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Assignment No-1

Name – Chetan Gundurao Jagatap **Roll No -**
Class –B.Sc II **Date - / /**
Signature -

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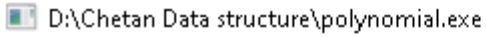
Q1) Polynomial

```
#include <iostream>
#include <iomanip>
using namespace std;

struct poly {
   int coeff;
   int pow_val;
   poly* next;
};

class add {
   poly *poly1, *poly2, *poly3;

public:
   add() { poly1 = poly2 = poly3 = NULL; }
   void addpoly();
   void display();
};

void add::addpoly()
{
   int i, p;
   poly *newl = NULL, *end = NULL;
   cout << "Enter highest power for x\n"; cin >> p;
   //Read first poly
   cout << "\nFirst Polynomial\n"; for (i = p; i >= 0; i--) {
      newl = new poly;
      newl->pow_val = p;
      cout << "Enter Co-efficient for degree" << i << ":: "; cin >> newl->coeff;
      newl->next = NULL;
      if (poly1 == NULL)
         poly1 = newl;
      else
         end->next = newl;
      end = newl;
   }

   //Read Second poly
   cout << "\n\nSecond Polynomial\n"; end = NULL; for (i = p; i >= 0; i--) {
      newl = new poly;
      newl->pow_val = p;
      cout << "Enter Co-efficient for degree" << i << ":: "; cin >> newl->coeff;
```

```
        newl->next = NULL;
        if (poly2 == NULL)
            poly2 = newl;
        else
            end->next = newl;
        end = newl;
    }

    //Addition Logic
    poly *p1 = poly1, *p2 = poly2;
    end = NULL;
    while (p1 != NULL && p2 != NULL) {
        if (p1->pow_val == p2->pow_val) {
            newl = new poly;
            newl->pow_val = p--;
            newl->coeff = p1->coeff + p2->coeff;
            newl->next = NULL;
            if (poly3 == NULL)
                poly3 = newl;
            else
                end->next = newl;
            end = newl;
        }
        p1 = p1->next;
        p2 = p2->next;
    }
}

void add::display()
{
    poly* t = poly3;
    cout << "\n\nAnswer after addition is : ";
    while (t != NULL) {
        cout.setf(ios::showpos);
        cout << t->coeff;
        cout.unsetf(ios::showpos);
        cout << "X" << t->pow_val;
        t = t->next;
    }
}
int main()
{
    add obj;
    obj.addpoly();
    obj.display();
}
```

**********Output**********




```
Enter highest power for x
2

First Polynomial
Enter Co-efficient for degree2:: 1
Enter Co-efficient for degree1:: 2
Enter Co-efficient for degree0:: 3


Second Polynomial
Enter Co-efficient for degree2:: 3
Enter Co-efficient for degree1:: 2
Enter Co-efficient for degree0:: 1


Answer after addition is : +4X2+4X1+4X0
--------------------------------
Process exited after 22.83 seconds with return value 0
Press any key to continue . . .
```

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Assignment No-2

Name – Chetan Gundurao Jagatap **Roll No -**
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Q1) Convert infix to postfix.

```
#include <bits/stdc++.h>
using namespace std;

int prec(char c)
{
   if (c == '^')
      return 3;
   else if (c == '/' || c == '*')
      return 2;
   else if (c == '+' || c == '-')
      return 1;
   else
      return -1;
}

void infixToPostfix(string s)
{

   stack<char> st;
   string result;

   for (int i = 0; i < s.length(); i++) {
      char c = s[i];

      if ((c >= 'a' && c <= 'z') || (c >= 'A' && c <= 'Z') || (c >= '0' && c <= '9'))
         result += c;

      else if (c == '(')
         st.push('(');

      else if (c == ')') {
         while (st.top() != '(') {
            result += st.top();
            st.pop();
         }
         st.pop();
      }

      else {
         while (!st.empty() && prec(s[i]) <= prec(st.top()))
                        {
            result += st.top();
```

```
            st.pop();
        }
        st.push(c);
    }
  }
  while (!st.empty()) {
    result += st.top();
    st.pop();
  }

  cout << result << endl;
}
int main()
{
  string exp = "a+b*(c^d-e)^(f+g*h)-i";

  infixToPostfix(exp);

  return 0;
}
```

**********Output**********

D:\Chetan Data structure\infix to postfix.exe

```
abcd^e-fgh*+^*+i-

--------------------------------
Process exited after 0.1065 seconds with return value 0
Press any key to continue . . .
```

****

****

Assignment No-3

Name – Chetan Gundurao Jagatap **Roll No -**
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Signature -

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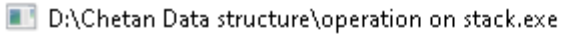
Q1) Operations on stack.

```
#include<iostream>
using namespace std;
int stack[100],n=100,top=-1;
void push(int val)
{
	if(top>=n-1)
	cout<<"Stack over flow"<<endl;
	else
	{
		top++;
		stack[top]=val;
	}
}
void pop()
{
	if(top<=-1)
	cout<<"Stack Underflow"<<endl;
	else
	{
		cout<<"The Popped element is "<<stack[top]<<endl;
		top--;
	}
}
void display()
{
	if(top>=0)
	{
		cout<<"Stack elements are :";
		for(int i=top;i>=0;i++)
		cout<<stack[i]<<" ";
		cout<<endl;
	}
	else
	cout<<"Stack is empty";
}
int main()
{
	int ch,val;
	cout<<"1) Push in stack"<<endl;
	cout<<"2) Pop from stack"<<endl;
	cout<<"1) Display stack"<<endl;
```

```
	cout<<"4) Exit"<<endl;
	do
	{
		cout<<"Enter choice :"<<endl;
		cin>>ch;
		switch(ch)
		{
			case 1:
				{
					cout<<"Enter value to be pushed :"<<endl;
					cin>>val;
					push(val);
					break;
				}
			case 2:
				{
					pop();
					break;
				}
			case 3:
				{
					display();
					break;
				}
			case 4:
				{
					cout<<"Exit"<<endl;
					break;
				}
			default:
				{
					cout<<"Invalid choice"<<endl;
				}
		}
	}
	while(ch!=4);
	return 0;
}
```

**********Output**********




```
1) Push in stack
2) Pop from stack
1) Display stack
4) Exit
Enter choice :
1
Enter value to be pushed :
143
Enter choice :
2
The Popped element is 143
Enter choice :
3
Stack is emptyEnter choice :
4
Exit

--------------------------------
Process exited after 22.17 seconds with return value 0
Press any key to continue . . .
```

****

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Assignment No-4

Name – Chetan Gundurao Jagatap **Roll No -**
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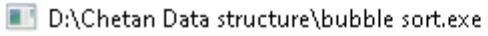
****

Q1) Bubble Sort.

```
#include<iostream>
using namespace std;
void print(int a[],int n)
{
	int i;
	for(i=0;i<n;i++)
	{
		cout<<a[i]<<" ";
	}
}
void bubble(int a[],int n)
{
	int i,j,temp;
	for(i=0;i<n;i++)
	{
	for(j=i+1;j<n;j++)
	{
		if(a[j]<a[i])
		{
			temp=a[i];
			a[i]=a[j];
			a[j]=temp;
		}
	}
   }
}
int main()
{
	int i,j,temp;
	int a[]={45,1,32,13,26};
	int n=sizeof(a)/sizeof(a[0]);
	cout<<"Before sorting array elements are -\n";
	print(a,n);
	bubble(a,n);
	cout<<"\nAfter sorting array elements are - \n";
	print(a,n);
	return 0;
}
```

**********Output**********



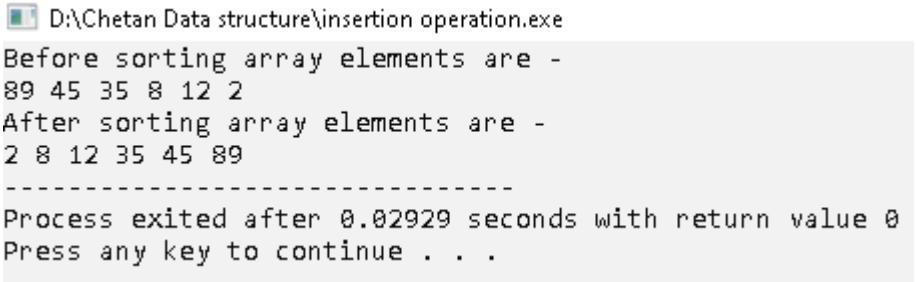

```
Before sorting array elements are -
45 1 32 13 26
After sorting array elements are -
1 13 26 32 45
--------------------------------
Process exited after 0.1847 seconds with return value 0
Press any key to continue . . .
```

****

Q2) Insert Sort.

```
#include<iostream>
using namespace std;
void insert(int a[],int n)
{
	int i,j,temp;
	for(i=0;i<n;i++)
	{
		temp=a[i];
		j=i-1;
		while(j>=0 && temp<=a[j])
		{
			a[j+1]=a[j];
			j=j-1;
		}
		a[j+1]=temp;
	}
}
void printArr(int a[],int n)
{
	int i;
	for(i=0;i<n;i++)
	{
		cout<<a[i]<<" ";
   }
}
int main()
{
	int a[]={89,45,35,8,12,2};
	int n=sizeof(a)/sizeof(a[0]);
	cout<<"Before sorting array elements are -\n";
	printArr(a,n);
	insert(a,n);
	cout<<"\nAfter sorting array elements are - \n";
	printArr(a,n);
	return 0;
}
```

**********Output**********



****

Q3) Selection Sort.

```
#include<iostream>
using namespace std;
void insert(int arr[],int n)
{
	int i,j,small;
	for(i=0;i<n-1;i++)
	{
		small=i;
		for(j=i+1;j<n;j++)
		if(arr[j] < arr[small])
		small=j;
		int temp=arr[small];
		arr[small]=arr[i];
		arr[i]=temp;
	}
}
void printArr(int a[],int n)
{
	int i;
	for(i=0;i<n;i++)
	{
		cout<<a[i]<<" ";
   }
}
int main()
{
	int a[]={80,10,29,11,8,30,15};
	int n=sizeof(a)/sizeof(a[0]);
	cout<<"Before sorting array elements are -\n";
	printArr(a,n);
	insert(a,n);
	cout<<"\nAfter sorting array elements are - \n";
	printArr(a,n);
	return 0;
}
```

**********Output**********

```
D:\Chetan Data structure\selection sort.exe
Before sorting array elements are -
80 10 29 11 8 30 15
After sorting array elements are -
8 10 11 15 29 30 80
--------------------------------
Process exited after 0.2016 seconds with return value 0
Press any key to continue . . .
```

****

Q4) Quick Sort.

```
#include<iostream>
using namespace std;
int partition (int a[], int start, int end)
{
   int pivot = a[end]; // pivot element
   int i = (start - 1);

   for (int j = start; j <= end - 1; j++)
   {
      // If current element is smaller than the pivot
      if (a[j] < pivot)
      {
         i++; // increment index of smaller element
         int t = a[i];
         a[i] = a[j];
         a[j] = t;
      }
   }
   int t = a[i+1];
   a[i+1] = a[end];
   a[end] = t;
   return (i + 1);
}

void quick(int a[], int start, int end)
{
   if (start < end)
   {
      int p = partition(a, start, end);
      quick(a, start, p - 1);
      quick(a, p + 1, end);
   }
}

void printArr(int a[], int n)
{
   int i;
   for (i = 0; i < n; i++)
      cout<<a[i]<< " ";
}
int main()
{
   int a[] = { 23, 8, 28, 13, 18, 26 };
   int n = sizeof(a) / sizeof(a[0]);
   cout<<"Before sorting array elements are - \n";
   printArr(a, n);
   quick(a, 0, n - 1);
   cout<<"\nAfter sorting array elements are - \n";
```

```
    printArr(a, n);

    return 0;
}
```

**********Output**********

```
D:\Chetan Data structure\quick sort.exe
Before sorting array elements are -
23 8 28 13 18 26
After sorting array elements are -
8 13 18 23 26 28
--------------------------------
Process exited after 0.1414 seconds with return value 0
Press any key to continue . . .
```

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Assignment No-5

Name – Chetan Gundurao Jagatap **Roll No -**
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Q) Linear Search.

```
#include<iostream>
using namespace std;
int linearSearch(int a[],int n,int val)
{
	//Going through array linear
	for(int i=0;i<n;i++)
	{
		if(a[i]==val)
		return i+1;
	}
	return 1;
}
int main()
{
	int a[]={69,39,29,10,56,40,24,13,51}; //Given array
	int val=56; //value to be searched
	int n=sizeof(a)/sizeof(a[0]);
	int res=linearSearch(a,n,val);
	cout<<"The element of the array are -";
	for(int i=0;i<n;i++)
	cout<<a[i]<<" ";
	cout<<"\n Element to be searched is -"<<val;
	if(res==1)
	cout<<"\n Element is not present in the array";
	return 0;
}
```

**********Output**********

D:\Chetan Data structure\linear search.exe

```
The element of the array are -69 39 29 10 56 40 24 13 51
 Element to be searched is -56
--------------------------------
Process exited after 0.1616 seconds with return value 0
Press any key to continue . . .
```

****

Q2) Binary Search.

```
#include<iostream>
using namespace std;
int BinarySearch(int a[],int beg,int end,int val)
{
	int mid;
	if(end>=beg)
	{
		mid=(beg+end)/2;
		if(a[mid]==val)
		{
			return mid+1;
		}
		else if
		{
			return BinarySearch(a,mid+1,end,val);
		}
		else
		{
			return BinarySearch(a,beg,mid-1,val);
		}
	}
	return 1;
}
int main()
{
	int a[]={10,12,24,29,39,40,51,56,70};
	int val=51;
	int n=sizeof(a)/sizeof(a[0]);
	int res=BinarySearch(a,0,n-1,val);
	cout<<a[i]<<" ";
	cout<<"\n Element to be searched is -"<<val;
	if(res==1)
	cout<<"\n Element is not present in the array";
	return 0;
}
```

**********Output**********

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Assignment No-6

Name – Chetan Gundurao Jagatap **Roll No -**
Class –B.Sc II **Date - / /**
Signature -

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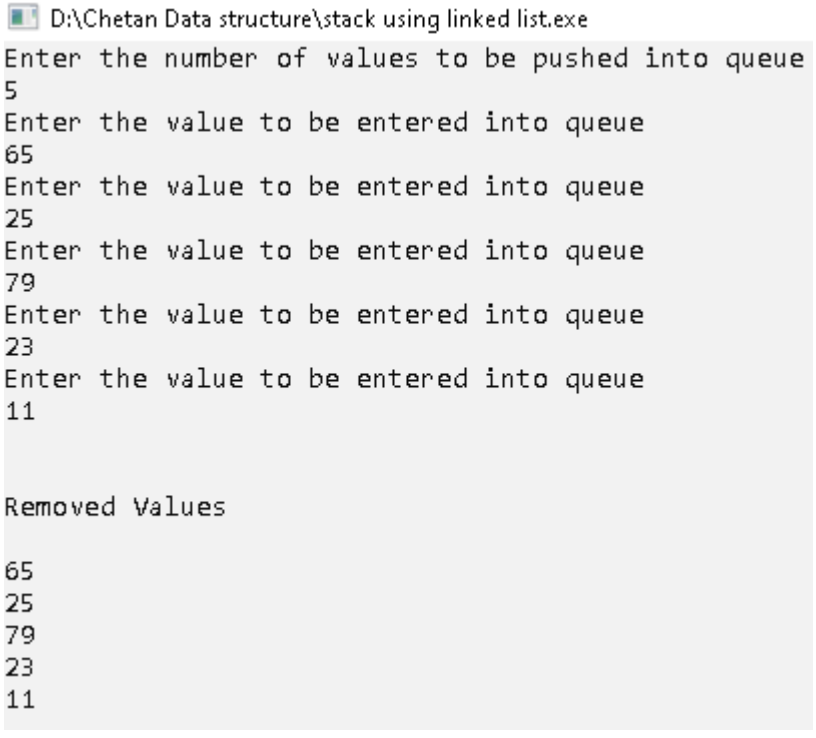
Q1)Implementation and operations of stack using linked list.

```
#include<iostream>
#include<stdio.h>
#include<conio.h>
using namespace std;
struct node
{
int data;
node *next;
}*front = NULL, *rear = NULL, *p = NULL, *np = NULL;
void push(int x)
{
np = new node;
np->data = x;
np->next = NULL;
if(front == NULL)
   {
front = rear = np;
rear->next = NULL;
   }
else
   {
rear->next = np;
rear = np;
rear->next = NULL;
   }
}
int remove()
{
int x;
if (front == NULL)
   {
cout<<"empty queue\n";
   }
else
   {
      p = front;
      x = p->data;
front = front->next;
delete(p);
return(x);
   }
}
```

```
int main()
{
int n, c = 0, x;
cout<<"Enter the number of values to be pushed into queue\n";
cin>>n;
while (c < n)
   {
        cout<<"Enter the value to be entered into queue\n";
        cin>>x;
push(x);
c++;
   }
cout<<"\n\nRemoved Values\n\n";
while(true)
   {
if (front != NULL)
cout<<remove()<<endl;
        else
        break;
   }
getch();
}
```

**********Output**********



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Assignment No-7

Name – Chetan Gundurao Jagatap **Roll No -**
Class –B.Sc II **Date - / /**
Signature -

****

Q1) Implementation & operation of binary tree using array.

```
#include<bits/stdc++.h>
using namespace std;
char tree[10];
int rootnode(char key){
	if(tree[0]!='\0')
	cout<<"Tree already had root";
	else
	tree[0]=key;
	return 0;
}
int leftchild(char key,int parent){
	if(tree[parent]=='\0')
	cout<<"\nCan't set child at"<<(parent*2)+1<<",no parent found";
	else
	tree[(parent*2)+1]+key;
	return 0;
}
int rightchild(char key,int parent){
	if(tree[parent]=='\0')
	cout<<"\nCan't set child at"<<(parent*2)+2<<",no parent found";
	else
	tree[(parent*2)+2]=key;
	return 0;
}
int traversetree(){
	cout<<"\n";
	for(int i=0;i<10;i++){
		if(tree[i]!='\0')
		cout<<tree[i];
		else
		cout<<"-";
	}
	return 0;
}
int main(){
	rootnode('A');
	rightchild('C',2);
	leftchild('D',0);
	rightchild('E',1);
	rightchild('F',2);
	traversetree();
```

```
    return 0;
}
```

**********Output**********


```
Can't set child at6,no parent found
Can't set child at4,no parent found
Can't set child at6,no parent found
A---------
--------------------------------
Process exited after 0.178 seconds with return value 0
Press any key to continue . . .
```

****

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Assignment No-8

Name – Chetan Gundurao Jagatap **Roll No -**
Class –B.Sc II **Date - / /**
Signature -

****

Q1) Implementation & operation on circular linked list.

```
#include<stdio.h>
#include<stdlib.h>
struct node
{
int info;
struct node* next;
};
struct node* last=NULL;
void insertAtFront()
{
int data;
struct node* temp;
temp=(struct node*)malloc(sizeof(struct node));

printf("\nEnter data to be inserted: \n");
scanf("%d", &data);

if (last==NULL) {
temp->info = data;
temp->next = temp;
last=temp;
   }

else {
temp->info = data;
temp->next = last->next;

last->next = temp;
   }
}

void viewList()
{

if(last==NULL)
printf("\nList is empty\n");

else {
struct node* temp;
temp = last->next;

do {
```

```
printf("\nData = %d", temp->info);
temp = temp->next;
   }
         while (temp != last->next);
   }
}
int main()
{
insertAtFront();
insertAtFront();
insertAtFront();

viewList();

return 0;
}
```

**********Output**********


D:\Chetan Data structure\operation on circular linked list.exe

```
Enter data to be inserted:
13

Enter data to be inserted:
45

Enter data to be inserted:
86

Data = 86
Data = 45
Data = 13
--------------------------------
Process exited after 13.54 seconds with return value 0
Press any key to continue . . .
```

****