

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA**

JABATAN TEKNOLOGI MAKLUMAT & KOMUNIKASI

**PEPERIKSAAN AKHIR
SESI JUN 2019**

DFC3033: DATA STRUCTURE

**TARIKH : 04 NOVEMBER 2019
MASA : 2.30 PETANG - 4.30 PETANG (2 JAM)**

Kertas ini mengandungi **DUA PULUH EMPAT (24)** halaman bercetak.

Bahagian A: Objektif (30 soalan)

Bahagian B: Struktur (2 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A : 45 MARKS
BAHAGIAN A : 45 MARKAH

INSTRUCTION:

This section consists of **THIRTY (30)** objective questions. Mark your answers in the OMR form provided.

ARAHAN :

Bahagian ini mengandungi **TIGA PULUH (30)** soalan objektif. Tandakan jawapan anda di dalam borang OMR yang disediakan.

CLO2
C2

- Identify the following data structure that is an indexed structure.
Kenal pasti struktur data berikut yang merupakan struktur berindex.

- A. Graph
Graf
- B. Tree
Pepohon
- C. String
Rentetan
- D. Array
Tatasusunan

CLO1
C1

- Choose the **CORRECT** syntax to create a structure named AccTerm with structure members of AccType, AccName and Balance.

*Pilih sintaks yang **BETUL** untuk mencipta struktur bernama AccTerm dengan ahli-ahli struktur adalah AccType, AccName dan Balance.*

- A. structure AccTerm
{ int AccType[20];
string AccName;
float Balance;
};
- B. struct AccTerm
{ char AccType[20];
string AccName[20];
float Balance;
}

CLO2 C1	<p>C. struct AccTerm</p> <pre>{ char AccType[20]; string AccName; float Balance; };</pre> <p>D. AccTerm struct</p> <pre>{ char AccType; string AccName; float Balance; }</pre>
CLO1 C2	<p>3. Identify the BEST description of Double Linked List. <i>Kenal pasti keterangan yang TERBAIK bagi Senarai Berpaut Dedua.</i></p> <ul style="list-style-type: none"> A. Each pointer of a node points to other node. <i>Setiap penunjuk bagi setiap nod yang menunjuk kepada nod yang lain.</i> B. A pointer is maintained to store both next and previous nodes. <i>Penunjuk yang menyimpan nilai bagi nod sebelum dan nod selepas.</i> C. Two pointers are maintained to store next and previous nodes. <i>Dua penunjuk menyimpan nilai bagi nod sebelum dan nod selepas.</i> D. Pointer of last node store the first node as next and pointer of first node store the last node as previous. <i>Penunjuk bagi nod yang terakhir menyimpan nilai bagi nod yang pertama dan penunjuk bagi nod yang pertama menyimpan nilai bagi nod yang terakhir.</i> <p>4. Identify the operation that can be performed to Linear Linked List. <i>Kenal pasti operasi yang boleh dilakukan oleh Senarai Berpaut.</i></p> <ul style="list-style-type: none"> i. Insertion <i>Penambahan</i> ii. Deletion <i>Penghapusan</i> iii. Traversing <i>Penjelajahan</i> iv. Checking <i>Pemeriksaan</i> <ul style="list-style-type: none"> A. i, ii, iii B. i, iii, iv C. i, ii, iv D. i, ii, iii, iv
CLO2 C3	

- CLO2 C3 5. Based on **Figure A5**, choose the **CORRECT** answer if node “KOKO” has been added between second node and third node into the Linked List.

Berdasarkan Rajah A5, pilih jawapan yang BETUL jika nod “KOKO” dimasukkan di antara nod kedua dan nod ketiga ke dalam Senarai Berpaut.

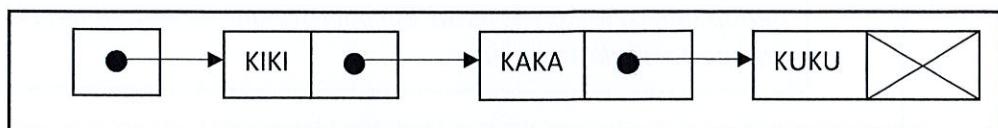


Figure A5 / Rajah A5

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

- CLO2 C3 6. Assume that an empty Linked List was created. Choose the new linked list after the sequences numbers of ‘66’ and ‘86’ are inserted in the linked list.

Andaikan Senarai Berpaut yang kosong telah dihasilkan. Pilih senarai berpaut yang baru selepas urutan nombor ‘66’ dan ‘86’ dimasukkan pada senarai berpaut tersebut.

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

CLO2
C3

7. Identify the answer for **X** based on the statement in **Figure A7**.
Kenal pasti jawapan bagi X berdasarkan penyataan di dalam Rajah A7.

Every node in a Double Linked List contains **X**, except for the first and last nodes.

Setiap nod di dalam Senarai Berpaut Dedua mengandungi X, kecuali bagi nod pertama dan terakhir.

Figure A7 / Rajah A7

- A. The address of the next node.
Alamat bagi nod seterusnya.
- B. The address of the previous node.
Alamat bagi nod sebelumnya.
- C. Only data and no address information.
Hanya data dan tiada maklumat alamat.
- D. The address of the next node and the address of the previous node.
Alamat nod seterusnya dan alamat nod sebelumnya.

CLO1
C2

8. Based on **Figure A8**, choose the **CORRECT** answer if 'M' is inserted as the second element and 'S' is deleted from the array.
Berdasarkan kepada Rajah A8, pilih jawapan yang BETUL jika 'M' ditambahkan sebagai elemen kedua dan 'S' dihapuskan dari tatasusunan.

Q	Z	S		
[0]	[1]	[2]	[3]	[4]

Figure A8 / Rajah A8

- A.

M	Q	Z		
[0]	[1]	[2]	[3]	[4]
- B.

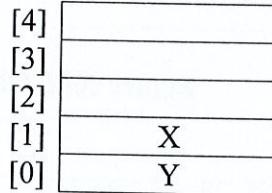
Q	M	S		
[0]	[1]	[2]	[3]	[4]
- C.

Q	M	Z		
[0]	[1]	[2]	[3]	[4]
- D.

M	Q	Z	S	
[0]	[1]	[2]	[3]	[4]

CLO3
C3

9. Identify the operation that returns the new value of the Stack.
Kenal pasti operasi yang mengembalikan nilai baru Tindanan.
- Pop
 - Top
 - Push
 - Remove
10. Based on **Figure A10**, examine the final value of the Stack operation after all the operations are executed.
Berdasarkan Rajah A10, tentukan nilai akhir bagi operasi Tindanan selepas semua operasi dilaksanakan.



Push (Z), Pop (), Pop (), Push (W), Push (A),
 Push (B), Pop (), Push (M), Push (N)

Figure A10 / Rajah A10

- N, M, W, Y
- Y, W, A, M, N
- X, Y, A, W
- N, M, A, B, Y

CLO3
C3

11. Assume an array implementation of the stack class, with the capacity of 15 items are stored at data[0] through data[14]. Determine where does the push member function places the new insertion data in the array?
Andaikan implementasi tatasusunan bagi kelas tindanan dengan kapasiti 15 item yang tersimpan di dalam data[0] hingga data[14]. Tentukan di mana ahli fungsi akan ditempatkan ke masukan baru di dalam tatasusunan berkenaan.
- data[15]
 - data[14]

- C. Overflow
- D. Underflow
- CLO3
C4
12. Based on **Figure A12** below, recognize the figure that represent the new structure of Stack after the following code segment is executed.
Berdasarkan Rajah A12 di bawah, kenal pasti rajah yang mewakili struktur baru Tindanan selepas segmen kod berikut dilaksanakan.

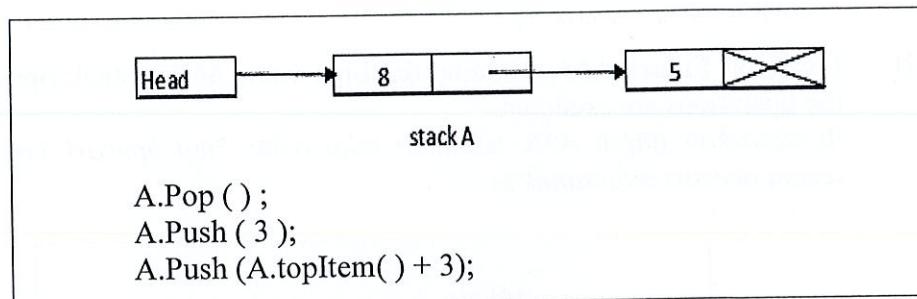


Figure A12 / Rajah A12

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

CLO3
C4

13. Based on **Figure A13** below, analyze the operation of Stack that performs (a) to (b).

Berdasarkan Rajah A13 di bawah, analisa operasi bagi Tindanan yang melaksanakan (a) hingga (b).

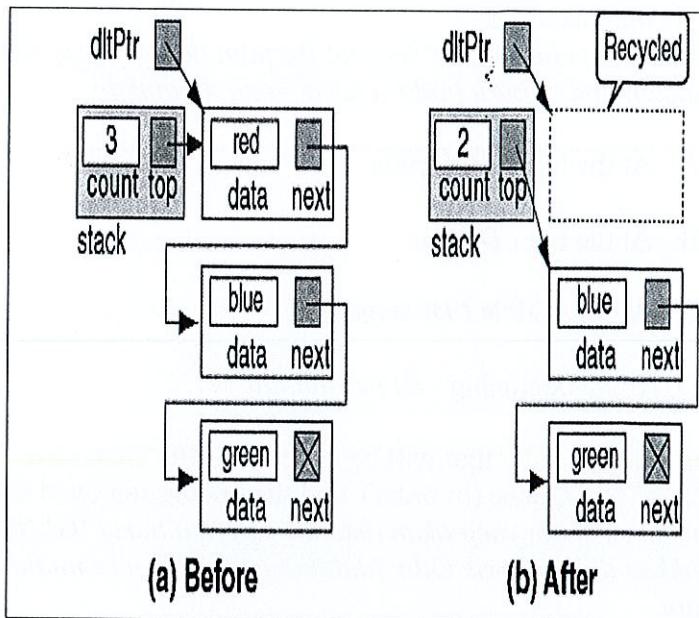


Figure A13 / Rajah A13

- A. Empty stack
Tindanan kosong
- B. Stack Top
Tindanan atas
- C. Push Stack
Tindanan masuk
- D. Pop Stack
Tindanan keluar

CLO1
C1

14. Identify the following operation that can be performed in Queue structure.
Kenal pasti operasi yang dilakukan dalam Baris Gilir.

- i. Push
 - ii. Pop
 - iii. Enqueue
 - iv. dequeue
- A. i and ii
 - B. i and iii

- C. ii and iii
D. iii and iv

CLO3 C2 15. Based on Queue Linked List implementation, identify the position of the new entry on the linked list.

Berdasarkan pelaksanaan Senarai Berpaut dalam Baris Gilir, kenal pasti kedudukan nod baharu pada senarai yang dipautkan.

- A. At the head / *Di kepala*
- B. At the tail / *Di ekor*
- C. At the middle / *Di tengah*
- D. At the beginning / *Di permulaan*

CLO3 C3 16. Determine the order that will be removed if the characters 'G','R','E','A','T' are paced in a Queue (in order) and then being removed one by one.

Tentukan susunan yang akan dikeluarkan jika huruf 'G','R','E','A','T' diletakkan dalam Baris Gilir (dalam turutan) dan kemudian dibuang satu persatu.

- A. GREAT
- B. REATG
- C. TAERG
- D. GRATE

CLO3 C3 17. Determine the output after the statement execution of Queue in **Figure A17**.
Tentukan output apabila operasi Baris Gilir dalam Rajah A17 dilaksanakan.

- | |
|---------------------|
| 1. Create Queue (P) |
| 2. Enqueue (P, 5); |
| 3. Dequeue (P); |
| 4. Enqueue (P, 8); |
| 5. Enqueue (P, 6); |

Figure A17 / Rajah A17

A	5	8	6
B	8	6	
C	6	8	
D	6	8	5

- CLO3 18. A Circular Queue using an array, T with the size of 8 and the data are in the index of [2] to [7]. Identify the index number of next item that will be inserted in the Queue.
Baris Gilir membulat menggunakan tatasusunan, T dengan saiz 8 dan data berada di indeks [2] hingga [7]. Kenal pasti nombor indeks item seterusnya yang akan dimasukkan dalam Baris Gilir tersebut.
- T [0]
 - T [1]
 - T [7]
 - T [8]
- CLO1 19. Select the data structure that represents hierarchical relationship between elements.
Pilih struktur data yang menggambarkan hubungan antara elemen dalam bentuk hirarki.
- Queue
Baris Gilir
 - Stack
Tindanan
 - Linear
Sesiri
 - Tree
Pepohon
- CLO3 20. Based on **Figure A20**, identify the leaves nodes.
Kenal pasti nod dedaun berdasarkan pada Rajah A20.

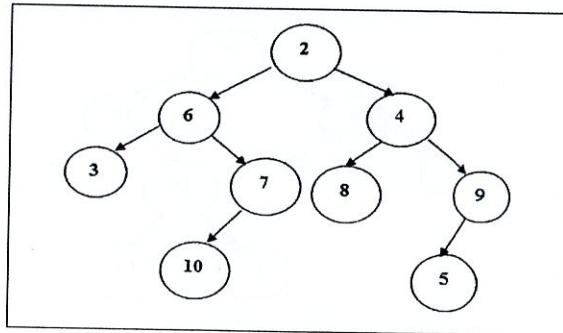


Figure A20 / Rajah A20

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

- CLO3
C3 21. Interpret the Arithmetic expression that are produces in **Figure A21**.
Tafsirkan pernyataan Arithmetik yang dihasilkan dalam Rajah A21.

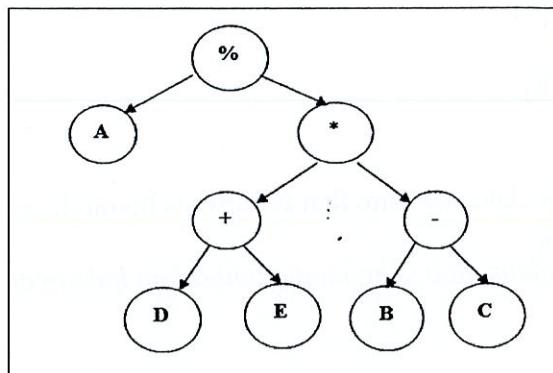


Figure A21 / Rajah A21

- A. $((D - E) * (B + C)) \% A$
- B. $A \% ((D + E) * (B - C))$
- C. $A \% ((B + C) * (D - E))$
- D. $((B + C) * (D - E)) \% A$

- CLO3
C3 22. Choose the **CORRECT** Binary Search Tree (BST) after deleting value 15 in **Figure A22**.
*Pilih Pepohon Carian Dedua yang **BETUL** setelah nilai 15 dihapuskan dalam Rajah A22.*

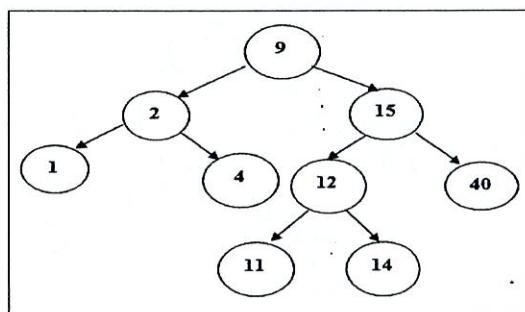
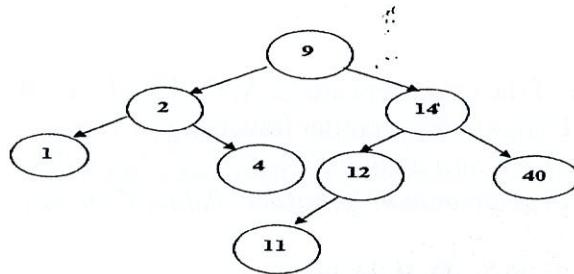
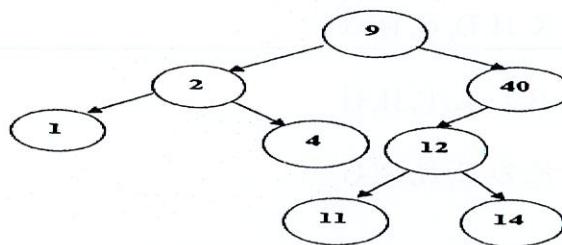


Figure A22 / Rajah A22

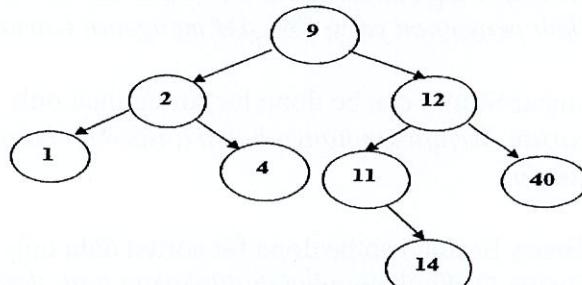
A.



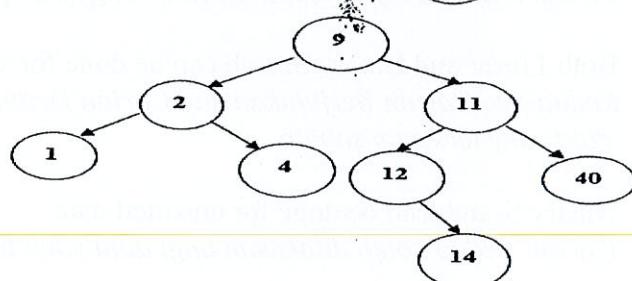
B.



C.



D.

CLO3
C4

23. Analyze the Postfix Traversal based on the expression given in **Figure A23**.
Takrifkan Postfix Traversal berdasarkan ungkapan yang diberikan dalam Rajah A23.

$$(A * B) - (C + D)$$

Figure A23/ Rajah A23

- A. A B C D * + -
 B. C D + A B * -

C. A B – C D * -

D. A B * C D + -

CLO3
C4

24. Given a list of the characters are E, A, C, K, F, H, D, B, G. Analyze the **CORRECT** answer for preorder traversing in Tree.

Diberi senarai aksara adalah E, A, C, K, F, H, D, B, G. Analisa jawapan yang BETUL bagi penjelajahan ‘preorder’ dalam Pepohon.

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

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

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

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

CLO1
C2

25. Which of the following statements are **FALSE** about Searching?

Yang manakah penyataan yang SALAH mengenai Carian?

i. Linear Search can be done for sorted data only

Carian Berjukan hanya boleh dilakukan bagi data yang tersusun sahaja.

ii. Binary Search can be done for sorted data only

Carian Dedua hanya boleh dilakukan bagi data yang tersusun sahaja.

iii. Both Linear and Binary Search can be done for sorted data only

Kedua-dua Carian Berjukan dan Carian Dedua boleh dilakukan bagi data yang tersusun sahaja.

iv. Binary Search can be done for unsorted data

Carian Dedua boleh dilakukan bagi data yang tidak tersusun.

A. i, ii, iii

B. i, ii, iv

C. i, iii, iv

D. ii, iii, iv

- CLO3 C1 26. Based on **Figure A26**, by using Insertion Sort, identify the count to complete the sort.

Berdasarkan Rajah A26, dengan menggunakan Isihan 'Insertion', kenal pasti bilangan langkah untuk menyelesaikan isihan.

5	10	8	100	15	2
---	----	---	-----	----	---

Figure A26/ Rajah A26

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

- CLO3 C3 27. Based on **Figure A27**, interpret the **BEST** pivot number on following list.
Berdasarkan pada Rajah A27, takrifkan nombor pivot terbaik bagi senarai nombor berikut.

50	45	38	24	80
----	----	----	----	----

Figure A27 /Rajah A27

- A. 24
- B. 45
- C. 50
- D. 80

- CLO3 C3 28. By using the Selection Sort based on **Figure A28**, choose the answer that represents the third steps of sorting the list.
Dengan menggunakan Isihan Pilihan berdasarkan Rajah A28, pilih jawapan yang mewakili langkah ketiga menyusun senarai.

⋮					
101	152	147	121	174	142

Figure A28/ Rajah A28

- CLO3 C4 29. Determine the data given in in **Figure A29** in ascending order by using Insertion Sort.
Tentukan data yang diberi dalam Rajah A29 dalam susunan menaik dengan menggunakan isihan ‘Insertion’.

39, 7, 9, 52, 20

Figure A29 /Rajah A29

- i. 7, 9, 20, 39, 52
 - ii. 39, 7, 9, 52, 20
 - iii. 7, 39, 9, 52, 20
 - iv. 7, 9, 39, 52, 20
-
- A. ii, i, iii, iv
 - B. iii, ii, iv, i
 - C. ii, iii, iv, i
 - D. iii, ii, i, iv

CLO3
C4

30. Given a list of unsorted numbers of **55, 33, 22, 44** and **66**. Analyze the number of steps required to find the value of **55** by applying Binary Search.
Diberi senarai nombor yang tidak tersusun iaitu 55, 33, 22, 44 dan 66. Analisa jumlah bilangan langkah yang diperlukan untuk mencari nilai 55 dengan mengaplikasikan Carian Binari.

- A. 2
- B. 3
- C. 4
- D. 5

SECTION B : 55 MARKS
BAHAGIAN B : 55 MARKAH

INSTRUCTION:

This section consists of **TWO (2)** structured questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **DUA (2)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO1

C1

- (a) Define data structure.

Takrifkan struktur data.

[2 marks]

[2 markah]

CLO2

C1

- (b) Define a structure named Student with structure members Name and Age.

Takrifkan struktur yang bernama Student yang mempunyai ahlinya Name dan Age.

[2 marks]

[2 markah]

CLO1

C2

- (c) Explain **THREE (3)** differences between Array and Linked List.

*Terangkan **TIGA (3)** perbezaan di antara Tatasusunan dan Senarai Berpaut.*

[3 marks]

[3 markah]

CLO2

C2

- (d) Define the Circular Linked List and illustrate them with three nodes.

Berikan definisi Senarai Berpaut Membulat dan lukiskan dengan tiga nod.

[3 marks]

[3 markah]

CLO2

C3

- (e) Based on **Figure B1(e)**, draw the diagram for the following questions.

Berdasarkan Rajah B1(e), lukiskan gambar rajah bagi soalan-soalan berikut.

3	8	10		
[0]	[1]	[2]	[3]	[4]

Figure B1(e) / Rajah B1(e)

- i) Insert new element with number 9 at the start of array.

Tambah elemen baru dengan nombor 9 di permulaan tatasusunan.

- ii) Delete the last element in the array using answer in e(i).

Hapus elemen terakhir di dalam tatasusunan menggunakan jawapan di e(i).

- iii) Insert new element with number 7 at index 1 using answer in e(ii).

Tambah elemen baru dengan nombor 7 pada index 1 menggunakan jawapan di e(ii).

- iv) Delete third element in the array using answer in e(iii).

Hapus elemen ketiga di dalam tatasusunan menggunakan jawapan di e(iii).

[4 marks]

[4 markah]

- | | |
|------------|--|
| CLO1
C1 | <p>(f) List TWO (2) basic operations in Stack with the explanation.
 <i>Senaraikan DUA (2) operasi asas dalam Tindanan dengan maksudnya.</i></p> <p style="text-align: right;">[3 marks]
 [3 markah]</p> |
| CLO3
C3 | <p>(g) Based on Figure B1(g), assume there are two empty Stacks of A and B with the size of 3. Draw a diagram of each Stack after the following operation are executed.</p> <p><i>Berdasarkan Rajah B1(g), anggapkan terdapat dua Tindanan kosong A dan B yang bersaiz 3. Lukis gambarajah setiap Tindanan selepas operasi berikut dilaksanakan.</i></p> |

```
pushStack (A,"Ahmad")
pushStack (B,"Bavani")
pushStack (B,"Chong")
pushStack (A,"Lily")
popStack (A,x)
popStack (B,x)
pushStack (B,"Milia")
popStack (B,x)
```

Figure B1(g) / Rajah B1(g)

[4 marks]

[4 markah]

CLO3
C4

- (h) Based on **Figure B1(h)**, sketch all the operations of Stack in order to get the output.

Berdasarkan Rajah B1(h), lakarkan semua operasi Tindanan untuk mendapatkan output.

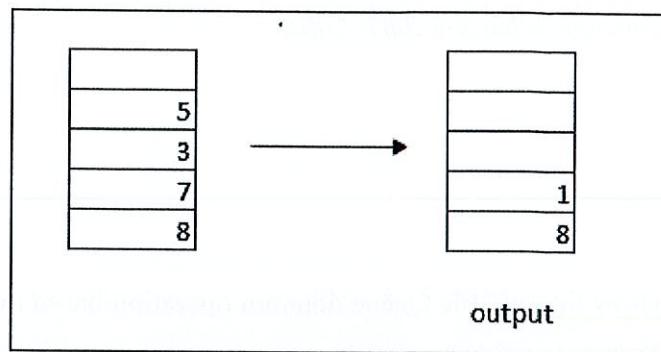


Figure B1(h) / Rajah B1(h)

[4 marks]

[4 markah]

QUESTION 2**SOALAN 2**CLO1
C2

- (a) Explain the concept of Queue.

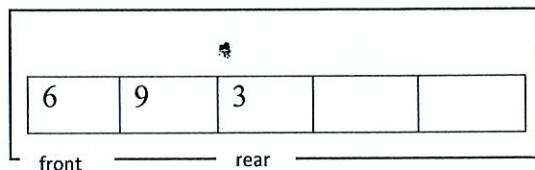
Terangkan konsep Baris Gilir.

[2 marks]

[2 markah]

CLO3
C3

- (b) Draw the suitable Queue diagram operation based on
- Figure B2(b)**
- given.

*Lukiskan rajah Baris Gilir yang sesuai untuk setiap operasi dalam **Rajah B2(b)** berikut.***Figure B2(b) / Rajah B2(b)**

- i) Enqueue (2)
- ii) Dequeue ()
- iii) Dequeue ()
- iv) Enqueue (5)

[4 marks]

[4 markah]

CLO3
C4

- (c) Draw an appropriate Circular Queue of Q for each of the statement below. Then determine the value for front, rear and count based on relevant diagram.

Lukis gambarajah Baris Gilir Membulat bagi Q yang sesuai untuk setiap pernyataan di bawah. Tentukan nilai bagi 'front', 'rear' dan 'count' mengikut gambarajah yang berkaitan.

- Create Circular Queue Q; Size = 6
- Enqueue (10)
- Enqueue (23)
- Dequeue ()

[4 marks]

[4 markah]

CLO1
C2

- (d) Based on **Figure B2(d)**, answer the following questions;

Berdasarkan Rajah B2(d), jawab soalan-soalan berikut;

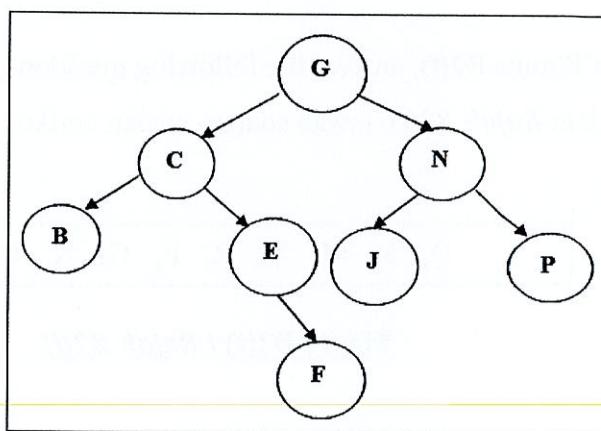


Figure B2(d) / Rajah B2(d)

- (i) Identify parents node.

Kenal pasti nod parent.

- (ii) Identify the leaf node.

Kenal pasti nod dedaun.

[2 marks]

[2 markah]

CLO3
C3

- (e)
- Figure B2(e)**
- shows an Arithmetic expression.

Rajah B2(e) menunjukkan ungkapan Arithmetik.

$4 / 2 + 6 - 2$

Figure B2(e) / Rajah B2(e)

- (i) Draw a Binary Tree based on the Arithmetic operation in
- Figure B2(e)**
- .

Lukis Pepohon Dedua berdasarkan ungkapan Arithmetik dalam Rajah B2(e).

- (ii) Based on
- Figure B2(e)**
- , write postfix notation.

Berdasarkan Rajah B2(e), tuliskan notasi postfix.

[4 marks]

[4 markah]

CLO3
C4

- (f) Based on
- Figure B2(f)**
- , answer the following questions;

Berdasarkan Rajah B2(f), jawab soalan- soalan berikut;

Q, S, M, V, R, F, G, N, U, B

Figure B2(f) / Rajah B2(f)

- (i) Draw a Binary Search Tree

Lukiskan Pepohon Dedua

- (ii) Delete node V

Hapuskan nod V

- (iii)Delete node Q

Hapuskan nod Q

[4 marks]

CLO1
C2

- (g) Explain TWO (2) types of Searching Algorithm.

Terangkan DUA (2) jenis Algoritma Carian.

[4 markah]

[2 marks]

[2 markah]

CLO3
C3

- (h) Based on the list in
- Figure B2(h)**
- , apply Merge Sort and show the steps involved in ascending order.

Berdasarkan senarai dalam Rajah B2(h), aplikasikan kaedah Isihan Gabungan dan tunjukkan langkah-langkah terlibat bagi mengisih dalam susunan menaik.

16	13	10	11	4	12	7	6
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Figure B2(h) / Rajah B2(h)

[4 marks]

[4 markah]

CLO3
C4

- (i) Analyze the data given in
- Figure B2(i)**
- . Illustrate the steps to find the target key of 25 by using Binary Search method.

Analisa data yang diberikan dalam Rajah B2(i). Illustrasikan langkah-langkah untuk pencarian nombor 25 menggunakan kaedah Carian Dedua.

23	39	14	25	21
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Figure B2(i) / Rajah B2(i)

[4 marks]

[4 markah]

SOALAN TAMAT