PEPERIKSAAN AKHIR
FINAL EXAMINATION

SEMESTER SEPTEMBER 2006
SEPTEMBER SEMESTER 2006

KOD KURSUS
COURSE CODE : CBDS2103

NAMA KURSUS
COURSE TITLE : STRUKTUR DATA
DATA STRUCTURE

MASA
TIME : 2.30 PETANG - 4.40 PETANG
2:30 PM - 4.40 PM

TARIKH
DATE : 23 NOVEMBER 2006

ARAHAN KEPADA CALON
INSTRUCTIONS TO CANDIDATES

1. Sila baca dengan TELITI arahan dibawah ini.
   Please read CAREFULLY the instructions given below.

2. Kertas soalan ini terdiri daripada dua versi bahasa, iaitu BAHASA MALAYSIA dan BAHASA INGGERIS. Sila jawab menggunakan salah SATU BAHASA sahaja.
   This question paper consists of MALAY and ENGLISH versions. Please answer in ONE LANGUAGE only.

   This question paper is printed on both sides of the papers. Please ensure that there are 8 PAGES of questions in Malay and 7 PAGES in English.

4. Kertas soalan ini dibahagikan kepada 2 BAHAGIAN, iaitu bahagian A dan B.
   This question paper is divided into 2 PARTS, A and B.

5. Sila jawab SEMUA soalan dalam Bahagian A dan TIGA (3) soalan dalam Bahagian B.
   Answer ALL questions in Part A and THREE (3) questions in Part B.

6. Sila tulis jawapan anda pada buku jawapan yang disediakan.
   Please write your answers in the Answer Booklet provided.

JUMLAH KESELURUHAN MUKA SURAT ADALAH SEBANYAK 15 TIDAK TERMASUK MUKA SURAT INI.
THERE ARE 15 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.
PART A

INSTRUCTIONS: Answer ALL questions.

QUESTION 1

Determine whether an array is a dynamic or static data structure. Explain your answer. [4 marks]

QUESTION 2

Explain the relationship between character and string. [4 marks]

QUESTION 3

Explain what is meant by structure concept in C language. [4 marks]

QUESTION 4

State FOUR (4) types of sorting. [4 marks]

QUESTION 5

Array can improve the order and efficiency of programs. However, there is still a weakness in the use of an array.

a) Determine the weakness.

b) What is the suggested data structure that could be used to improve this weakness? [4 marks]
QUESTION 6

Given the following function prototype declaration:

```c
void CiptaTimbunan (TIMB *t);
```

Write the basic function to create an empty stack in C language using the function prototype declaration above. Assume that implementation is using the array approach.

[4 marks]

QUESTION 7

Give FOUR (4) basic operations for queue data structure.

[4 marks]

QUESTION 8

Variables for basic data types such as integer and char has direct access on the value stored in the storage defined by the programmer. Explain what is meant by pointer.

[4 marks]

QUESTION 9

Explain what is meant by searching. State TWO (2) searching techniques.

[4 marks]

QUESTION 10

Give the definition for a tree. Draw an example of tree using diagram.

[4 marks]
PART B

INSTRUCTION: Answer THREE (3) questions only.

QUESTION 1

Linked list is different from a list. Linked list has sequential items which are known as nodes. Whereas, list application can be assumed as what is found around us such as a list of your friends’ telephone numbers and addresses.

a) Explain the difference between list and linked list. [3 marks]

b) Give the definition for list and linked list. Then, give an illustration using diagrams of list and linked list. [6 marks]

c) Structure declaration for linked list is given below:

```c
typedef char UNSUR;      // [row 1]
typedef struct nod      // [row 2]
{
    UNSUR data;      // [row 3]
    struct nod *next; // [row 4]
} NOD;        // [row 5]
typedef enum bool {PALSU, BENAR} BOOL;    // [row 6]
```

Function prototype declaration is given as follows:

```c
BOOL SenaraiKosong (NOD *sList);    // [row 7]
```
i. Explain what is meant by [row 6] in the code above.  

ii. Based on the declaration above, complete the function to determine whether the linked list is empty.

iii. Describe **THREE (3)** basic operations for linked list other than the linked list operation mentioned above.

**QUESTION 2**

Stack application has been mostly used in programming. One of the stack applications is Reversed Polish Notation (Notasi Polish Songsang). The arithmetic expression is written in infix notation such as P+Q*R where the operator exists between two operands. Compiler will change the expression in infix notation to postfix or prefix notation.

a) The method to evaluate postfix expression allows the operand value to be stored until the operator is found while scanning the expression from left to right. After the operator is found, the two preceding operands must be retrieved and operation is performed.

Write the algorithm that can evaluate postfix expressions completely.

b) Given the variables **A=17, B=4, C=6, D=5**, count the value for the following postfix expression. Show how you trace the algorithm for the postfix expression.

\[ A / B + ( C - D) \]
QUESTION 3

Queue is a data structure which is being widely used in computer system applications. For example, for the printing tasks which are sent by many users to one printer, every user in the network environment has access to that printer at the same time.

a) Give the formal definition for queue. Then, based on this definition determine the main characteristic for queue data structure.

[4 marks]

b) Based on the queue data structure which has been given in the paragraph above, describe how the queue concept can be used.

[5 marks]

c) Give TWO (2) examples on how queue can be applied in real life.

[4 marks]

d) You have a queue which contains list of integer numbers, G1 and G2. Draw the diagram that shows the content of queue G1 and G2 after the following pseudocode is executed.

```plaintext
G1 = ciptaGiliran;
G2 = ciptaGiliran;
loop (not end of file)
    read nombor_integer;
    masukGiliran (G1, nombor_integer); //integer item is inserted
        //into queue G1
    masukGiliran (G2, nombor_integer); //integer item is inserted
        //into queue G2
loop (not empty G1)
    keluarGiliran (G1, y);//integer item,y is removed from queue G1
    masukGiliran (G2, y); //integer item,y is inserted into queue G2
```

Integer items 3,5,6,2,1,2,4 are inserted as input.

(Note: masukGiliran will insert one integer into the queue; and keluarGiliran will remove one integer from the queue.)

[7 marks]

[Total: 20 marks]
QUESTION 4

Assume that you want to sort a list of integer numbers using selection sort. List of integer numbers are elements in an array.

a) Write the selection sort function which is implemented using array. [9 marks]

b) An array consists of the following list of integer numbers: 55, 35, 25, 45, 15
   Using selection sort algorithm, show the steps that need to be executed on the list of integer numbers to sort in ascending order. [9 marks]

c) What is the execution time for selection sort? [2 marks]

[Total: 20 marks]
QUESTION 5

Binary Search Tree (BST) is used to store node in certain sequential order so that it can be accessed easily.

a) State the relationship between Binary Search Tree (BST) and binary tree. Explain your answer.  

[4 marks]

b) Given the function prototype declaration to traverse Binary Search Tree (BST) using in order as shown below.

```c
void inOrder (PGD *ptr);
```

Complete the function to implement traversal of Binary Search Tree (BST) using in order.

[7 marks]

c) Create Binary Search Tree using the following data which are inserted sequentially:  

6, 2, 14, 10, 18, 8, 12  

[9 marks]  

[Total: 20 marks]  

THE QUESTION PAPER ENDS HERE