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➢ Laboratory *Assignment #4*

Write menu driven program to perform following operations using functions:

A.IMPLEMENTATION OF STACK OPERATIONS LIKE PUSH(), POP(), ISEMPTY(), ISFULL() USING ARRAY

Ans:

```
#include<stdio.h>
#include<stdlib.h>
#define MAX 5
int stack[MAX];
int top=-1;
int isFull(){
 if(top == MAX-1){
return 1;
 }
 else
 return 0;
}
void push(int x) {
 if(isFull() == 1) {
 printf("\n Stack is full");
return;
 }
 stack[++top] = x;
}
int isEmpty(){
 if(top == -1){
```

```
return 1;
 }
 else
 return 0;
}
int pop(void){
 int x;
 if(isEmpty() == 1){
printf("\n Stack is empty");
return -1;
 }
 x = stack[top--];
 return x;
}
int peek(void){
 int x;
 if(top == -1){
printf("\n Stack is empty");
return -1;
 }
 x = stack[top];
 return x;
}
void display(){
int i;
for(i=top;i>=0;i--){
printf("\n %d",stack[i]);
```

```
}
}
int main(){
int x, ch;
while(1){
printf("\n Press 1 to push an element");
printf("\n Press 2 to pop an element");
printf("\n Press 3 to peek an element");
printf("\n Press 4 to display stack");
printf("\n Press 5 to exit");
printf("\n ENTER THE OPERATION : ");
scanf("%d",&ch);
switch(ch){
case 1: printf("\n Enter an element to be pushed:");
scanf("%d",&x);
push(x);
break;
case 2: x = pop();
if(top>=-1 && x!=-1){
printf("\n The popped element is %d",x);
}
break;
 case 3: x = peek();
 if(top>=-1 && x!=-1){
printf("\n The top element is %d",x);
}
break;
```

```
case 4: display();
break;
case 5: exit(0);
}
}
}
```

OUTPUT =>

```
Press 1 to push an element
Press 2 to pop an element
Press 3 to peek an element
Press 4 to display stack
Press 5 to exit
ENTER THE OPERATION : 1
Enter an element to be pushed:10
Press 1 to push an element
Press 2 to pop an element
Press 3 to peek an element
Press 4 to display stack
Press 5 to exit
ENTER THE OPERATION : 1
Enter an element to be pushed:20
Press 1 to push an element
Press 2 to pop an element
Press 3 to peek an element
Press 4 to display stack
Press 5 to exit
ENTER THE OPERATION : 1
```

Enter an element to be pushed:30

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 1

Enter an element to be pushed:40

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 1

Enter an element to be pushed:50

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 1

Enter an element to be pushed:60

Stack is full

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 4

50

40

30

20

10

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 3

The top element is 50

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 50

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 40

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 30

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 20

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 10

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

Stack is empty

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 5

Process exited after 75.84 seconds with return value 0

Press any key to continue . . .

B.IMPLEMENTATION OF STACK OPERATIONS LIKE PUSH(), POP(), ISEMPTY(), ISFULL() USING STRUCTURE

Ans:

```
#include<stdio.h>
#include<stdlib.h>
#define MAX 5
struct stk {
 int stack[MAX];
 int top;
};
struct stk ST;
int isFull(){
```

```
if(ST.top == MAX-1)
 return 1;
else
return 0;
}
void push(int x) {
if(isFull(ST)==1){
printf("\n Stack is Full");
return;
}
ST.stack[++ST.top] = x;
}
int isEmpty(struct stk ST) {
if(ST.top == -1)
return 1;
else
return 0;
}
int pop() {
int x;
if(isEmpty(ST) == 1){
printf("\n Stack is Empty");
return -1;
}
```

```
x = ST.stack[ST.top--];
return x;
}
int peek() {
int x;
if(isEmpty(ST) == 1){
printf("\n Stack is Empty");
return -1;
}
x = ST.stack[ST.top];
return x;
}
void display() {
int i;
for(i = ST.top;i>=0;i--){
printf("\n %d",ST.stack[i]);
}
}
int main(){
int x, ch;
ST.top = -1;
while(1){
printf("\n Press 1 to push an element");
printf("\n Press 2 to pop an element");
```

```
printf("\n Press 3 to peek an element");
printf("\n Press 4 to display stack");
printf("\n Press 5 to exit");
printf("\n ENTER THE OPERATION : ");
scanf("%d",&ch);
switch(ch){
case 1: printf("\n Enter an element to be pushed:");
scanf("%d",&x);
push(x);
break;
case 2: x = pop(ST);
if(ST.top>=-1 && x!=-1)
printf("\n The popped element is %d",x);
break;
case 3: x = peek(ST);
if(top>=-1 && x!=-1)
printf("\n The top element is %d",x);
break;
case 4: display(ST);
break;
case 5: exit(0);
}
}
}
```

OUTPUT =>

```
Press 1 to push an element
Press 2 to pop an element
Press 3 to peek an element
Press 4 to display stack
Press 5 to exit
ENTER THE OPERATION : 1
Enter an element to be pushed:10
Press 1 to push an element
Press 2 to pop an element
Press 3 to peek an element
Press 4 to display stack
Press 5 to exit
ENTER THE OPERATION : 1
Enter an element to be pushed:20
Press 1 to push an element
Press 2 to pop an element
Press 3 to peek an element
Press 4 to display stack
Press 5 to exit
ENTER THE OPERATION : 1
Enter an element to be pushed:30
Press 1 to push an element
Press 2 to pop an element
Press 3 to peek an element
Press 4 to display stack
Press 5 to exit
```

ENTER THE OPERATION : 1

Enter an element to be pushed:40

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 1

Enter an element to be pushed:50

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 1

Enter an element to be pushed:60

Stack is full

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 4

50

40

30

20

10

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 3

The top element is 50

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 50

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 40

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 30

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 20

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 10

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

Stack is empty

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

```
Press 5 to exit
ENTER THE OPERATION : 5
--------------------------------
Process exited after 86.94 seconds with return value 0
Press any key to continue . . .
```

C.IMPLEMENTATION OF STACK OPERATIONS LIKE PUSH(), POP(), ISEMPTY(), ISFULL() USING STRUCTURE POINTERS.

Ans:

```
#include<stdio.h>
#include<stdlib.h>
#define MAX 5
struct stk {
 int stack[MAX];
 int top;
};
int isFull(struct stk *ST){
if(ST->top == MAX-1)
 return 1;
else
return 0;
}
void push(struct stk *ST, int x) {
if(isFull(ST)==1){
printf("\n Stack is Full");
```

```
return;
}
ST->stack[++ST->top] = x;
}
int isEmpty(struct stk *ST) {
if(ST->top == -1)
return 1;
else
return 0;
}
int pop(struct stk *ST) {
int x;
if(isEmpty(ST) == 1){
printf("\n Stack is Empty");
return -1;
}
x = ST->stack[ST->top--];
return x;
}
int peek(struct stk *ST) {
int x;
if(isEmpty(ST) == 1){
printf("\n Stack is Empty");
return -1;
}
x = ST->stack[ST->top];
return x;
```

```
}
void display(struct stk *ST) {
int i;
for(i = ST->top;i>=0;i--){
printf("\n %d",ST->stack[i]);
}
}
int main(){
int x, ch;
struct stk *ST;
ST = (struct stk *)malloc(sizeof(struct stk));
ST->top = -1;
while(1){
printf("\n Press 1 to push an element");
printf("\n Press 2 to pop an element");
printf("\n Press 3 to peek an element");
printf("\n Press 4 to display stack");
printf("\n Press 5 to exit");
printf("\n ENTER THE OPERATION : ");
scanf("%d",&ch);
switch(ch){
case 1: printf("\n Enter an element to be pushed:");
scanf("%d",&x);
push(ST, x);
break;
case 2: x = pop(ST);
if(ST->top>=-1 && x!=-1)
```

```
printf("\n The popped element is %d",x);
break;
 case 3: x = peek(ST);
 if(top>=-1 && x!=-1){
printf("\n The top element is %d",x);
}
break;
case 4: display(ST);
break;
case 5: exit(0);
}
}
}
```

OUTPUT =>

```
Press 1 to push an element
Press 2 to pop an element
Press 3 to peek an element
Press 4 to display stack
Press 5 to exit
ENTER THE OPERATION : 1
Enter an element to be pushed:10
Press 1 to push an element
Press 2 to pop an element
Press 3 to peek an element
Press 4 to display stack
Press 5 to exit
ENTER THE OPERATION : 1
```

Enter an element to be pushed:20

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 1

Enter an element to be pushed:30

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 1

Enter an element to be pushed:40

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 1

Enter an element to be pushed:50

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 1

Enter an element to be pushed:60

Stack is full

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 4

50

40

30

20

10

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 3

The top element is 50

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 50

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 40

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 30

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 20

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

The popped element is 10

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 2

Stack is empty

Press 1 to push an element

Press 2 to pop an element

Press 3 to peek an element

Press 4 to display stack

Press 5 to exit

ENTER THE OPERATION : 5

Process exited after 101.11 seconds with return value 0

Press any key to continue . . .