FINAL
ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session	:	**April 2021**
Programme	:	Diploma In Computer Science (DCS) Diploma In Information Technology (DITN)
Course	:	**ICT2102: Introduction To Data Structure** **DCS2101: Data Structure**
Date of Examination	:	July 29, 2021 (Thursday)
Time	:	8.00am – 10.30am Reading Time : Nil
Duration	:	2 Hours 30 Minutes

Note: 30 minutes is added into the duration of the examination to factor in any connectivity matters and for you to scan and upload your scripts.

Special Instructions :

Answer **ALL** questions

Materials permitted :

Non-programmable calculator

Materials provided :

Nil

Examiner(s)	:	**Siti Hajar Khairuddin**, Lim Soo Seng, Siti Syakira, and Koo Lee Chun
Moderator	:	Ms Yogeswari

*This paper consists of **7** printed pages, including the cover page*

DIPLOMA IN COMPUTER SCIENCE PROGRAMME (DCS)
DIPLOMA IN INFORMATION TECHNOLOGY PROGRAMME (DITN)
DCS2101: DATA STRUCTURE
ICT2102: INTRODUCTION TO DATA STRUCTURE
FINAL ALTERNATIVE ASSESSMENT: APRIL 2021 SESSION

Instruction: This paper consists of **FIVE (5)** questions. Answer all questions.

Question 1

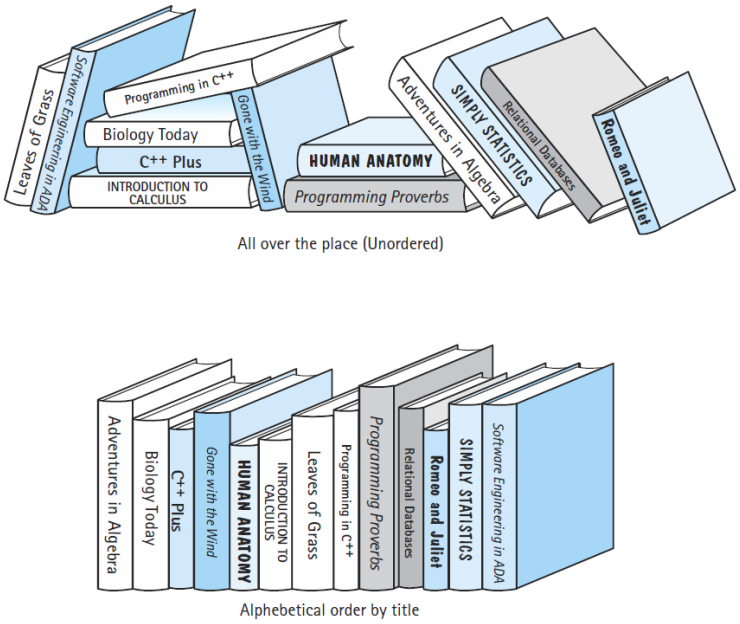

Image 1: Arrangement of Books in a Library

(a) Based on Image 1 above, discuss in your own words the

(i) description of data structure to an online library system

(6 marks)

(ii) the application of ADT for the system.

(6 marks)

(b) Explain how the functionality of a data structure is expressed in C++.

(8 marks)

[Total: 20 marks]

Question 2

(a) By drawing boxes to represent variables and arrows to represent pointers, show a correct representation of the code fragments below:

```
bool truth = new bool;
*truth = true;
float money = new float;
*money = 33.46;
float* myMoney = new float;
```

(11 marks)

(b) Define a structure based on variable named `person` as initialized as below.

NOTE: Use descriptive variable names.

```
Passenger person = {"Roland", true, "839435" };
```

(5 marks)

(c) Based on the enumeration declarations below,

(i) declare a variable for `Day` and assign it with value in index 4 and

(ii) declare a variable for `Mood` and assign it with the last value.

```
enum Day { SUN, MON, TUE, WED, THU, FRI, SAT };
enum Mood { HAPPY = 3, SAD = 1, ANXIOUS = 4, SLEEPY = 2 };
```

(4 marks)

[Total: 20 marks]

Question 3

(a) From the class definition for linked list below, explain each numbered line including the member functions and pointer based on their names:

```
(i)  class StringLinkedList {

public:
(ii)     StringLinkedList();
(iii)   ~StringLinkedList();
(iv)    bool empty() const;
(v)     const string& front() const;
(vi)    void addFront(const string& e);
(vii)   void removeFront();

private:
(i)     StringNode* head;

};
```

(8 marks)

(b) Write a `while` loop statement which calls function `removeFront()` from question 3(a) as long as the list is not empty.

(2 marks)

(c) By using your own words, explain the steps to delete a node from the front of a singly linked list. Assist your explanation by filling up the content of function `removeFront()` from Question 3 (a) with suitable variables and pointer.

(10 marks)

[Total: 20 marks]

Question 4

(a) Explain the purpose of each stack operation below:

(i) push(*e*)

(ii) pop()

(iii) top()

(iv) size()

(v) empty()

(5 marks)

(b) Write down the stacks contents from the series of the stacks operations below:

Stack Operations	Stack Contents
`push(5)`	
`push(3)`	
`pop()`	
`push(7)`	
`pop()`	
`top()`	
`pop()`	
`pop()`	
`top()`	
`empty()`	
`push(9)`	
`push(7)`	
`push(3)`	
`push(5)`	
`size()`	

(15 marks)

[Total: 20 marks]

Question 5

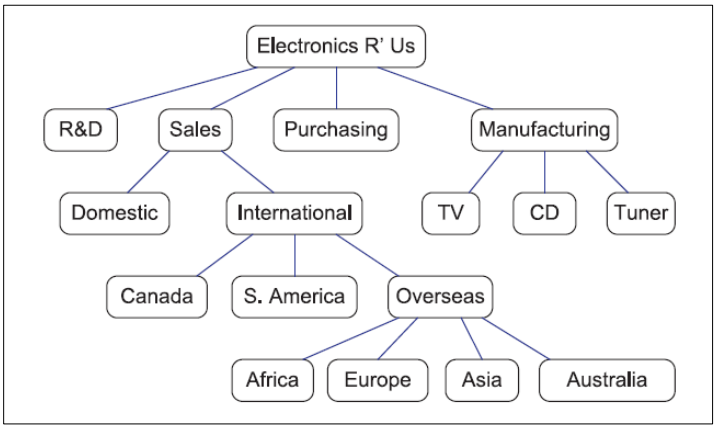

Figure 1: Tree for an organizational structure

a) Based on the tree in Figure 1, identify:

(i) Root node

(ii) Leaf nodes

(7 marks)

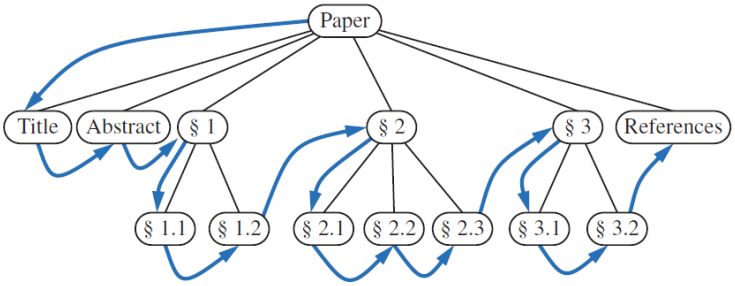

Figure 2: Tree Traversal

b) Based on Figure 2, identify the type of tree traversal and explain its movement.

(4 marks)

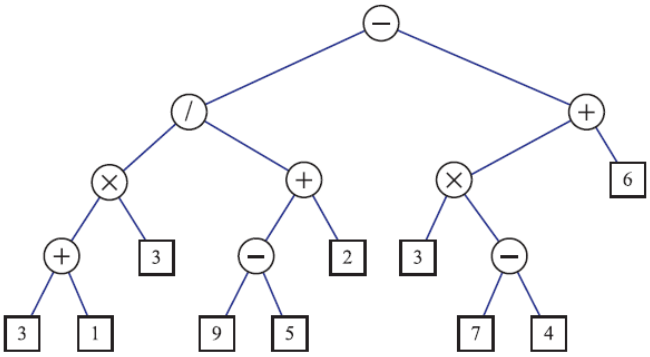

Figure 3: A binary tree

(c) Write down the arithmetic expression obtained from the binary tree in Figure 3.
(9 marks)

[Total: 20 marks]

~ The End ~