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St Benedicts's College

SUBJECT	Information Technology	DATE	November 2020
GRADE	Grade 11	MARKS	125
EXAMINER	Mr Gill	DURATION	2.5 hours
MODERATOR	Mrs Julien		

NAME	
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INSTRUCTIONS

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

1. Fill your name in the space above
2. This paper consists of **15** 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 – TERMINOLOGY	10	
QUESTION 2 – SYSTEMS TECHNOLOGIES	27	
QUESTION 3 – ICT	32	
QUESTION 4 – SOCIAL IMPLICATIONS	13	
QUESTION 5 – DATA REPRESENTATION AND BOOLEAN LOGIC	20	
QUESTION 6 – SOLUTION MANAGEMENT	23	
TOTAL	125	

QUESTION 1**10 MARKS**

Give the term that best matches the following definitions:

Definition	Term
A small software module that provides customisation for a web browser.	
A small piece of data sent from a website and stored in a user's web browser while a user is browsing a website.	
A protocol used to transfer files across the Internet.	
A device that provides connectivity between two or more network segments with two different protocols.	
A protocol for outgoing emails which is used when an email is delivered from an email client to an email server	
The bus that carries signals between the CPU and RAM	
Battery-backed, volatile memory that stores hardware settings and user settings.	
A device number which the CPU uses to identify which device is interrupting it.	
A section of the hard disk used as an extension of RAM	
The central printed circuit board that connects components and devices to each other.	

(10)

SCENARIO

Your cousin has chosen to take Information Technology as a subject next year, but he does not own a computer of his own. Additionally, he would also like to participate in an eSports team and participate in gaming tournaments. His parents have little knowledge of hardware and software and have asked you to assist them in making a purchasing decision.

QUESTION 2**27 MARKS**

Your cousin's parents have found two advertisements that they would like you to consider. The main details are included below:

Specifications	Advertisement 1	Advertisement 2
Processor	AMD Ryzen 3.5Ghz, 4x Cores 8x Threads	AMD Athlon 3.5Ghz 4x Threads
RAM	16GB DDR4 2666MHz	16GB DDR4 2666MHz
Storage	512GB NVME SSD up to 2000MB/s	256GB SSD up to 550MB/s

2.1 A CPU contains a CU, ALU and registers.

2.1.1 What is the function of the CU? (1)

2.1.2 What is the function of the ALU? (1)

2.1.3 What is the function of the registers? (1)

2.2 Advertisement 1 has a CPU with 4x cores and 8x threads.

2.2.1 Give the name for having multiple cores on a single CPU chip. (1)

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2.2.2 What is the term for having 4x cores and 8x threads? (1)

--

2.2.3 Explain how the process you mentioned in 2.2.2 works

(2)

2.3 Your cousin sees that the RAM runs at 2666MHz and the CPU at 3.5GHz.

2.3.1 Which of the above components is the fastest?

(1)

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2.3.2 Explain how RAM and the CPU can run at different speeds if they both base their speeds on the system clock.

(2)

2.3.3 Explain what will happen to the system if the system clock speed is increased. Refer both to the speed of the PC components and their stability

(2)

Speed:
Stability:

2.4 Advertisement 1 lists an SSD with a transfer speed of 2000MB/s and Advertisement 2 lists an SSD with a transfer speed of 550MB/s.

2.4.1 Name the type of bus will be used in Advertisement 2?

(1)

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2.5 Both motherboards support UEFI

2.5.1 Which technology does UEFI replace? You may give the acronym. (1)

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2.5.2 Give **ONE** advantage of UEFI compared to the older technology. (1)

2.6 While a program is running an interrupt may be generated.

2.6.1 Define an interrupt. (2)

2.6.2 Give an example of a software interrupt. (1)

2.7 Two process states are **ready** and **waiting**.

2.7.1 What is the similarity between **ready** and **waiting** threads? (1)

2.7.2 What is the difference between **ready** and **waiting** threads? (1)

2.8 What is an IO range and what is it used for?

(2)

2.9 Your cousin will be programming in Java which is a high-level language.

2.9.1 What does it mean to say that Java has a high level of abstraction?

(1)

2.9.2 Why would a program written in a high-level language be easier to understand than one written in a low-level language?

(1)

2.10 The last stage of the machine cycle is to STORE. List the other **THREE** stages.

(3)

QUESTION 3

32 MARKS

The school your cousin attends has 3 campuses. Each campus has some computer centres which are networked, all other offices and classrooms are also connected to the network, some through wired connections and some through wireless connections.

3.1 Connections can be point-to-point or broadcast.

3.1.1 Define a point-to-point connection.

(1)

3.1.2 Define a broadcast

(1)

3.1.3 Which type of connection should you choose for maximum security?

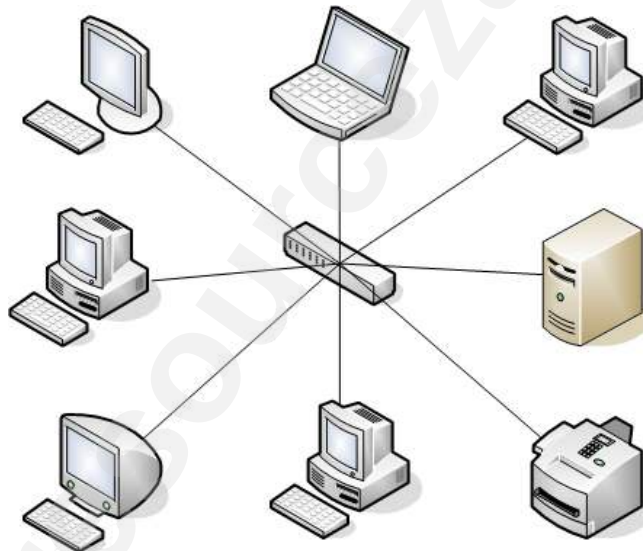
(1)

--

3.1.4 Give a reason for your answer above.

(1)

3.2 The network diagram for one the admin office is given below:



<https://en.wikipedia.org/wiki/network#/media/File:Topology.png>

3.2.1 Name the topology in the diagram above.

(1)

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3.2.2 Give ONE advantage of this type of topology.

(1)

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3.2.2 What type of cable will be used in the above network?

(1)

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3.3 Some network devices are: **repeater, switch, router, bridge**. For each of the scenarios below choose the **most appropriate** device. Each device may only be used **once**.

3.3.1 Connecting the school network to the internet. (1)

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3.3.2 Connecting the LAN in the library to the LAN in the admin building wirelessly. (1)

--

3.3.3 Connecting the CCTV camera in tuckshop to the security centre 230m away. This connection uses a UTP cable. (1)

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3.4 The OSI model is divided into 7 layers, with each layer performing a specific function.

3.4.1 Name the layer which transmits network data from one location to the next over the media. (1)

--

3.4.2 Name the layer which creates packets. (1)

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3.4.3 Name the layer where data encryption / decryption would take place. (1)

--

3.5 Name the 3 main parts of a packets. (3)

3.6 With reference to frames and packets explain why a switch cannot send data to an IP address but a router can.

(4)

3.7 The school network uses a fibre optic backbone

3.7.1 Define a backbone.

(1)

3.7.2 Give **ONE** advantage of fibre optic cabling which makes it suitable for a backbone.

(1)

3.8 Define bandwidth.

(2)

3.9 In the context of web pages a script is a set of instructions which modifies the page that the user sees.

3.9.1 Which type of scripting runs on the **user's** machine?

(1)

--

3.9.2 Give **ONE** disadvantage of the type of scripting from the answer above.

(1)

3.10 Give **TWO** advantages of a web based application.

(2)

3.11 The music teacher at the school often plays musical pieces to their students by streaming over the internet. Today they are watching videos of the performances rather than simply streaming audio files. The videos do not play continuously and keep freezing or stopping.

3.11.1 Give the name for when videos halt when they are streamed.

(1)

--

3.11.2 How can the teacher solve this problem?

(1)

3.11.3 Why did the teacher not experience this problem when audio files were being streamed?

(1)

3.12 What is the main difference in the way in which a DOS attack and a DDOS attack are performed?

(1)

QUESTION 4

13 MARKS

The recent presidential election in the USA involved many different types of voting including physical paper at voting centres, voting electronically on touch screen voting machines and sending physical votes through the postage system. Machine-counting was widely employed to count the results. The current president of the USA, Donald Trump, has claimed that there was widescale fraud after he lost the election.

Trump's vote fraud claims go viral on social media despite curbs

President's posts are top on Facebook as efforts to stop misinformation about election prove ineffective

● **US politics: live updates**



4.1 Future elections might allow virtual voting over the internet.

4.1.1 Give **ONE** advantage of virtual voting.

(1)

4.1.2 Give **ONE** disadvantage of virtual voting.

(1)

4.2 Electronic vote counting machines have built-in security measures and require a secure login with a password to operate them.

4.2.1 Name and describe **TWO** social engineering techniques a hacker might use to steal a login and password from an authorised user. (4)

Technique 1 Name:
Describe Technique 1:
Technique 2 Name:
Describe Technique 2:

4.3 Explain how a white hat hacker could help improve the security of online voting by describing what a white hat hacker does. (2)

4.4 Twitter has flagged some of Donald Trump's tweets as disputed and possibly misleading. Twitter is a social media platform and tweets are messages written by users of the platform.

4.4.1 Define fake news. (1)

- 4.4.2 Do you think twitter should have flagged the tweets Donald Trump made? Justify your answer. (2)

- 4.4.3 List two criteria you can use to help you evaluate a tweet on the internet. (2)

QUESTION 5

19 MARKS

- 5.1 Calculate $110011_2 + 1011_2$. Show ALL working. (2)

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- 5.2 In the game Civilization Mahatma Gandhi was given an aggression level of 0, stored in an 8-bit unsigned integer. If the Democracy government type was chosen, 2 was subtracted from aggression. If Gandhi, with an aggression level of 0 chose Democracy, 2 was subtracted from his 0 bug caused his aggression to rise to a near-maximum.

5.2.1 What is the largest number that can be represented in 8 unsigned bits?

(2)

5.2.2 What is the smallest number that can be represented in 8 unsigned bits?

(1)

5.2.3 What is the name of the process that caused Gandhi to achieve near-maximum aggression levels when subtracting 2 from his aggression level of 0?

(1)

5.3 Express -37 in two's complement using 8 bits.

(2)

5.4 The final two digits of a MAC address in hexadecimal are F4. Convert this number to binary.

(2)



5.5 In order to teach at a South African school you must have either a BEd or a PGCE (two types of qualification). Additionally, you must be registered with SACE or have an exemption certificate.

- Let $B = 1$ represent having a BEd degree.
- Let $P = 1$ represent having a PGCE.
- Let $S = 1$ represent having registered with SACE.
- Let $E = 1$ represent having an exemption certificate.

Create a Boolean expression that represents the above information. DO NOT create a truth table.

(4)



5.6 Given the Boolean expression **AB + C**.

5.6.1 Draw a truth table to evaluate the scenario.

(5)

A	B	C	AB	AB + C

5.6.2 In how many outcomes will the scenario be true?

(1)

QUESTION 6

23 MARKS

6.1 What is the role of a constructor in OOP?

(2)

6.2 Consider the Truck class.

TRUCK
- numTrucks : integer
- mileage : integer
+ Constructor(m : integer)
+ milesToKilometers(m : real) : real
+ honk()
+ toString() : string

- It contains a static integer called numTrucks.
- It contains a non-static integer called mileage.
- It has a static method called milesToKilometres that takes a real parameter and returns a real number.
- It has a non-static method called honk that takes no parameters and returns no values.

- A Truck object called `deliveryTruck` with 6000 miles has been instantiated with the following code:

```
Truck deliveryTruck = new Truck(6000);
```

- 6.2.1 Write the code to assign the return value of `milesToKilometres` to a variable called `numMiles` with a parameter of 10.5. (2)

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- 6.2.2 Write the code to call the `honk` method using the `deliveryTruck` object. (2)

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- 6.2.3 Assume that 10 Truck objects have been instantiated. How many copies of the `numTrucks` variable are there? (1)

--

- 6.2.4 Assume that there are still 10 Truck objects. How many copies of the `mileage` variable are there? (1)

--

- 6.2.5 If the `numTrucks` variable is meant to keep track of how many Truck objects have been instantiated, explain why it is a static variable. Ensure your answer explains what it means for a variable to be static as well as why `numTrucks` can be static. (2)

6.3 Method overloading is an Object-Oriented Programming technique

6.3.1 Explain what method overloading is.

(2)

6.3.2 How can the compiler determine which overloaded method to call?

(1)

6.4 The String class in Java has a typed method called `charAt`. Consider the following code:

```
String name = "Thembekile";
```

```
name.charAt(3);
```

Why is the code unproductive? Ensure that your answer refers to a typed method and return values.

(2)

6.5 An array called **arr** consists of the following String data:

0	1	2	3	4	5
James	Albert	Sipho	Mary	Sashil	Thandi

You code a binary search and search for the value "Albert". The search is meant to return the position of the searched for value.

Explain why the binary search will not work with the data as is. Ensure your answer refers to the current state of the data as well as a description of how a binary search work. (3)

- 6.6 Complete the following pseudocode to create a bubble sort. Missing pieces of pseudocode have been indicated with question numbers (e.g. 6.6.1, 6.6.2 etc). Fill in the missing pseudocode in the table below. You may assume a variable size has been created which contains the size of the array.

```

for i from 6.6.1 down to 0
    for j from 0 to 6.6.2
        if (arr[j] < arr[6.6.3])
            temp ← arr[j]
            arr[j] ← arr[j + 1]
            arr[j + 1] ← 6.6.4

            6.6.5
        end j for loop
    end i for loop

```

Question Number	Missing pseudocode
6.6.1	
6.6.2	
6.6.3	
6.6.4	
6.6.5	

(5)

[illegible]