

SECTION A: 30 MARKS
BAHAGIAN A: 30 MARKAH

INSTRUCTION:

This section consists of **TWENTY (20)** objective questions. Mark your answers in the OMR form provided.

ARAHAN :

*Bahagian ini mengandungi **DUA PULUH (20)** soalan objektif. Tandakan jawapan anda di dalam borang OMR yang disediakan.*

CLO1
C1

1. Identify which of the following data structure are primitive data type.
Kenal pasti yang manakah jenis data structure berjenis data primitif
- i. Integer
 - ii. Float
 - iii. Array
 - iv. Stack
- A. i, ii
- B. i, iii
- C. ii, iii
- D. iii, iv

CLO1
C2

2. Based on the answer given, determine the **CORRECT** structure declaration.
*Berdasarkan jawapan yang disediakan, tentukan pengistiharan struktur yang **BETUL**.*

A.

```
struct VaccineC19 Pfizer, Sinovac, Astrazeneca
{
    char nama[20], noKP[12], alamat[30];
    int IDMySejahtera;
    int noHP;
};
```

B.

```
struct VaccineC19 Pfizer, VaccineC19 Sinovac, VaccineC19 Astrazeneca
{
    char nama[20], noKP[12], alamat[30];
    int IDMySejahtera;
    int noHP;
};
```

C.

```
struct VaccineC19
{
    char nama[20], noKP[12], alamat[30];
    int IDMySejahtera;
    int noHP;
    Pfizer, Sinovac, Astrazeneca};
```

D.

```
struct VaccineC19
{
    char nama[20], noKP[12], alamat[30];
    int IDMySejahtera;
    int noHP;
}Pfizer, Sinovac, Astrazeneca;
```

CLO1
C1

3. Select the definition of a Linked List.

Pilih definisi senarai berpaut.

- A. Linked list is a collection of connected components called nodes.
Senarai berpaut ialah himpunan komponen bersambung yang dipanggil nod.
- B. Linked list contains the address of the next node in the list.
Senarai berpaut mengandungi alamat nod seterusnya dalam senarai.
- C. Linked list is a structure that need to hold large records.
Senarai berpaut ialah struktur yang perlu menyimpan rekod besar.
- D. A linked list should use integers.
Senarai berpaut perlu menggunakan integer.

CLO1
C1

4. Identify the function of link field in a linked list.

Kenal pasti fungsi bagi Medan Pautan dalam senarai berpaut.

- A. Hold the data of the first node and points to it
Memegang data bagi nod pertama dan menuding kearahnya.
- B. Hold the address of the next node and points to it
Memegang alamat bagi nod yang seterusnya dan menuding kearahnya.
- C. Hold the data of the last node and points to it
Memegang data bagi nod terakhir dan menuding kearahnya.
- D. Hold the address of the last node and points to it
Memegang alamat bagi nod terakhir dan menuding kearahnya.

CLO1
C2

5. Show the **CORRECT** diagram if “ENDEMIC” is added as a second node to the linked list shown in Figure A5 below.

*Tunjukkan gambar rajah yang **BETUL** sekiranya “ENDEMIC” dimasukkan sebagai nod kedua di dalam Rajah A5 di bawah.*



Figure A5/ Rajah A5

- A.
- B.
- C.
- D.

CLO1
C2

6. Identify the sequence of the linked list after the new node ‘SINOVAC’ is inserted between the first and second nodes as shown in on Figure A6 below.

Kenal pasti senarai berpaut selepas nod yang baharu ‘SINOVAC’ dimasukkan di antara nod pertama dan nod kedua berdasarkan Rajah A6 di bawah.

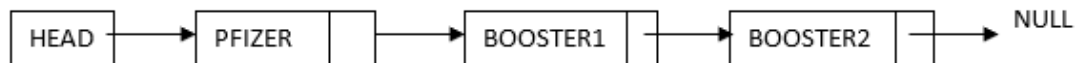


Figure A6/Rajah A6

- A. HEAD, SINOVAC, PFIZER, BOOSTER1, BOOSTER2, NULL
- B. SINOVAC, HEAD, PFIZER, BOOSTER1, BOOSTER2, NULL
- C. HEAD, PFIZER, SINOVAC, BOOSTER1, BOOSTER2, NULL
- D. HEAD, PFIZER, BOOSTER1, SINOVAC, BOOSTER2, NULL

CLO1
C1 7. Choose a concept that has been implemented in a stack.
Pilih konsep yang digunakan dalam tindanan.

- A. LIFO
- B. FIFO
- C. Bottom Up/ *Bawah Atas*
- D. Traversal concept/ *Konsep penyusuran*

CLO1
C2 8. A stack with seven characters is inserted into an empty stack as shown in Figure A8 below. Determine the sequence of character if the characters are pop out, one character at a time.

Satu tindanan dengan tujuh karakter telah dimasukkan ke dalam tindanan yang kosong seperti Rajah A8. Tentukan susunan karakter jika karakter tersebut di keluarkan satu pada satu masa.

C, O, V, I, D, 1, 9

Figure A8/ Rajah A8

- A. C, O, V, I, D, 1, 9
- B. 9, 1, D, I, V, O, C
- C. C, V, D, 9, O, I, 1
- D. 9, D, V, C, 1, I, O

CLO1
C3

9. Predict the new stack after the following code segment is executed as shown in Figure A9.

Ramalkan tindakan yang baru selepas kod segmen berikut dilaksanakan berdasarkan Rajah A9.

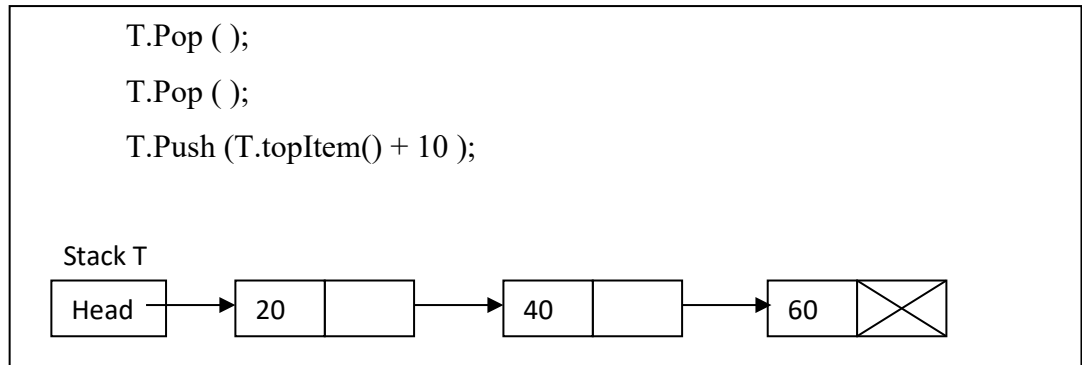


Diagram A9/ Rajah A9

- A.
- B.
- C.
- D.

CLO1
C1

10. Identify the **CORRECT** operations that can be performed in Queue.
*Kenal pasti operasi yang **BETUL** yang boleh dilaksanakan dalam Baris Gilir.*

- i. Push
 - ii. Pop
 - iii. Enqueue
 - iv. Dequeue
- A. i and ii/ *i dan ii*
 - B. i and iv/ *i dan iv*
 - C. ii and iii/ *ii dan iii*
 - D. iii and iv / *iii and iv*

CLO1
C2

11. If the characters 'H', 'F', 'M', 'D', 'S' are placed in a queue (in that order), and then removed one at a time, rewrite the order of the characters at which they are removed.

Jika huruf 'H', 'F', 'M', 'D', 'S' diletakkan dalam giliran (dalam turutan berkenaan), dan kemudian dibuang satu persatu, tulis semula susunan aksara apabila ia dibuang.

- A. SDMFH
- B. HFMDS
- C. FHMDS
- D. SMDFH

CLO1
C3

12. Figure A12 shows a circular queue R with the size of 3. Predict a suitable value for front, rear, and count if the following statement is executed.

Gambar A12 menunjukkan barisan bulat R dengan saiz 3. Ramalkan nilai yang sesuai untuk pemboleh ubah depan, belakang dan bilangan, jika pernyataan berikut dilaksanakan.

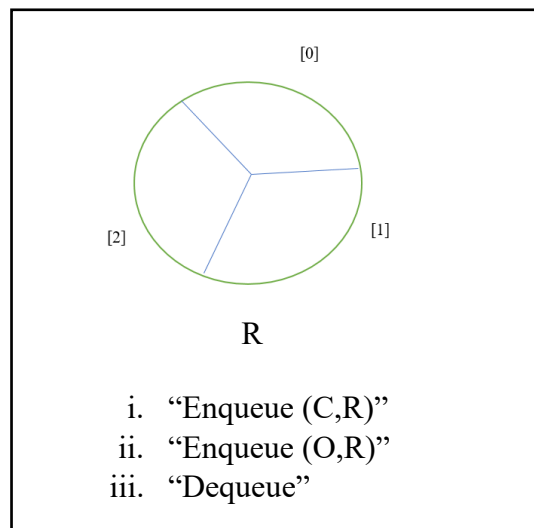


Figure A12/Rajah A12

- A. Front=0, Rear=2, Count=1
Depan=0, Belakang=2, bilangan=1
- B. Front=1, Rear=1, Count=1
Depan=1, Belakang=1, bilangan=1
- C. Front=0, Rear=1, Count=1
Depan=0, Belakang=1, bilangan=1
- D. Front=1, Rear=2, Count=1
Depan=1, Belakang=2, bilangan=1

CLO1
C3

13. Examine the **CORRECT** answer if all of the operations in Figure A13 are executed and converted to a linked list in a queue concept.

*Periksa jawapan yang **BETUL** jika semua operasi dalam Rajah A13 dilaksanakan dan tukar kepada senarai terpaut dalam konsep baris gilir*

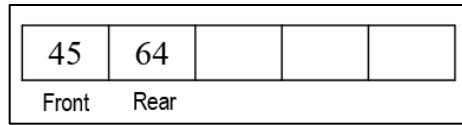
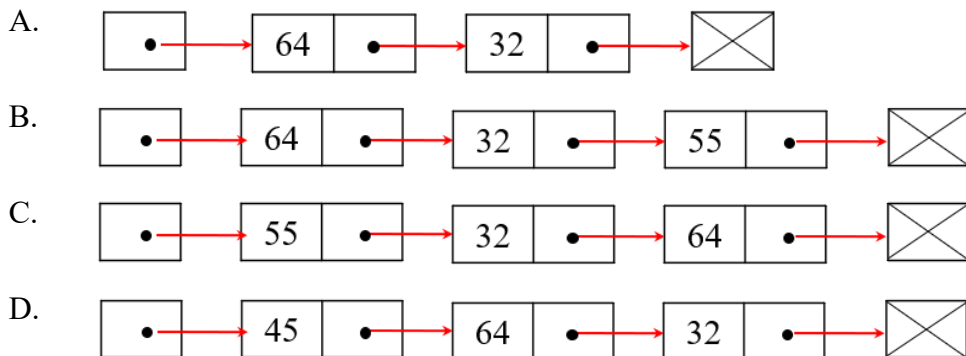


Figure A13 / Rajah A13

Operation / Operasi:

- i. Enqueue(32);
- ii. Dequeue();
- iii. Enqueue(55);



CLO1
C2

14. Using information in Figure A14, identify the leaves nodes.
Menggunakan maklumat dalam Rajah A14, kenal pasti nod dedaun.

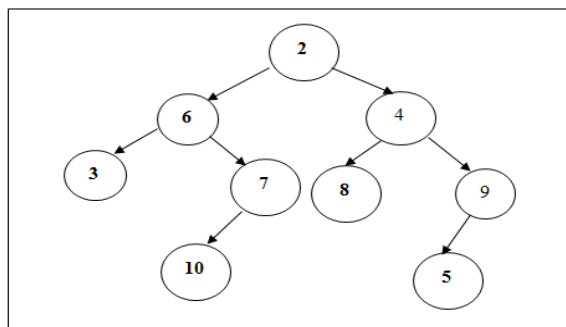


Figure A14 / Rajah A14

- A. 6, 7, 4, 9
- B. 2, 4, 6, 8
- C. 3, 10, 8, 5
- D. 3, 7, 8, 9

CLO1
C2

15. Based on the tree shown in Figure A15, predict what will be the new root if the root node is removed and replaced with anode from the left subtree.

Berdasarkan pokok yang ditunjukkan di Rajah A15, ramalkan nod akar yang baru jika nod akar dikeluarkan dan digantikan dengan nod dari sub pokok kiri.

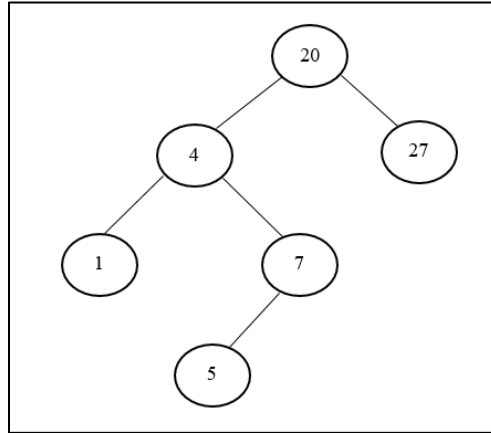


Figure A15/ Rajah A15

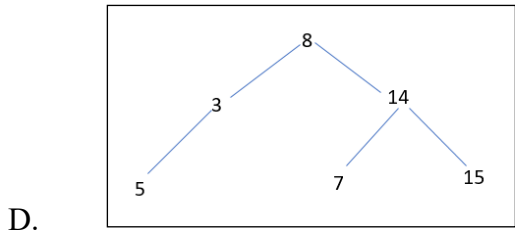
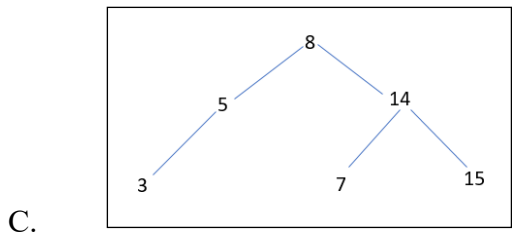
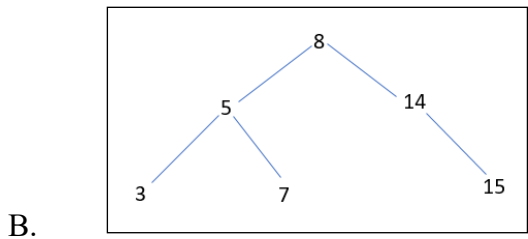
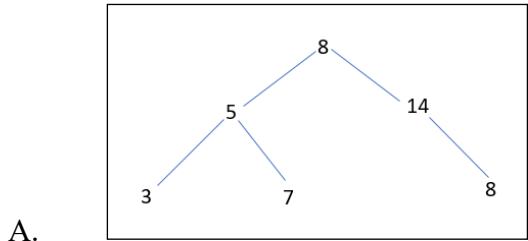
- A. 4
- B. 7
- C. 5
- D. 1

CLO1
C3

16. Choose the **CORRECT** binary tree for Figure A16.
Pilih pohon dedua yang **BETUL** bagi Rajah A16.

8, 14, 5, 7, 15, 3

Figure A16/ Rajah A16



CLO1
C3

17. Predict the **CORRECT** preorder traversing for Binary Tree in Figure A17.
*Ramalkan pergerakan penyusunan preorder yang **BETUL** bagi Rajah A17..*

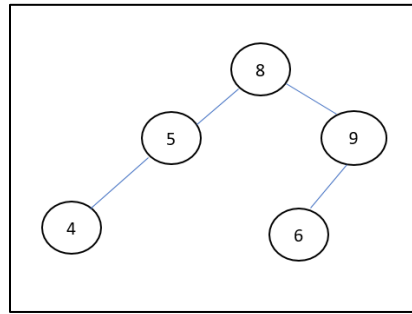


Figure A17 / Rajah A17

- A. 8 5 4 6 9
 B. 4 5 6 9 8
 C. 8 5 4 9 6
 D. 4 5 8 9 6

CLO1
C1

18. Identify which type of sorting that uses divide and conquer technique.
Kenal pasti jenis isihan yang menggunakan teknik pembahagian dan penggabungan.

- A. Merge sort/*isihan cantum*
 B. Quick sort/*isihan cepat*
 C. Insertion sort/*isihan masukan*
 D. Selection sort/*isihan pilihan*

CLO1
C2

19. Based on information in Figure A18, determine the number of steps required to find the letter E using Linear Searching.

Berdasarkan maklumat dalam Rajah A18, tentukan bilangan langkah yang diperlukan untuk mencari huruf E menggunakan Carian Linear.

A, B, C, D, E, F, G, H

Figure A18/ Rajah A18

- A. 3
 B. 4
 C. 5
 D. 6

20. Based on information in Figure A19, calculate the number of key comparisons needed to find the number 24 using binary search.

Berdasarkan Rajah A19, kira bilangan kunci perbandingan yang diperlukan untuk mencari nombor 24 menggunakan carian dedua.

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
5	7	16	24	25	30	45	50	62	65

Figure A19/ Rajah A19

- A. 1
- B. 2
- C. 3
- D. 4

CLO1
C3

SECTION B: 70 MARKS
BAHAGIAN B: 70 MARKAH

INSTRUCTION:

This section consists of **THREE (3)** structured questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi TIGA (3) soalan berstruktur. Jawab SEMUA soalan.

QUESTION 1

CLO1
C1

- (a) State the definition of Data Structures.

Nyatakan definisi Struktur Data.

[2 marks]

[2 markah]

CLO1
C2

- (b) Based on the information in Table B1 (b), write the declaration of the structures,

Berdasarkan maklumat dalam Jadual B1(b), tuliskan pengisytiharan struktur.

Type/Jenis	Name>Nama	Data Type/Jenis Data
Structure name	C19_TestKit	
Member1	Product_Name	30 characters
Member2	Co_Name	integer
Member3	Manufacturer	40 characters
Member4	Price	float
Object names	Saliva, NasalSwab	

Table B1(b)/ *Jadual B1(b)*

[4 marks]

[4 markah]

CLO1
C1

- (c) Identify **TWO (2)** basic operations that can be performed on a List.

Kenal pasti DUA(2) operasi asas yang boleh dilakukan pada Senarai.

[2 marks]

[2 markah]

CLO1
C1

- (d) List **TWO (2)** differences between a List and a Linked List.
*Senaraikan **DUA(2)** perbezaan antara Senarai dan Senarai Berpaut.*

[4 marks]

[4 markah]

CLO1
C2

- (e) Sketch a real life example of Linked List .
Lakarkan contoh senarai berpaut dalam kehidupan sebenar

[2 marks]

[2 markah]

CLO1
C2

- (f) Refer to Figure B1 (f) and sketch new diagram for each of the statement given.
Rujuk kepada Rajah B1 (f), lakarkan gambar rajah yang baru bagi setiap pernyataan berikut.

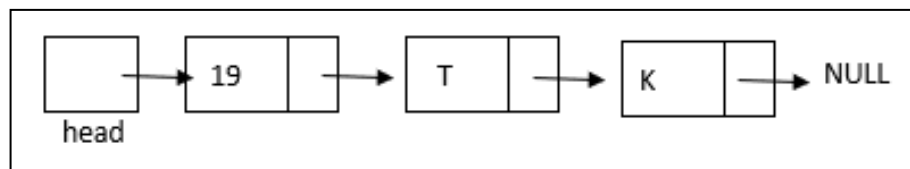


Figure B1 (f)/ Rajah B1 (f)

- i. Insert a new node 'C' at the beginning of the Linked List.
Masukkan nod baharu 'C' pada permulaan Senarai Terpaut
- ii. Remove the node '19' from the Linked List.
Keluarkan nod '19' daripada Senarai Terpaut.
- iii. Insert a new node 'S' as a second node of the Linked List.
Masukkan nod baharu 'S' sebagai nod kedua Senarai Terpaut.

[6 marks]

[6 markah]

QUESTION 2CLO1
C3

- (a) Illustrate a stack diagram for each of the statement below if T Stack contain four elements.

Lakarkan gambar rajah tindanan bagi pernyataan di bawah jika Tindanan T mengandungi empat elemen.

- i. CreateStack (T);
- ii. Push(Ameir, &T);
- iii. Push(Afif, &T);
- iv. Pop;
- v. Push(Athif, &T);

[5 marks]

[5 markah]

CLO1
C3

- (b) Figure B2 (b) illustrates a stack of data structures using an array. Answer the following questions:

Rajah B2 (b) menunjukkan satu tindanan bagi struktur data yang menggunakan tatasusunan. Jawab soalan-soalan berikut:

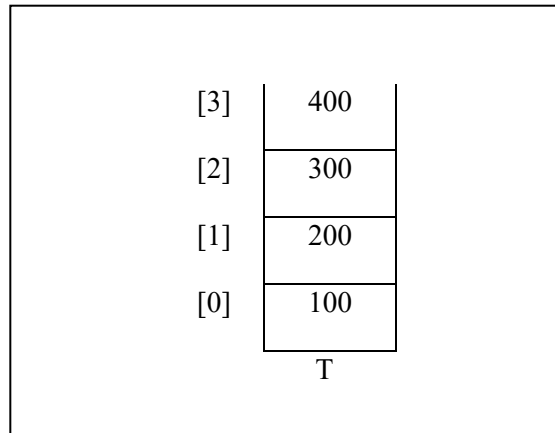


Figure B2 (b)/ *Rajah B2 (b)*

- i. Convert the stack in Figure B3 to a stack that implements Linked List and show each step.

Tukarkan tindanan dalam Rajah B3 kepada tindanan yang menggunakan Senarai Berpaut dan tunjukkan setiap langkah.

[4 marks]

[4 markah]

- ii. Based on your answer in b(i), illustrate the **Top** of the stack.

*Berdasarkan jawapan di b(i), tunjukkan **Top** bagi tindanan tersebut.*

[1 mark]

[1 markah]

CLO 1
C3

- (c) Based on information in Figure B2 (c), illustrate a diagram after each Queue operation is executed using Linked List.

Berdasarkan maklumat dalam Rajah B2 (c), ilustrasikan gambarajah baharu selepas setiap operasi Baris Gilir dilaksanakan menggunakan Senarai Berpaut.

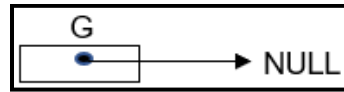


Figure B2 (c)/ Rajah B2 (c)

- i. enqueue(40, &G)
- ii. enqueue(35, &G)
- iii. enqueue(66, &G)
- iv. dequeue(&G)

[6 marks]

[6 markah]

CLO1
C3

- (d) Demonstrate a queue diagram by using an array to perform the operations shown in Figure B2 (d).

Tunjukkan gambar rajah baris gilir dengan menggunakan tatasusunan yang ditunjukkan untuk melaksanakan operasi pada Rajah B2 (d).

```
enqueue (90,&S);
enqueue(17,&S);
dequeue(&S);
enqueue(20,&S);
dequeue(&S);
```

Figure B2 (d)/ Rajah B2 (d)

[5marks]

[5 markah]

QUESTION 3

CLO1
C3

(a) Draw a Binary Search Tree (BST) for each of the following.

Lukis pohon dedua (BST) setiap di bawah.

i) C, U, V, E, D

[2.5 marks]

[2.5 markah]

ii) 10, 16, 30, 2, 7

[2.5 marks]

[2.5 markah]

CLO1
C3

(b) Figure B3 (b) is an arithmetic operation. Answer the following questions:

Rajah B3 (b) ialah operasi aritmetik. Jawab soalan berikut:

$$4 + ((3+9)*2)$$

Figure B3 (b)/ *Rajah B3(b)*

i) Draw a binary tree using arithmetic operation.

Lukis pohon dedua berdasarkan operasi aritmetik.

[3.5 marks]

[3.5 markah]

ii) Discover the postfix notation for the binary tree.

Cari notasi postfix bagi pepohon dedua.

[3.5 marks]

[3.5 markah]

CLO1
C1(c) List **THREE(3)** advantages of a sorted list.*Senaraikan **TIGA(3)** kelebihan senarai tersusun.*

[3 marks]

[3 markah]

CLO1
C27

- (d) Convert the data in Figure B3(d) into a sorted list using insertion sort in ascending order with all the required steps.

Tukarkan data dalam Rajah B3(d) kepada senarai tersusun menggunakan isihan selit bersama semua langkah yang diperlukan.

90	4	53	20	11	88	38	101
----	---	----	----	----	----	----	-----

Figure B3(d)/Rajah B(d)

[4 marks]

[4 markah]

CLO1
C3

- (e) Demonstrate the steps required to solve problem using Bubble sort to sort the sequence of characters shown in Figure B3 (e).

Tunjukkan langkah-langkah untuk menyelesaikan masalah dengan menggunakan Bubble sort untuk mengisih jujukan aksara yang ditunjukkan dalam Rajah B3 (e).

N, O, D, E

Figure B(e)/Rajah B3 (e)

[4 marks]

[4 markah]

- (f) Solve the problem in Figure B3 (f) using Binary Searching Method.

CLO1
C3

Selesaikan masalah yang diberikan dalam Rajah B3 (f) dengan menggunakan Kaedah Carian Binari.

Target Key = 3

Kekunci Sasaran = 3

1	2	3	4	5	6	7
[0]	[1]	[2]	[3]	[4]	[5]	[6]

Figure B3 (f)/Rajah B3 (f)

[5 marks]

[5 markah]

QUESTION END**SOALAN TAMAT**