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[SCHOOL NAME]

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SUBJECT	Information Technology Theory	DATE	June 2022
	11		100
GRADE		MARKS	Ms Kench
EXAMINER		MODERATOR	2 hours
		DURATION	

NAME

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A desktop computer has the following specifications.

CPU	Intel Core i3 -10105, 4.40 GHz, 6MB Cache Processor, 4 Cores, Hyperthreaded
RAM	4 GB DDR4 RAM
Storage	1 TB HDD
Monitor	15.6" 16:9 HD 1366 x 768
Graphics	Onboard
Connectivity	Ethernet, Wireless LAN,
Ports	RJ45, 1x HDMI, 1x USB 3.2 Type-A, 2x USB 2.0 , 1x Audio Combo Jack

QUESTION 1

HARDWARE

30 MARKS

1.1 Storage:

1.1.1 Write down the correct term next to the definition. (4)

Definition	Term
Stores all loaded programs and data.	
Stores current instruction.	
Stores next few instructions and data.	
Stores all data and programs.	

1.1.2 It is suggested that the secondary storage is replaced with a 500GB Solid State Drive (SSD) to make the computer faster. Give TWO advantages of a Solid State Drive. (2)

Advantage 1:
Advantage 2:

1.1.3 It is not entirely true that the computer executes faster. Write true or false next to the following statements: (5)

Statement	True / False
Installing an SSD will make the processor run faster.	
An SSD will increase virtual memory.	
An SSD will improve loading and saving of programs.	
An SSD will require less RAM.	
The SSD would need the M.2 format.	

1.2 The CPU uses multiprocessing and hyperthreading

1.2.1 Define multiprocessing. (2)

1.2.2 Define hyperthreading. (2)

1.2.3 Explain how these two techniques can increase the speed at which instructions are processed. (2)

Multiprocessing:
Hyperthreading:

1.3 The CPU has 6 MB of cache and 4 GB of DDR DRAM.

1.3.1 Explain why cache is made out of SRAM. (2)

1.3.2 Explain why RAM is called DDR RAM? What does DDR mean? Do not write out the acronym. (3)

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1.3.3 Give TWO reasons is there more RAM than cache. (2)

Reason 1:
Reason 2:

1.4 The CPU can be overclocked to increase its speed.

1.4.1 Explain how a CPU can change its speed. (2)

1.4.2 When would it be necessary for the CPU to change its speed? Provide an example. (2)

1.4.3 Why would a CPU running at a faster speed reduce the battery life of a laptop? (2)

1.5 The CPU is connected to RAM via the Front Side Bus. Name the three buses. (3)

QUESTION 2**SYSTEM SOFTWARE****16 MARKS**

2.1 Multitasking and multithreading are linked to multiprocessing and hyperthreading.

2.1.1 Define multitasking. (2)

2.1.2 Define multithreading. (2)

2.1.3 Explain how multithreading programs can execute faster when multiprocessing is used? (2)

2.2 Describe the Power On Self Test (POST) process? (4)

2.3 Operating systems provide translators.

2.3.1 What is the function of a translator? (2)

2.3.2 Write down the correct term next to each definition:

(4)

Definition	Term
Converts a file to an executable form line by line.	
Programming languages that are similar to English.	
Produces a separate file if the code has no errors.	
Converts assembly language to machine code	

QUESTION 3**DATA REPRESENTATION****18 MARKS**

3.1 Show how 31 will be represented in:

3.1.1 Sign and size in 8 bits.

(2)

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3.1.2 Explain why 31 in 8 bits using sign and size will be the same as 31 in 8 bits in twos complement.

(2)

3.1.3 Represent -31 in twos complement in 8 bits.

(3)

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3.2 The TV decoder used 8 bits to store the channel numbers. Show, using a formula, why the maximum number TV channel number is 255.

(2)

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- 3.2.1 The TV channel service provider decides to add 50 more channels producing 305 channels. Show, using binary addition, what channel will be selected if a user enters 305. Use the table below to complete your calculation: (5)

Convert 255 to binary:	
Convert 50 to binary:	
Add the resulting binary numbers:	
Show how the result will be interpreted in decimal:	

- 3.3 Represent the real number 0.000000012356 with two digits are for the exponent and its sign and 4 digits for the mantissa and its sign. Truncation will occur in the mantissa. (4)

Working:

Mantissa				Exponent	

QUESTION 4**BOOLEAN LOGIC****10 MARKS**

4.1 A Grade 10 student is trying to solve $F(A,B)'$ if $F(A,B) = (A+B') \cdot (A+B)$. They get an answer of $A + B' \cdot A' + B'$.

4.1.1 Prove using the truth table below, why their answer is wrong. (6)

A	B	B'	A+B'	A+B	$(A+B') \cdot (A+B)$	$((A+B') \cdot (A+B))'$	A'	B' \cdot A'	$A + B' \cdot A' + B'$
0	0								
0	1								
1	0								
1	1								

4.1.2 Show what the answer should be. (3)

$F(A,B)'$

4.1.3 What is the name of the law that is used in the above two questions? (1)

QUESTION 5**OOP PROGRAMMING****23 MARKS**

A programmer has designed the following class diagram to represent the data stored to describe the details of files stored in a folder. For simplicity, files can only be text, images or video and do not

have a file extension. Each file has a name, type (text = 0, image = 1 or video = 2), size (in bytes) and whether the file is hidden (true = hidden, false = not hidden).

The programmer needs to record the number of files in the folder using the field **numFiles**. Each time a new **File** object is instantiated, **numFiles** must be increased.

The programmer has three fields TEXT, IMAGE and VIDEO to help class users deal with the different types of files. Instead of class users remembering the numeric values of 0, 1 and for text, image and video files respectively, they can use these 3 fields.

File
<pre> - fileName : string - fileType : integer - fileSize : integer - hidden : boolean - numFiles : integer + TEXT : integer = 0 + IMAGE : integer = 1 + VIDEO : integer = 3 </pre>
<pre> + Constructor (inFN : string, inFT : integer, inFS : integer, inH : boolean) + getFileName() : string + getFileSize() : integer + getFileType() : integer + setFileName(inFN : string) + convertToKB() : integer + toString() : string </pre>

5.1.1 Explain why all the methods are public. (2)

5.1.2 Why are the fields **fileName**, **filetype**, **fileSize** and **hidden** declared as private? (2)

5.1.3 Why is the **numFields** field declared as private and static? (2)

5.1.4 Define the terms accessor method and mutator method. (2)

Accessor method:
Mutator method:

5.1.5 Explain why the fields TEXT, IMAGE and VIDEO do not have accessor or mutator methods. (2)

Accessor Method:
Mutator method:

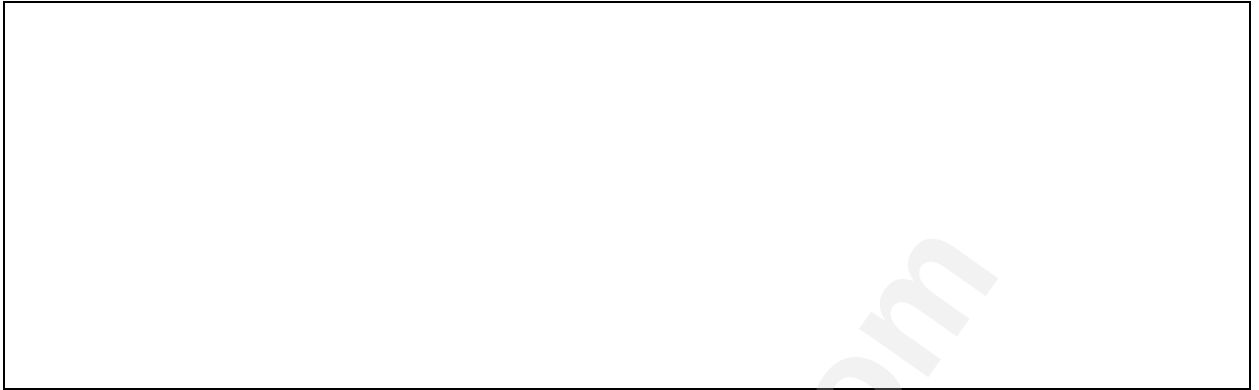
5.2 Write Java code to show a File object called **myFile** will be instantiated. The file is called "Homework", it is a text file, consists of 1345 bytes and is not hidden. (4)

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5.3 Write Java code for a frontend class to check if the File object called **myFile** instantiated in Question 5.2 is a TEXT file using the appropriate fields. The code must display the message: fileName " is a text file". For example: Homework is a text file. (5)

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- 5.4 Write Java code for the **convertToKB** method. The method must convert the file size in bytes by dividing by 1024 and removing the remainder. Files that are less than 1024 bytes will be considered to be 1KB not matter how small they are.



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[illegible]

