2)

2 sets of registers✓ on the CPU✓ OR CPU appears to process more than one task at a time. Must say appears

1.2.1 How many logical cores will the processor have? (1)

8✓

1.3 The processor has 8MB of level 1 cache.

1.3.1 What is the purpose of processor cache? (2)

Store next set of data and instructions✓ to speed up access from slower RAM✓

Must say data and instructions

1.3.2 Name TWO differences between level 1 processor cache and level 2 processor cache. (2)

Difference 1: **Slower access**✓

Difference 2: **Further away from CPU OR larger ANY ONE**✓

1.4 The motherboard speed is much slower than the RAM and processor speed.

1.4.1 What technique is used to set the speed of faster components based on a slower motherboard? (1)

clock multiplication✓ **accept over clocking**

1.4.2 Explain how all the components can be made to run faster without changing any of the components. (2)

Overclocking✓ – make the system bus speed faster ✓ – hence all components will be faster

Accept if they correctly explain overclocking without using the term overclocking

1.4.3 Name TWO disadvantages to the solution you explained in Question 2.4.2. (2)

Disadvantage 1: **Over heating**✓ **Accept increased power consumption**

Disadvantage 2: **Components not tested to run at faster speeds**✓

1.5 The system bus consists of THREE busses. Write down the name of the bus next to the correct term: (3)

Bus Description	Bus Name
Transfers the address of the instructions and related data between RAM and the CPU.	Address Bus ✓
Sends read from memory and write to memory signals.	Control bus ✓
Transfers actual data and program instructions between RAM and the CPU.	Data bus ✓

1.5.1 Which of these three busses will have the most impact on the speed that instructions are processed if doubled? (1)

Data Bus✓

1.6 It has been suggested that the hard drive be replaced with a M.2 Format Solid State Drive (SSD).

1.6.1 Give TWO reason why a SSD would be an improvement. (2)

Reason 1: Access data faster✓

Reason 2: Smaller in size OR Less susceptible to shock✓ Do not accept that SSD is not susceptible to shock

1.6.2 Why is the M.2 Format not necessary in this scenario? (1)

The PC is a desktop – M.2 is for laptops✓ Accept the device has 1TB HDD

M2 is smaller for laptops, device is a desktop which is larger hence not needed

1.7 People often confuse disk cache and virtual memory.

1.7.1 Explain how these two differ with reference to the function they perform. (4)

Disk cache speeds up✓ access from the Hard Disk✓

Virtual memory uses HDD as an extension to RAM✓ - slower✓

2 marks if they just write a definition need to say how they differ

1.8 Write the correct system software term next to each definition or description: (4)

Definition	Term
The core of the operating system that remains in memory.	kernel✓
Volatile memory that stores the computer and user settings.	CMOS✓
Firmware that can boot in both 32-bit or 64-bit mode.	UEFI✓ <u>Accept UEIF</u>
Low-level software that resides on ROM.	BIOS✓

1.9 A line of code written in source code is:

```
num = 5*oldNum - 3;
```

1.9.1 Is this code a high level language or a low level language? (1)

High level✓

1.9.2 Give ONE reason for your answer in Question 1.9.1. (1)

Easier to understand OR Closer to English OR Many simpler instructions combined ✓

1.9.3 The code is translated and a new file is created. What is the term given to the new file? (1)

Object code OR Executable code✓ Accept bytecode

1.9.4 What type of translator produces a new file? (1)

Compiler✓

QUESTION 2

NETWORKING

36 MARKS

2.1 The nursery school is currently using a Local Area Network (LAN) network in order to share files.

2.1.1 Which type of server would they need to use to share documents across the network? (1)

File Server.✓

2.1.2 Define the role of a proxy server in a network by explaining how it differs from the server you mentioned in Question 3.1.1. (2)

A Proxy server intercepts and checks all traffic, maintaining security by disallowing access to unauthorised users✓. A files server stores files that can be accessed by all network users.✓

Mark through if they incorrectly identify the server in Question 3.1.1

Accept proxy server stores recently accessed webpages in a network – file server stores user's files

2.2 The network receives data from the Internet in the form of packets. Name TWO items of information found in the packet header. (2)

Item 1: Sender IP/Source address, Receiver IP/Destination address✓ ,
Synchronisation , Protocol , Packet length/size ANY TWO

Item 2: Protocol, Packet Count/Number✓ ANY TWO

2.3 Explain the significance of a MAC address when using a switch? (2)

A Switch uses the embedded MAC address/ MAC address is a hardware label for a device✓ in the frame to send the message to the intended node.✓

2.4 How does a router differ from a switch when determining where a packet should go? (2)

A switch uses the MAC address when determining where the message should go and a router uses the IP address✓ to determine the best path for the packets to travel to

the intended node.✓ Accept router connect networks and looks at whole packet/router can change packet configuration – switch only looks at part of the packet

2.5 Bluetooth and Near Field Communication (NFC) have become more popular when facilitating wireless communication between devices.

2.5.1 Explain how NFC is used for communication. (2)

NFC connection between devices within close proximity.✓ Used for contactless /wireless payment.✓

Accept two-way communication

2.5.2 Explain how Bluetooth differs from NFC. (1)

Bluetooth connection over short distances (+-10m)✓ with high level of security. Do not accept the definition of Bluetooth – they must say how it differs.

Do not accept NFC is not encrypted. Both Bluetooth and NFC are encrypted

Accept Bluetooth needs devices to pair/sync as opposed to just tapping therefor it is more secure

2.5.3 Give an example where these technologies would be used. (2)

NFC example: Make a contactless payment/ Accept in credit cards for Grade 11 – but they should say the process of payments i.e. how NFC is USED.

Do not accept AirDrop – it does not use NFC

Bluetooth example: ANY acceptable example: Playing music from a phone to a speaker, allowing synchronisation across devices.✓

Do not accept vague answers such as send a photo to a friend. Need to mention devices or indicate Bluetooth is needed.

2.5.4 Which would you choose (NFC or Bluetooth) for a wireless Personal Area Network connection? (1)

Bluetooth✓

2.5.5 Give TWO reasons for your answer to Question 3.5.4. (2)

Reason 1: It is more secure than NFC ✓ accept more commonly used-/ accept faster

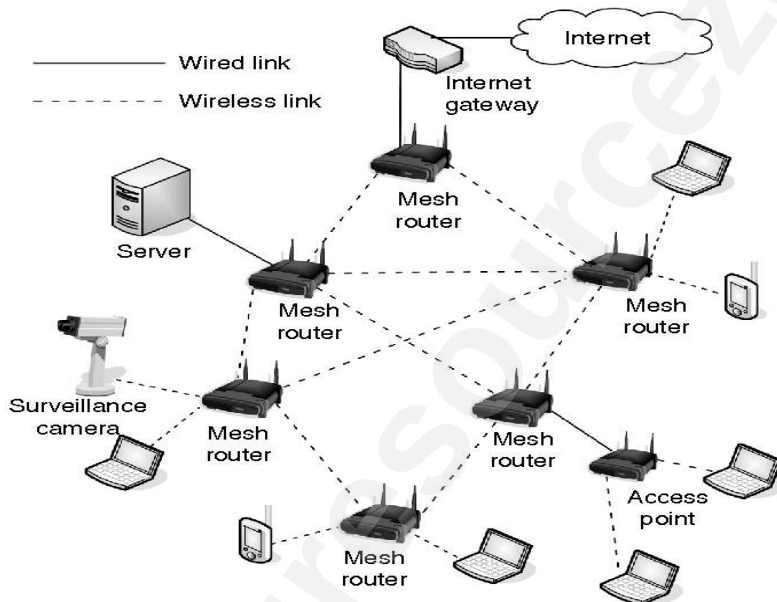
Reason 2: Works over further distances. ✓ Do not accept can transmit data and voice – NFC can transmit voice data <https://www.wpxbox.com/record-voice-messages-and-store-them-on-nfc-tags-using-nearspeak/>

NFC tag = NFC-equipped device

If they say Bluetooth has low energy, they need to specify Bluetooth LE (Low Energy) is used. The question says Bluetooth.

Accept more secure since it needs to be paired.

2.6 Consider the below network diagram and answer the questions that follow.



2.6.1 What topology is featured in the above diagram? (1)

Wireless Mesh Topology ✓ do not accept hybrid
accept mesh topology

2.6.2 This network also uses Wireless Access Points. Explain the difference between a Wireless Access Point and a Hotspot. (2)

Wireless Access Points broadcast a signal within an area and enable computers and devices to be connected to a network.✓ Must say network NOT Internet

Hotspots offer internet access over a wireless local area network.✓ Must say internet

2.6.3 Name one advantage and one disadvantage of using this topology. (2)

Advantage: ANY ONE: Reduced cable cost, it is robust, easy to install. easy to expand✓

If their answer to 3.6.1 is different – apply advantages and disadvantages to their incorrect answer.

Disadvantage: Increased workload for each node, Initial set up is complicated✓ accept expensive

2.6.4 Would network topology like this be suitable for a nursery school with limited cashflow? Circle either Yes or No. (1)

Yes / No - Either one correct. ✓ Give a mark here even if the reason is not correct.

2.6.5 Justify your answer in Question 3.6.4. (1)

NO circled - This network would need more powerful devices a WLAN could be more suitable.✓ accept cost

Yes✓, there are reduced costs on the set up and the network is more stable.✓

2.7 Compare UDP and TCP by completing the table below: (6)

	TCP	UDP
Reliability	TCP is a connection- oriented / <u>connection based</u> protocol, there is no corruption while transferring✓	UDP is a connectionless protocol, there may be corruption while transferring a message✓
Ordered	Messages are delivered in order✓ <u>Accept ordered</u>	No guarantees on the order of messages being received✓ <u>Accept unordered.</u>

Examples	Word wide web, email, files transfer (any one)✓	VoIP, Online Multiplayer games, Streaming (any one)✓
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2.8 Consider the following URL <https://www.takealot.com/>

2.8.1 Which part of the URL indicates that this is a secure site? (1)

The S in https.✓

2.8.2 The web site makes use of both client-side and server-side scripting.

a) What is client-side scripting. (2)

Code ✓that run in the local browser. ✓ Must say local browser/client's machine

b) Give an example of the type of task that would be performed by client-side scripting. (1)

Checking passwords, totalling a till slip. Animation for the website. ✓

ANY ONE do not accept interactive

2.9 When sending and receiving emails specific protocols are used. Name ONE protocol for sending emails and ONE protocol for receiving emails. (2)

Protocol for sending emails: SMTP (Simple mail Transfer Protocol)✓

Protocol for receiving emails: POP3 or IMAP✓

QUESTION 3

SOCIAL IMPLICATIONS

13 MARKS

3.1 The owner of the nursery school wants to ensure that the donated computer is only used for purposes related to the nursery school.

3.1.1 Name the policy that she can give to her staff to describe how the computer is to be used. (1)

AUP✓ Accept Acceptable User

3.2 The desktop computer has the Windows Operating system loaded. Is the nursery school owner licenced to use the operating system if it came with the computer? Justify your answer. (2)

Yes✓ – if the licence is transferred to her✓

No – if the licence is related to the learner's email

3.3 When you deliver the computer to the nursery school, the owner asks you about social engineering.

3.3.1 Define social engineering. (2)

Manipulate people✓ to give up private information. ✓

3.3.2 Name TWO types of social engineering and how she can avoid each type. (4)

	Name	How to avoid this type.
Type 1:	Shoulder surfing✓ OR Dumpster diving	Look over a persons shoulder to see password being typed✓ OR Go through a persons trash to find revealing documents
Type 2:	Phishing✓ OR Role Playing <u>OR Trojan</u>	Send emails with enticing links✓ OR Pretend to help fix the computer but install malicious software <u>OR</u> <u>Do not download files that you are unsure of</u>

3.4 The owner has come across an article on the Internet which she is not sure true. Name and describe TWO checks she can perform to evaluate the website. (4)

Check 1: Affiliation OR Audience OR Authority✓

Explanation: Who supports the web site OR who is the article intended for? OR credential of author✓

Check 2: Content OR Currency OR Design OR Objectivity✓

Explanation: Is it well written? OR Is it up to date? OR Easy to navigate? OR Biased?

✓

QUESTION 4 DATA REPRESENTATION AND TRUTH TABLES 19 MARKS

4.1 Define the term word size. (2)

Number of bits✓ that can be simultaneously processed✓ in the computer. ✓

Must say number of bits.

Must say processed not stored.

4.2 Convert the decimal numbers 31 and 52 to binary and then add them together. (3)

$$31 = 11111_2 \checkmark$$

$$+ 52 = 110100_2 \checkmark$$

$$= 1010011_2 \checkmark$$

At least -1 if missing base-2

4.3 What is the largest and smallest number that can be represented in signed 9 bits? Show your formulas and all your workings. (4)

Smallest number in 9 signed bits	Largest number in 9 signed bits
$-2^{n-1} \checkmark$	$= 2^{9-1}-1 \checkmark$
$= -2^{9-1}$	$= 2^8-1$
$= -2^8$	$= 256 - 1$
$= -256 \checkmark$	$= 255 \checkmark$ <u>If incorrect formula do not give any marks</u>

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4.4 The owner wants to take the children in the nursery school on an outing. She creates the following criteria to choose the destination.

- The destination is 5km or closer $D = 1$. $D = 0$ if the destination more than 5km away.

AND either one of:

- The destination has NO entry fee $F = 0$. $F = 1$ if there is an entry fee.

OR

- The outing has been sponsored $S = 1$. $S = 0$ if the outing is not sponsored.

4.4.1 Write the above as a function. (4)

$$F(D,F,S) = D \vee (F \vee S) \vee -1 \text{ if } F \text{ not } F', -1 \text{ if brackets missing.}$$

4.5 Complete the trace table to show that $(A'B)' = A + B'$ (6)

A	B	WORKINGS $(A'B)'$	$(A'B)'$	WORKINGS $A + B'$	$A + B'$
0	0	$(0'.0)' = (1.0)' = 0' \checkmark \checkmark$	1✓	$0 + 0' = 0 + 1 \checkmark \checkmark$	1✓
0	1	$(0'.1)' = (1.1)' = 1'$	0	$0 + 1' = 0 + 0$	0
1	0	$(1'.0)' = (0.0)' = 0'$	1	$1 + 0' = 1 + 1$	1
1	1	$(1'.1)' = (0.1)' = 0'$	1	$1 + 1' = 1 + 0$	1

2 marks for correct substitution for each side of the equation

2 marks for working out answers for each side of the calculation

2 marks for the final result

Formatted: stbNormal

QUESTION 5

OOP

24 MARKS

The nursery school owner decides to classify her outings as either INDOOR or OUTDOOR. She wants to record the name of the venue, the cost, the total number of indoor outings (stored in a field called **totalIndoor**) and the total number of outdoor outings (stored in a field called **totalOutDoor**).

Create a class diagram called **Outing**.

The **Outing** class will have the following private fields:

- venueName** (each object will have its own copy).
- cost** (as a real number - each object will have its own copy).
- type** (either a 1 for outdoor, or 2 for indoor).
- totalIndoor** (a static field to record the total number of indoor outings).
- totalOutDoor** (a static field to record the total number of indoor outings).

The **Outing** class will have the following public constants:

- INDOOR** = 1 (a static constant field).

- **OUTDOOR** = 2 (a static constant field).

The class will have the following methods:

- A constructor with parameters for the **venueName**, **type** and **cost** fields.
- An accessor for the **venueName** field.
- A mutator for the **cost** field.
- A **toString** to combine all the private fields into a string.

5.1 Create a class diagram for the **Outing** class. (10)

Outing✓ - venueName : string✓ 2 marks for non-static fields - must get name, type and private. -1 for each mistake - cost : ~~real~~double✓ - type : integer - totalIndoor : integer✓ 1 mark for both static fields. -1 if both not underlined. - totalOutdoor : integer✓ + INDOOR : integer = 1✓ + OUTDOOR : integer = 2✓
+ Constructor(vn : string, t : integer, c : integer) ✓ + getVenueName() : string✓ do not penalise if brackets are missing + setCost(c : real) ✓ do not award a mark if the type is integer + toString() : string✓ Penalise -1 once if fields and parameters are written wrong way around i.e. type : filename.

5.1.1 Explain why the INDOOR and OUTDOOR fields do not need an accessor method. (1)

They are public✓ Accept can be accessed Outing. INDOOR / Outing.OUTDOOR

5.1.2 Explain why the INDOOR and OUTDOOR fields do not need a mutator method. (1)

They are constants and will not change. ✓ Accept both are public.

5.2 What is the purpose of the constructor? (2)

Assign values✓ to the private fields✓ accept if private is not mentioned
Do not accept a constructor creates an object. Constructor does not create an object – it initialises it by providing the name of the class to initialise.

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5.2.1 Why does the constructor not have parameters for the static indoor and outdoor fields? (2)

~~indoor and outdoor will be incremented depending on the type of outing.~~

Question should have been totalIndoor and total Outdoor.

Accept indoor and outdoor already have values assigned ✓✓

OR indoor and outdoor are constants ✓✓

5.3 Complete the trace table of the following algorithm that determines if a number is prime (the number has NO factors other than 1 and itself).

Assume the user enters **25** as data.

Line Number	Algorithm
1	input num
2	factor $\leftarrow$ 2
3	found $\leftarrow$ false
4	while factor * factor $\leq$ num AND found = false
5	begin
6	if number MOD factor = 0
7	begin
8	found $\leftarrow$ true
9	else
10	factor $\leftarrow$ factor + 1
11	endif
12	endwhile
13	isPrime $\leftarrow$ NOT found

Trace table

(8)

Line No	num	factor	found	while factor * factor <= num AND found = false?	number MOD factor = 0?	isPrime
1	25✓					
2		2✓				
3			F✓			
4				T✓✓		
6					F✓✓	
10		3				
4				T		
6					F	
10		4				
4				T		
6					F	
10		5				
4				T	F	
~~6~~			~~T~~	~~T~~	~~T~~	
~~138~~			~~T~~			~~F✓~~
4				F		
13						F

1 mark for num is 251 mark for factor going 2,3,4,51 mark found going F to T2 marks for while loop – must show 4 trues and a false.2 marks for test for factor1 mark isPrime assigned NOT foundDo not penalise for incorrect line numbers**EXTRA SPACE – CLEARLY INDICATE THE QUESTION NUMBER**

[illegible]