

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN TEKNOLOGI MAKLUMAT & KOMUNIKASI

PEPERIKSAAN AKHIR
SESI JUN 2017

DFC3033 : DATA STRUCTURE

TARIKH : 21 OKTOBER 2017
MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)

Kertas ini mengandungi **DUA PULUH TIGA (23)** 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.

CLO1
C1

1. Choose non-primitive data type.

Pilih jenis data bukan primitif.

- A. int
- B. char
- C. float
- D. integer

CLO2
C1

2. Select the **CORRECT** syntax to create a structure named student with structure members id and name.

*Pilih sintak yang **BETUL** untuk mencipta struktur yang bernama student dengan ahli-ahli struktur adalah id dan name.*

- A. Student struct
 - { char id[5];
 - char name[25];
 - }
- B. struct student
 - { char id[5];
 - char name[25];
 - }
- C. struct student
 - { char id[5],
 - char name[25],
 - }
- D. struct student
 - { char id[5];
 - char name[25];
 - }

CLO1
C1

3. Select the **CORRECT** answer for the Figure A1 below.

*Pilih jawapan yang **BETUL** bagi Rajah A1 di bawah.*

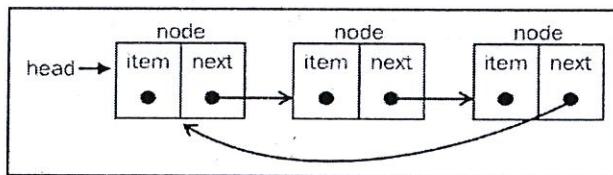


Figure A1 / Rajah A1

- A. Single Linked List / *Senarai Berpaut 'Single'*
- B. Double Linked List / *Senarai Berpaut 'Double'*
- C. Circular Linked List / *Senarai Berpaut 'Circular'*
- D. Circular Double Linked List / *Senarai Berpaut 'Circular Double'*

CLO1
C2

4. In general, determine the suitable action that is allowed by linked lists.

Secara amnya, tentukan tindakan yang sesuai yang dibenarkan oleh senarai berpaut.

- A. Insertions and removals anywhere.
Sisipan dan penyingkiran boleh di mana-mana
- B. Insertions and removals only at front.
Sisipan dan penyingkiran hanya di depan sahaja
- C. Insertions and removals only at one end.
Sisipan dan penyingkiran hanya di hujung sahaja.
- D. Insertions at the back and removals from the front.
Sisipan di belakang dan penyingkiran di hadapan.

CLO2
C1

5. In circular linked list, the last node of the list contains the address of X node. Identify X.

Dalam senarai berpaut membulat, nod terakhir akan mengandungi alamat kepada nod X. Kenalpasti X.

- A. Null / Null
- B. Last node / Nod terakhir
- C. First node / Nod pertama
- D. The previous node / Nod sebelumnya

CLO2
C1

6. Figure A2 shows a before and after situation after an operation is executed. Choose the **CORRECT** operation.

Rajah A2 menunjukkan rajah situasi sebelum dan selepas satu operasi dijalankan. Pilih operasi yang **BETUL**.

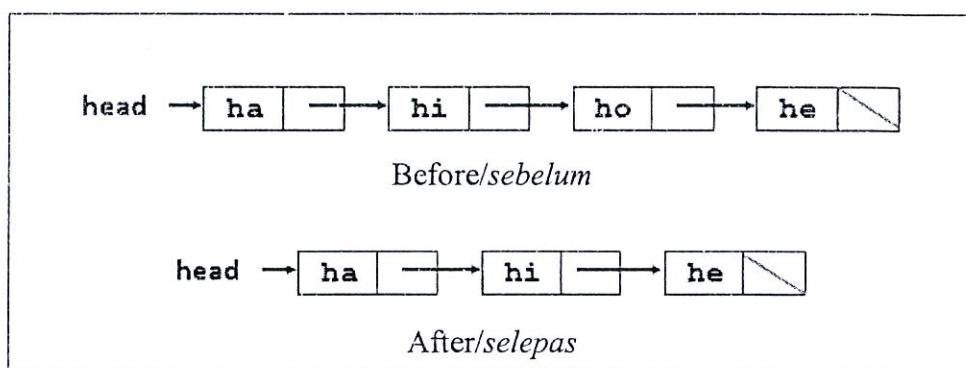


Figure A2 / Rajah A2

- A. insert
- B. delete
- C. update
- D. traverse

CLO2
C2

7. Choose the **CORRECT** answer if 'M' is inserted as second node and 'S' is deleted from the linked list based on Figure A3 below.

*Pilih jawapan yang **BETUL** jika 'M' disisipkan sebagai nod kedua dan 'S' dihapuskan dari senarai berpaut seperti di Rajah A3 di bawah.*

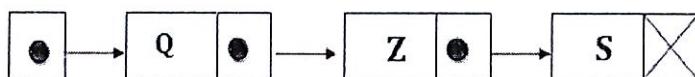


Figure A3 / Rajah A3

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

CLO1
C1

8. Select the operations that represent inserting and deleting item in stack.

Pilih operasi yang mewakili memasukkan dan memadamkan data dalam tindanan.

- A. In, Out
- B. Push, Pop
- C. Last in, Last out
- D. Enqueue, Dequeue

CLO1
C1

9. In a stack, identify the position of new nodes.

Dalam tindanan, kenalpasti kedudukan nod baharu.

- A. Top / Atas
- B. End / Akhir
- C. Middle / Tengah.
- D. Beginning / Permulaan

- CLO1
C2 10. Assume that the value of array is 4, 5, 6, 7. The values are inserted sequentially in that order in a stack. Select the first value that will be deleted if the operation is executed.

Andaikan nilai dalam tatasusunan adalah 4, 5, 6, 7. Nilai-nilai tersebut disisipkan secara berturutan mengikut susunan tersebut di dalam tindanan. Pilih nilai yang pertama akan dihapuskan jika operasi itu dijalankan.

- A. 4
- B. 5
- C. 6
- D. 7

- CLO1
C2 11. Select the situation that occur when user try to remove element from the empty stack.

Pilih situasi yang berlaku apabila pengguna cuba untuk membuang elemen daripada tindanan yang kosong.

- A. Overflow / Limpahan lebih
- B. Underflow / Limpahan kurang
- C. Fullyflow / Limpahan penuh
- D. Emptyflow / Limpahan kosong

- CLO3
C1 12. Characters S, A, W are placed in a stack respectively. Choose the order if they are removed one by one.

Karakter S, A, W ditempatkan ke dalam tindanan mengikut turutan. Pilih turutan jika elemen dihapuskan satu per satu.

- A. S, A, W
- B. W, A, S
- C. A, S, W
- D. W, S, A

CLO3
C2

13. Determine structure that represent the new stacks structure after the following code segment is executed based on Figure A5.

Tentukan struktur yang mewakili struktur tindanan yang baru selepas segmen kod yang berikut dilaksanakan berdasarkan Rajah A5.

Stack T / Tindanan T;

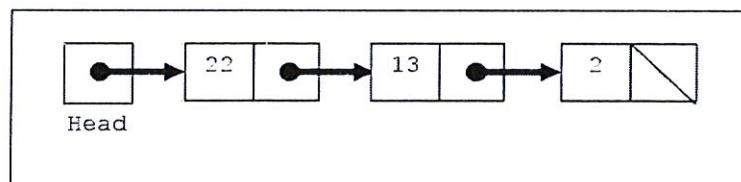
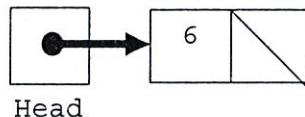


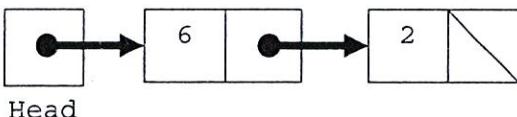
Figure A5 / Rajah A5

- i) T.Pop();
- ii) T.Pop();
- iii) T.Push(T.topItem() + 4);

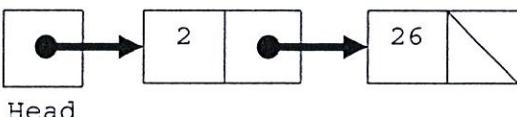
A.



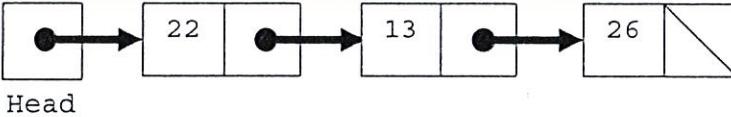
B.



C.



D.

CLO1
C1

14. Choose data structure that you would use to represent simulation of people waiting in a line.

Pilih struktur data yang anda akan gunakan untuk mewakili simulasi orang beratur dalam satu barisan.

- A. Tree / Pohon
- B. List / Senarai
- C. Stack / Tindanan
- D. Queue / Giliran

- CLO1 15. Identify the appropriate place to insert the new entry on the queue when it implement linked list.

Kenalpasti kedudukan yang sesuai untuk memasukkan data baru jika baris gilir menggunakan senarai berpaut.

- A. At the tail
Pada ekor senarai
- B. At the head
Pada kepala senarai
- C. In the middle
Pada tengah senarai
- D. At any point of list
Pada mana-mana tempat dalam senarai

- CLO3 16. A circular queue using an array, Q with the size of 10 and the data are in the index of [2] to [9]. Identify the index number of next item will be inserted in the queue.

Baris gilir membulat menggunakan tatasusunan, Q dengan saiz 10 dan data berada di indeks [2] hingga [9]. Kenalpasti nombor index item seterusnya akan dimasukkan dalam baris gilir tersebut.

- A. Q[0]
- B. Q[1]
- C. Q[10]
- D. Q[11]

CLO3
C1

17. Figure A6 shows a circular queue implemented using array. Define the suitable value for each variables head, tail and count after item "d" is removed.

Rajah A6 menunjukkan baris gilir membulat menggunakan tatasusunan. Tentukan nilai yang sesuai untuk setiap kepala, ekor dan bilangan selepas item "d" dibuang.

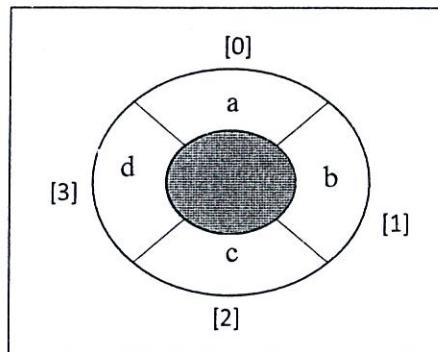


Figure A6 / Rajah A6

- A. Head = 2, tail = 2, count = 4
Kepala = 2, ekor = 2, bilangan = 4
- B. Head = 0, tail = 0, count = 3
Kepala = 0, ekor = 0, bilangan = 3
- C. Head = 0, tail = 3, count = 3
Kepala = 0, ekor = 3, bilangan = 3
- D. Head = 0, tail = 2, count = 4
Kepala = 0, ekor = 2, bilangan = 3

CLO3
C3

18. Identify the **CORRECT** answer if all operations below are executed and converted to linked list based to Figure A7 and queue concept.

Kenalpasti jawapan yang BETUL jika semua operasi berikut dilaksanakan dan ditukarkan kepada senarai berpaut berdasarkan Rajah A7 dan konsep baris gilir.

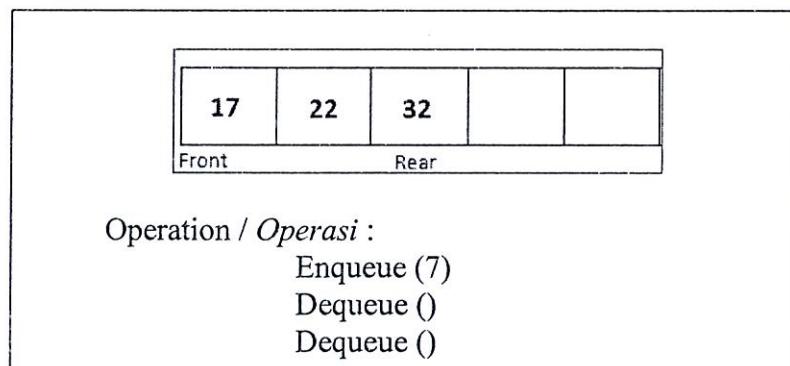
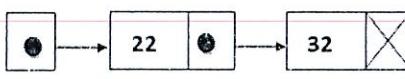
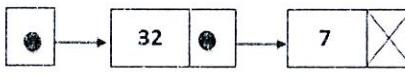
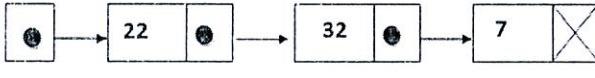


Figure A7 / Rajah A7

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

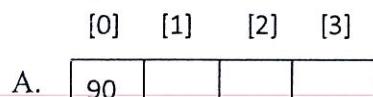
CLO3
C3

19. Based on Figure A8, choose the **CORRECT** answer to show the end result after all operations are executed.

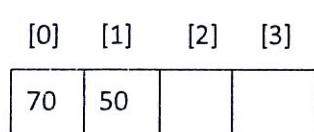
*Berdasarkan Rajah A8, pilih jawapan yang **BETUL** bagi menunjukkan keputusan akhir selepas operasi tersebut dilaksanakan.*

Enqueue (20, Q1)
 Enqueue (50, Q2)
 Dequeue (Q1)
 Enqueue (70, Q2)
 Enqueue (90, Q1)
 Dequeue (Q2)
 Enqueue (40, Q2)

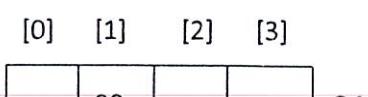
Figure A8/ Rajah A8



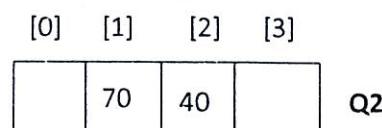
Q1



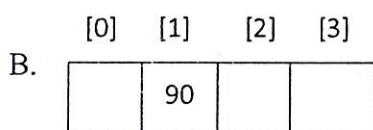
Q2



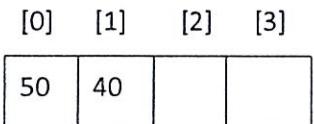
Q1



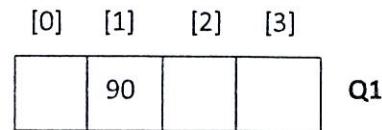
Q2



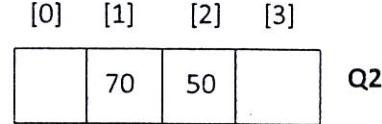
Q1



Q2



Q1



Q2

CLO1
C1

20. Select the data structure that represent hierarchical relationship between elements.
Kenalpasti struktur data yang menggambarkan hubungan antara elemen dalam bentuk hirarki.

- A. Tree
Pokok
- B. Linear
Linear
- C. Queue
Giliran
- D. Stack
Tindanan

- CLO1
C2 21. In full Binary Search Tree, every internal node has exactly two children. If there are 100 leaf nodes in the tree, select the numbers of the internal nodes in the tree.

Dalam Pohon Carian Dedua yang penuh, setiap nod dalaman mempunyai dua anak. Sekiranya terdapat 100 nod dedaun dalam pohon itu, pilih bilangan nod dalaman di dalam pohon tersebut.

- A. 25
- B. 50
- C. 99
- D. 101

- CLO3
C1 22. Identify the **CORRECT** order in a Binary Search Tree (BST) in the in-order traversal.

*Kenalpasti turutan yang **BETUL** di dalam Pepohon Carian Dedua (BST) dalam penyusuran ‘in-order’.*

- A. left, root, right / *kiri, akar, kanan*
- B. root, left, right / *akar, kiri, kanan*
- C. right, root, left / *kanan, akar, kiri*
- D. right, left, root / *kanan, kiri, akar*

- CLO3
C3 23. Based on Figure A9, choose the result using the post order traversal.

Berdasarkan Rajah A9, pilih hasil menggunakan penyusuran ‘post order’.

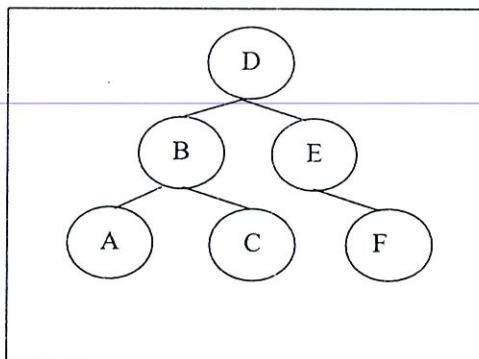


Figure A9 / Rajah A9

- A. A C B F E D
- B. D B A C E F
- C. A B C F E D
- D. D E F B C A

CLO3
C3

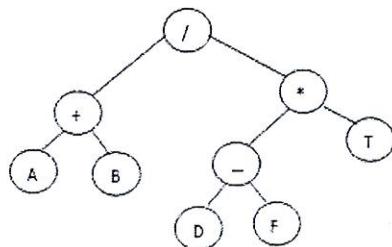
24. Choose the
- CORRECT**
- binary tree based on arithmetic expression in Figure A10.

*Pilih pepohon dedua yang **BETUL** berdasarkan ungkapan aritmetik dalam Rajah A10.*

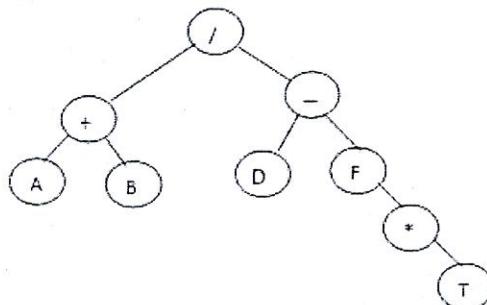
$$A + B / (D - F) * T$$

Figure A10 / Rajah A10

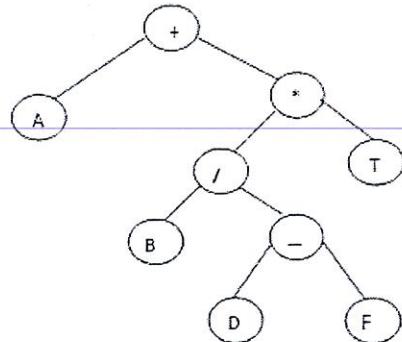
A.



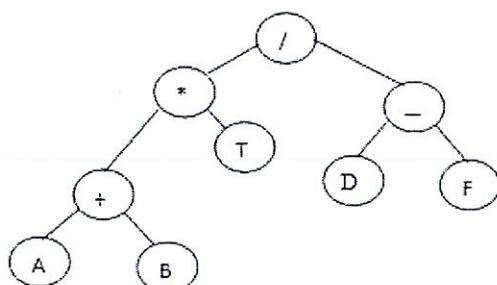
B.



C.



D.



CLO1 C1	25. Identify the following sorting algorithm that applying divide and conquer method. <i>Kenalpasti algoritma isihan berikut yang mengaplikasikan kaedah 'divide' dan 'conquer'.</i> <ul style="list-style-type: none">A. Merge sort <i>Isihan 'merge'</i>B. Bubble sort <i>Isihan 'bubble'</i>C. Insertion sort <i>Isihan 'insertion'</i>D. Selection sort <i>Isihan 'selection'</i>
CLO1 C2	26. Select the following statement that is NOT the required condition for Binary Search algorithm. <i>Pilih pernyataan berikut yang BUKAN syarat yang diperlukan untuk algoritma Carian Dedua.</i> <ul style="list-style-type: none">A. The list must be sorted. <i>Senarai mestilah disusun secara tertib.</i>B. The values in the list should be present. <i>Nilai-nilai dalam senarai sepatutnya wujud.</i>C. There should be the direct access to the middle element in any list. <i>Perlu ada capaian terus kepada unsur di tengah dalam mana-mana senarai.</i>D. There must be mechanism to delete and/or insert elements in list. <i>Perlu ada mekanisma untuk menghapuskan dan/atau memasukkan unsur ke dalam senarai.</i>

CLO1
C2

27. Choose a **CORRECT** statement about pivot in quick sorting method.

A. A pivot be pick up randomly.

Pivot boleh dipilih dengan bebas.

B. A pivot divides the list evenly.

Pivot membahagikan senarai sama rata.

C. A pivot divides a list into two sublists of equal size.

Pivot membahagikan senarai kepada dua subsenarai yang bersaiz sama.

D. A pivot makes division methods to search data becomes slow

Pivot menjadikan kaedah pembahagian pencarian data menjadi lambat

CLO3
C1

28. Suppose a list is {2, 9, 5, 4, 8, 1}. Choose the answer after a first phase of bubble sort is applied.

Andaikan senarai diberi {2, 9, 5, 4, 8, 1}. Pilih jawapan selepas fasa pertama isihan 'bubble' diaplikasikan.

A. 2, 9, 5, 4, 8, 1

B. 2, 9, 5, 4, 1, 8

C. 2, 5, 9, 4, 8, 1

D. 2, 5, 4, 8, 1, 9

CLO3
C3

29. Rearrange the data given in ascending order by using selection sort.

Susun semula data yang diberi dalam susunan menaik dengan menggunakan isihan 'selection'.

38, 8, 9, 41, 16

Figure A11 / Rajah A11

- i. 8, 9, 16, 41, 38
 - ii. 8, 9, 38, 41, 16
 - iii. 8, 38, 9, 41, 16
 - iv. 8, 9, 16, 38, 41
-
- A. iii, i, ii, iv
 - B. iii, ii, i, iv
 - C. i, ii, iii, iv
 - D. ii, i, iii, iv

CLO3
C3

30. Choose how many steps needed to sort the following numbers in Figure A12 using a merge sort.

Pilih berapakah langkah yang diperlukan untuk menyusun nombor-nombor di dalam Rajah A12 menggunakan isihan 'merge'.

38	27	43	3	9	82	10
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Figure A12/ Rajah A12

- A. 4
- B. 5
- C. 6
- D. 7

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.
<i>Definisikan struktur data.</i> | [2 marks]
[2 markah] |
| CLO 2
C2 | (b) Declare a structure named Staff with structure members Name and Age.
<i>Isytiharkan struktur yang bernama Staff dengan ahlinya Name dan Age.</i> | [2 marks]
[2 markah] |
| CLO1
C1 | (c) State THREE (3) types of linked list.
<i>Nyatakan TIGA (3) jenis senarai berpaut.</i> | [3 marks]
[3 markah] |
| CLO2
C1 | (d) State ONE (1) difference between list and linked list.
<i>Nyatakan SATU (1) perbezaan di antara senarai dan senarai berpaut.</i> | [3 marks]
[3 markah] |

CLO2
C3

- (e) Based on Figure B1, demonstrate the linked list for the following questions.

Berdasarkan Rajah B1, tunjukkan semula senarai berpaut bagi soalan-soalan yang berikut.

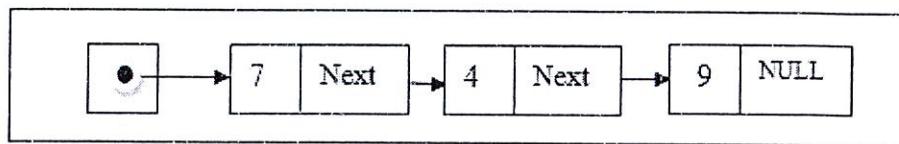


Figure B1/ Rajah B1

- i. Insert new node with data = 5 at the beginning of Linked List.

Masukkan nod baru dengan data = 5 pada permulaan senarai berpaut.

- ii. Delete data = 7 using answer in (e)(i).

Padam data = 7 dengan menggunakan jawapan pada (e)(i).

- iii. Insert new node with data = 2 after data = 4 using answer in (e)(ii)

Masukkan nod selepas data = 2 selepas data = 4 dengan menggunakan jawapan pada (e)(ii)

- iv. Delete the last node of Linked List using answer in (e)(iii)

Padam nod terakhir bagi senarai berpaut dengan menggunakan jawapan pada (e)(iii)

[4 marks]

[4 markah]

CLO1
C2

- (f) Identify TWO (2) examples of the implementation of stack in real life situation.

Kenalpasti DUA (2) contoh implementasi tindanan di dalam situasi kehidupan sebenar.

[2 marks]

[2 markah]

CLO3
C1

- (g) Figure B2 shows the top of stack implemented using array. Draw a stack data structure in Figure B2 using linked list.

Rajah B2 menunjukkan bahagian atas tindanan yang dilaksanakan menggunakan tatasusunan. Lukis struktur data tindanan di Rajah B2 menggunakan senarai berpaut.

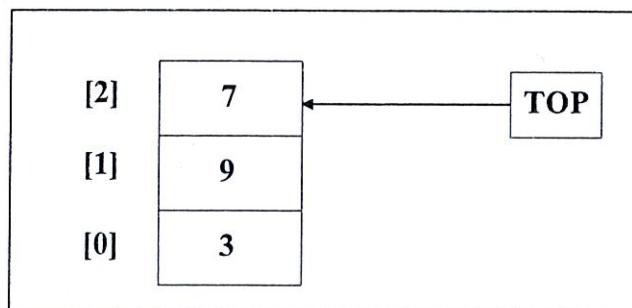


Figure B2/ Rajah B2

[5 marks]

[5 markah]

CLO3
C2

- (h) Given a stack of integer, R. Based on Figure B3, draw diagram for each operations by using linked list method.

Diberi tindanan bagi integer, R. Berdasarkan Rajah B3, lukiskan gambarajah bagi setiap operasi dengan menggunakan kaedah senarai berpaut.

pushStack (R, 9)
PushStack (R, 4)
PushStack (R, 7)
PopStack (R)

Figure B3/ Rajah B3

[4 marks]

[4 markah]

QUESTION 2**SOALAN 2**CLO1
C1

- (a) Define the concept of FIFO (First In, First Out) in queue and give **TWO** examples of queue application in daily life.

*Definisikan konsep FIFO (First In, First Out) dalam giliran dan berikan **DUA** contoh aplikasi giliran dalam kehidupan sehari-hari.*

[4 marks]

[4 markah]

- (b) Draw each following operations sequentially to new diagram after being executed.

Draw setiap operasi berikut secara berturutan ke gambarajah baru selepas dilaksanakan.

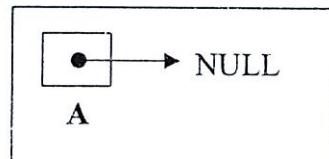


Figure B4 / Rajah B4

- i. Enqueue (26, &A)
- ii. Enqueue (65, &A)
- iii. Dequeue (&S)

[3 marks]

[3 markah]

CLO3
C3

- (c) Illustrate the Circular Queue according to the sub program below.

Ilustrasikan Baris Gilir Membulat berdasarkan sub program di bawah.

```
typedef struct cQueue
{
    int front,rear,count;
    int cQueue[3];
}cQueue;

void create(cQueue *cq)
{
    cq->front = 0;
    cq->rear = 0;
    cq->count = 0;
}
```

Figure B5 / Rajah B5

[3 marks]

[3 markah]

CLO1
C1

- (d) Define the following terminology in relation to tree.

Definisikan terminologi berikut yang berkaitan dengan pepohonan.

- i. Parents / Ibu bapa
- ii. Siblings / Adik-beradik
- iii. External node or leaf / Nod luar atau dedaun

[3 marks]

[3 markah]

CLO1
C2

- (e) Based on Figure B6 below, answer the following questions;
Berdasarkan Rajah B6 di bawah, jawab soalan-soalan berikut;

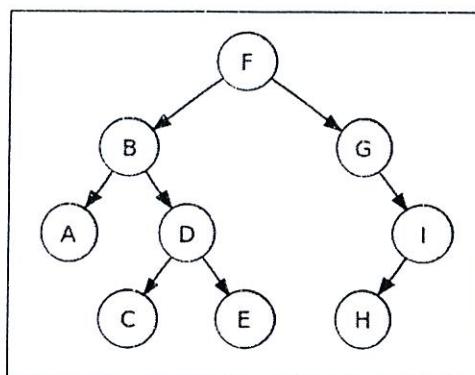


Figure B6 / Rajah B6

- (i) Identify the numbers of the node on the tree.

Kenalpasti bilangan nod pada pohon tersebut.

- (ii) Identify the parents node.

Kenalpasti nod parent.

- (iii) Identify the external node or leaf.

Kenalpasti nod luar atau dedaun.

[3 marks]

[3 markah]

CLO3
C1

- (f) Figure B7 shows an arithmetic expression.

Rajah B7 menunjukkan ekspresi aritmetik.

$$2 * 2 + 3 - 8$$

Figure B7 / Rajah B7

- (i) Draw a binary tree based on arithmetic operation in Figure B7.

Lukis pohon dedua berdasarkan ekspresi aritmetik dalam Rajah B7.

- (ii) Based on Figure B7, write the prefix notation.

Berdasarkan Rajah B7, tuliskan notasi prefix.

[4 marks]

[4 markah]

CLO1
C1

- (g) State THREE (3) methods / types of sorting.

Nyatakan TIGA (3) kaedah / jenis penyisihan

[3 marks]

[3 markah]

CLO1
C2

- (h) Question 2h(i) and 2h(ii) are based on Figure B8.

Soalan 2h(i) dan 2h(ii) adalah berdasarkan Rajah B8.

This searching method starts by testing the data in the element at the middle of the list to determine if the target is in the first or second half of the list.

Kaedah carian ini bermula dengan memadankan elemen di tengah senarai untuk menentukan jika sasaran berada di separuh pertama atau separuh kedua senarai.

Figure B8 / Rajah B8

- (i) Identify the searching method based on description in Figure B8.

Kenalpasti kaedah carian berdasarkan pernyataan di dalam Rajah B8.

- (ii) Write the formula to find element at the middle of the list.

Tulis formula untuk mencari elemen di tengah senarai.

[3 marks]

[3 markah]

CLO3
C4

- (i) The following is
- unsorted list**
- . By using Binary Searching, solve the problem to find how many steps needed to search the desired value. Illustrate the process.

Berikut adalah senarai tidak tersusun. Dengan menggunakan Carian Dedua, selesaikan masalah tersebut untuk cari berapakah langkah-langkah yang diperlukan bagi mencari nilai yang dikehendaki. Ilustrasikan proses tersebut.

Find 11 in / Cari 11 dalam : {90 4 53 20 11 88 38}

[4 marks]

[4 markah]

SOALAN TAMAT