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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2019/2020**

COURSE NAME : DATA STRUCTURE
COURSE CODE : BIC 10404
PROGRAMME CODE : BIP / BIS / BIM / BIW
EXAMINATION DATE : JULY 2020
DURATION : 3 HOURS
INSTRUCTION : 1. ANSWER **ALL** QUESTIONS
2. PLEASE MAKE SURE TO
CLICK "SAVE ANSWER"
BUTTON FOR SUBJECTIVE
QUESTIONS.

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

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Q1 Answer Q1(a) and Q1(b) based on the program given in Figure Q1.

```

#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#define SIZE 10

struct Staff{
    char name[20];
    double salary;};

typedef struct Staff Staff;

struct StaffNode{
    Staff staffData;
    struct StaffNode *next;};

int main(){
    int i;
    char staffName[20];
    double staffSalary;

    struct StaffNode *head = NULL, *p1;

    for(i=0; i<SIZE; i++)
    {
        printf("\nEnter name:");
        scanf("%s", staffName);
        printf("\nEnter salary:");
        scanf("%lf", &staffSalary);

        p1 = malloc(sizeof(struct StaffNode));

        strcpy(p1->staffData.name, staffName);
        p1->staffData.salary = staffSalary;
        p1->next = NULL;

        if (head == NULL)
            head = p1;
        else
            { p1->next = head;
              head = p1;}
    }

    return 0;
}

```

FIGURE Q1

- (a) Write a function, named findMax for **Figure Q1** that will return the maximum salary from the linked list.
- (10 marks)
- (b) Write a code segment that will remove a node from the linked list according to stack operation.

(10 marks)

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Q2 (a) Determine the output for the program in **Figure Q2(a)**.

```
#include <stdio.h>

long testNum( long n );
int main()
{
    long result;

    result = testNum (5);
    printf( "\nResult = %ld\n", result );

    return 0;
}

long testNum( long n )
{
    if ( n == 0 || n == 1 ) {
        printf("    %ld", n),
        return n;
    }
    else {
        return testNum( n - 1 ) + testNum( n - 2 );
    }
}
```

Figure Q2(a)

(5 marks)

Q3 (a) **Figure Q3(a)** presents a program with a sorting function, called SortData. Determine the output for **Figure Q3(a)**.

```
#include <stdio.h>
void SortData( int list[], int no)
{
    int i, j, largest, largestidx, temp, k;

    for (i = 0; i <no-1; i++)
    { largest = list[i];
      largestidx = i;
      for (j = i+1; j <no; j++)
          if (list[j] > largest) {
              largest = list[j];
              largestidx = j;
          }

      if (largest > list[i]){
          temp = list[i];
          list[i] = largest;
          list[largestidx] = temp;
      }
      printf("\nPass %d:", i+1);
      for (k = 0; k <no; k++)
          printf("%5d", list[k]);
    }
}
```

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```

int main()
{
int list[ ] = {25, 57, 48, 37, 12, 65, 98, 75, 83};
SortData(list,9);

return 0;}

```

FIGURE Q3(a)

(8 marks)

(b) Name the sorting algorithm performed in **Figure Q3(a)**.

(2 marks)

(c) Determine the output for **Figure Q3(b)**.

```

int testQ3( int list[], int no, int x)
{
    int idx, test, left, right, mid;

    idx = 1;
    test = 0;

    left = 0;
    right = no-1;

    while (left <= right && !test)
    {
        mid = (int)((left+right)/2);
        if (x == list[mid]){
            test = 1;
            idx = mid;
        }
        else if (x>list[mid])
            left = mid+1;
        else
            right = mid-1;
    }
    return idx;
}

int main()
{
    int i, list[10];
    for(i=0;i<10;i++)
        list[i] = i+3*i;

    printf("\nOutput: %d ", testQ3(list,10,36));
    printf("\nOutput: %d ", testQ3(list,10,8));
    printf("\nOutput: %d ", testQ3(list,10,40));
    printf("\nOutput: %d ", testQ3(list,10,20));
    printf("\nOutput: %d ", testQ3(list,10,3));
    return 0;}

```

FIGURE Q3(b)

(10 marks)

- Q4** Complete **Figure Q4** with a code segment that will insert a new node to the linked list according to queue operation.

Answer:

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#define SIZE 10

struct Staff{
    char name[20];
    double salary;};

typedef struct Staff Staff;

struct StaffNode{
    Staff staffData;
    struct StaffNode *next;};

int main(){
    int i;
    char staffName[20];
    double staffSalary;

    struct StaffNode *head = NULL, *p1;

    for(i=0; i<SIZE; i++)
    {
        printf("\nEnter name:");
        scanf("%s", staffName);
        printf("\nEnter salary:");
        scanf("%lf", &staffSalary);

        p1 = malloc(sizeof(struct StaffNode));

        strcpy(p1->staffData.name, staffName);
        p1->staffData.salary = staffSalary;
        p1->next = NULL;

```

Answer:

```

} //for
return 0;
}
```

FIGURE Q4

(10 marks)

Q5 Refer to **Figure Q5** to answer the question **Q5(b) – Q5(e)**.

45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48

FIGURE Q5

- (a) Write the algorithm for Binary Search Tree (BST). (4 marks)
- (b) Create a Binary Search Tree BST using the following twelve (12) numbers entered as a sequential set as **Figure Q5**. (6 marks)
- (c) Determine the result of Preorder Traversal. (5 marks)
- (d) Determine the result of Inorder Traversal. (5 marks)
- (e) Determine the result of Postorder Traversal. (5 marks)

- END OF QUESTION-

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