ZHONGHUA SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2018
SECONDARY 4 EXPRESS

Candidate's Name	Class	Register Number
MODEL ANSWER, TOS		

COMPUTING

7155/01

Paper 1

13 Sep 2018
2 hours

Additional Materials: NIL

READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions.
Write your answers in this question booklet.
Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
The use of a scientific calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.

At the end of the presentation, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of marks for this paper is **80**.

For Examiner's Use:

Setter: Mr. Calvin Heng
Vetter: Mr. Low Kee Ley

1	Define the term ‘computer’.	[3]
	It is a device that can receive data,	
	process the data according to a set of instructions,	
	and produce the processed data as a result.	
	_____	
	It is said that the modern smartphone is a computer. From your definition above, describe two areas where the smartphone meets the requirements of the definition.	[2]
	Smartphones have a keypad where alphanumeric characters can be	
	entered as text. Depending on the App, e.g. messaging, the text can then	
	be transmitted according to programmed instructions.	
	<Reasonable answers that match the Definition portion>	
	  	

2	Number Systems. **All workings must be shown clearly.**	
(a)	Convert the Hexadecimal number 4D to Denary:	[2]
	77	
(b)	Convert the Binary number 101011110101 to Hexadecimal:	[2]
	AF5	
(c)	Convert the Denary number 844 to Hexadecimal:	[2]
	34C	
(d)	Convert the Binary number 1010111111001000 to Denary:	[2]
	45000	
3	Data Protection.	
(a)	Study the following exhibit. Is this a case of data loss or data corruption? Explain your answer briefly.	[2]

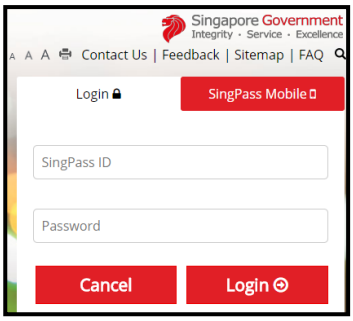
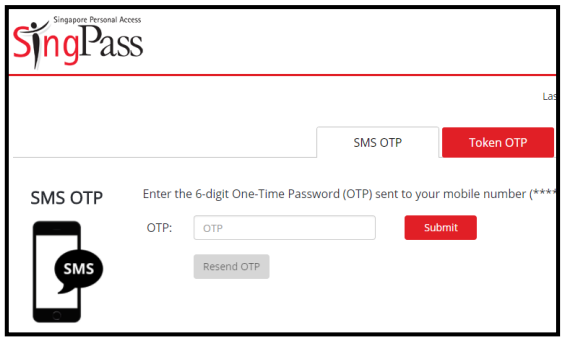
$#!!%	9!%%@	&%!#+-	!!**#@$
1011	1.65	65	176.96
1012	1.52	54	124.76
1013	1.68	62	174.99

***Data Loss*. The header fields of the table are corrupted. This renders the table useless as the contents are now meaningless.**

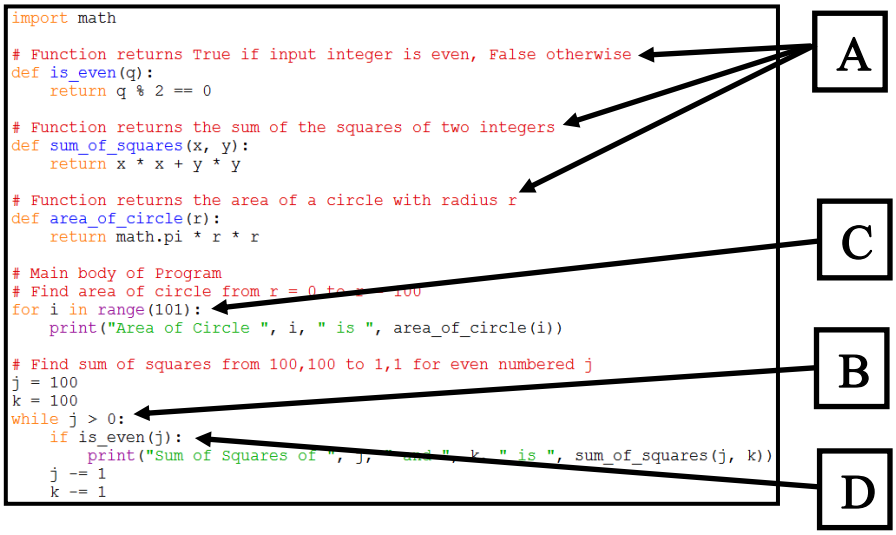
(b)	Describe one way to prevent Data Loss.	[1]
	Having a scheduled backup cycle.	
	<Reasonable Answers>	

4	Complete the following table by writing in the type of Malicious Software next to its description.		
	Type of Malicious Software	Description	
(a)	**SPYWARE**	A hidden program that secretly collects personal information about its users and transmits this information to attackers without the users' knowledge.	[1]
(b)	**WORM**	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.	[1]
(c)	**TROJAN HORSE**	A computer program that pretends to be a harmless file or useful application, but when activated, does harmful things like grant unauthorised access to the computer.	[1]

5	For the following scenarios, state whether the person described is guilty of copyright infringement, plagiarism, or both by putting a tick (✓) in the box.			[4]
	Scenario	**Copyright Infringement**	**Plagiarism**	
(a)	Jason takes his friend's python program and submits it for a contest as his own program without his friend's permission.	✓	✓	
(b)	Jason installs a crack on a software application so that he can use it for free.	✓		
(c)	Jason found a programming solution on a public domain website and submits it as his own work for an assignment.		✓	

6	Study the problem statement below and answer the questions:	
	Problem Statement	
	Your 70-year-old grandma is trying to access her Central Provident Fund information on the www.cpf.gov.sg website. As she knows you are a student of Computing, she requests for your help in logging in. You are presented with the following screen:	
		
(a)	What are the inputs for this screen?	[3]
	Grandma's SingPass ID, usually it is the NRIC	
	Grandma's Password, usually following specified character requirements	
	Clicking on the Login Button	
	In order to improve security, websites use two-factor authentication.	[2]
	What is two-factor authentication?	
	Security protocol above usual ID and Password, requirement information	
	which only the user has. For example, token device.	
	The next screen shows two-factor authentication in action.	
		
(c)	Describe how the process works here, using her mobile phone.	[1]
	Website sends 6 digit one-time password to grandma's phone via SMS.	
	Grandma keys in this password into the OTP field and clicks on Submit.	

7 Study the following program code:



Annotate the program with the following Labels:

	LABEL	STATEMENT	
(a)	A	Sub-Goal Labelling *{Has been done for you as an example}*	
(b)	B	Iteration over Condition Statement	[1]
(c)	C	Iteration over Sequence Statement	[1]
(d)	D	Selection Statement	[1]

8 Study the following program carefully:

```
Line    Program Code
-----    ------------------
001     def dectobin(n):
002         binary = 0
003         while str(n):
004             if n // 2 == 0:
005                 binary += '0'
006             else:
007                 binary += '1'
008         n = n // 2
009         return ''.join(reversed(result))
```

The programmer tests this program by issuing the following commands:

print(dectobin(2)), with expected result as: '10'

Print(dectobin(10)), with expected result as: '1010'

Unfortunately, errors of various kinds start to appear. Please help to debug the program.

	There are four errors in this program. Locate the errors (*state the line number*) and state the correction in the program:	
(a)	Error 1:	[2]
	LINE 002	
	Correction:	
	binary = ''	
(b)	Error 2:	[2]
	LINE 003	
	Correction:	
	while n:	
(c)	Error 3:	[2]
	LINE 004	
	Correction:	
	if n % 2 == 0	
(d)	Error 4:	[2]
	LINE 008	
	Correction:	
	Indent n = n // 2 to be aligned with if statement	

9 Study the program (func_s) below. Use the Trace Table for the inputs of:
a_list = [5, 4, 3, 2]

(values of *i* and *j* have been placed for you)

```
def func_s(a_list):    # a_list is a list of integers
    for i in range(len(a_list)):
        for j in range(len(a_list)-1):
            if a_list[j] > a_list[j+1]:
                a_list[j], a_list[j+1] = a_list[j+1], a_list[j]
            print(a_list)
    return a_list
```

(a) Complete the Trace Table here: [4]

	i	*j*	a_list				
01	0	0	**4**	**5**	**3**	**2**	
02		1	**4**	**3**	**5**	**2**	
03		2	**4**	**3**	**2**	**5**	
04	1	0	**3**	**4**	**2**	**5**	
05		1	**3**	**2**	**4**	**5**	
06		2	**3**	**2**	**4**	**5**	
07	2	0	**2**	**3**	**4**	**5**	
08		1	**2**	**3**	**4**	**5**	
09		2	**2**	**3**	**4**	**5**	
10	3	0	**2**	**3**	**4**	**5**	
11		1	**2**	**3**	**4**	**5**	
12		2	**2**	**3**	**4**	**5**	

(b) What does this program do? [1]

THIS PROGRAM SORTS A LIST OF INTEGERS IN ASCENDING ORDER.

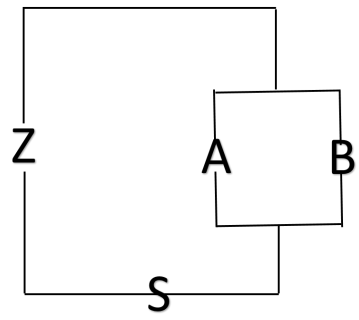
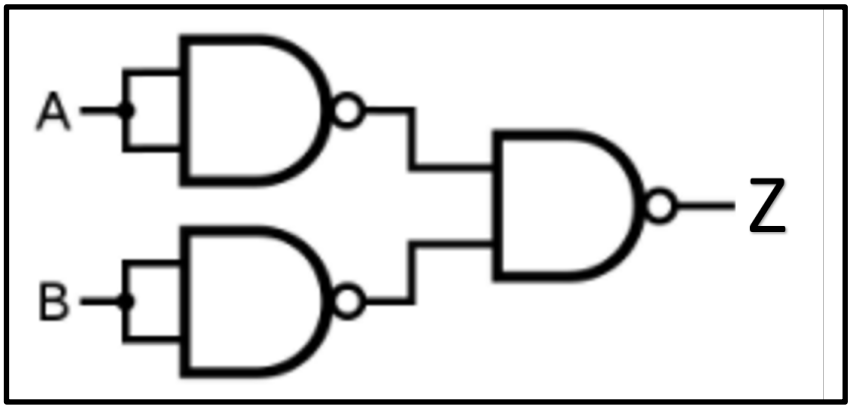
(c) Make a suggestion to improve the efficiency of this program. [1]

USE A FLAG (BOOLEAN VARIABLE) TO CHECK IF LIST IS SORTED – THEN EXIT FROM OUTERMOST FOR-LOOP.

10	Data validation is an important function for many software applications. You have been tasked to write a specification for performing data validation on the Email field. Please focus your answer on the Format Check. Here is a typical example of an Email ID:	
	firstname.lastname@service.domain_name	
	Discuss four aspects of your format check in your specification.	
(a)	**The '@' symbol must appear after the initial string of text.**	[1]
	_____	
	_____	
(b)	**An appropriate email service name must appear after the '@' symbol.**	[1]
	_____	
	_____	
(c)	**An appropriate domain name must appear after the '.' that follows the**	[1]
	email service name.	
	_____	
(d)	**Space or spaces are not allowed in the Email ID text string.**	[1]
	_____	
	_____	

11	Programming Languages can be categorized as Compiled Languages or Interpreted Languages. For example, C is a compiled language and Python is an interpreted language.	
(a)	State Two advantages of an interpreted Programming Language.	[2]
	Changes to the source code take effect immediately.	
	_____	
	Interpreters usually offer an interactive mode, which facilitates	
	learning and experimentation.	
(b)	State Two disadvantages of an Interpreted Programming Language.	[2]
	- The resulting program runs at a slower speed because translation	
	occurs while the program is running.	
	The interpreter needs to be run every time that the program is started.	
	_____	

12	Client-Server Network Technology.	
(i)	Write down three advantages of using a Client-Server Network	
(a)	**Centralized control of Data and Resources.**	[1]
	_____	
(b)	**Easy to schedule back-ups of shared files at regular intervals.**	[1]
	_____	
(c)	**Security may be enhanced with the use of specialised software or**	[1]
	Operating System features that are designed for servers.	
(ii)	Write down one disadvantage of using a Client-Server Network.	
(d)	**Higher initial cost due to the need for a server.**	[1]
	Administrative costs needed for the maintenance of server and clients	

13	Study the following electrical circuit diagram.	
	A & B represent switches Z represents a light bulb S represents a power source	
		
(a)	Using only the **NAND** gate, draw the **Logic Circuit Diagram** for this circuit. (Label your diagram!)	[6]
		
(b)	Write out the Truth Table for this electrical circuit diagram.	[3]

A	B	Z
0	0	0
0	1	1
1	0	1
1	1	1

(c)	Write down the Boolean Statement for this device.	[3]
	A OR B = Z	

14	Computer Networking	
(a)	Give two reasons why wireless networks are preferred over wired networks at educational facilities.	[2]
	- It is much easier to add new devices (e.g. new staff joining) to	
	the network as the router can be easily configured or even	
	auto-configured.	
	- Staff and students can move around easily on campus and still	
	have access to the services and data offered by the educational	
	Facility.	
(b)	Explain the terms 'modulation' and 'demodulation' as applied in the world of computer networking.	[2]
	Modulation: **Conversion of digital data into a form suitable**	
	for transmission.	
	Demodulation: **Conversion of transmitted signals into**	
	digital data.	

(c)	A topology describes the physical layout of a network. Understanding the topology is essential to designing a network. Connect the topology term with the statement.					[3]
	Topology Term				Statement	
	BUS	☐		☐	Each computer is connected to two other computers. All the data is passed around in the same direction. If a failure occurs in the cable or if a computer breaks down, the entire network will fail to function.	
	RING	☐		☐	Network device such as a hub or switch is at the centre of the network with connections to all the other computers. The computers will send data to the central device and the device forwards the data to the intended destination.	
	STAR	☐		☐	A common cable or backbone connects all the devices. It also allows the devices to communicate with the server, with each other and with devices such as a shared printer.	

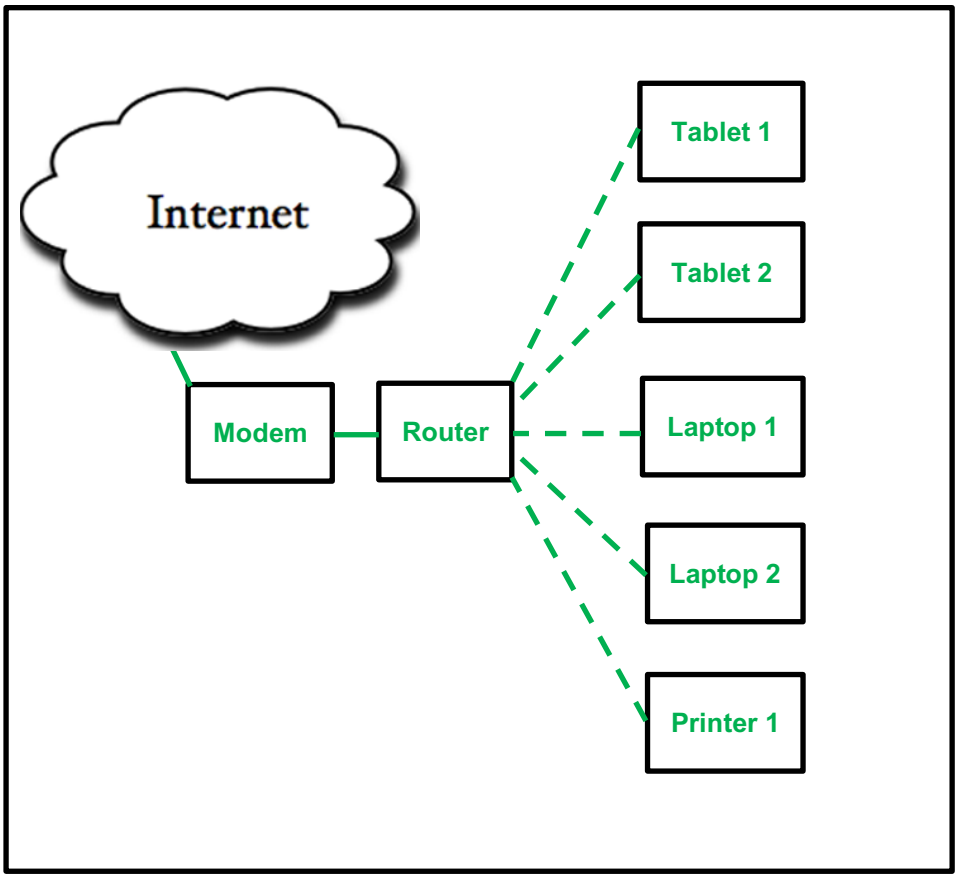
(d)	Alex wants to wirelessly connect up to five devices, which includes two tablets, two laptops and one wireless printer, in his home. There will be a Wireless Router for connecting all the devices and a Modem to offer Internet connectivity. Draw a simple diagram of Alex's home network. (Make sure you LABEL your diagram)	[3]
		
	End of Paper	

TABLE OF SPECIFICATIONS

Module	Knowledge	Comprehension	Application	Totals
Systems and Communications	3	2	8	13
Abstraction and Algorithms	2	8	6	16
Programming	4	3	8	15
Computer Ethics	4	2	4	10
Computer Networks	9	14	3	26
TOTAL Marks	22	29	29	80
PERCENTAGE Marks	28%	36%	36%	