13.Write a C program for stack implementation of Shift Reduce parser.

```
//Including Libraries
#include<stdio.h>
#include<stdlib.h>
#include<string.h>

//Global Variables
int z = 0, i = 0, j = 0, c = 0;

// Modify array size to increase
// length of string to be parsed
char a[16], ac[20], stk[15], act[10];

// This Function will check whether
// the stack contain a production rule
// which is to be Reduce.
// Rules can be E->2E2 , E->3E3 , E->4
void check()
{
        // Copying string to be printed as action
        strcpy(ac,"REDUCE TO E -> ");

        // c=length of input string
        for(z = 0; z < c; z++)
        {
                //checking for producing rule E->4
                if(stk[z] == '4')
        {
            printf("%s4", ac);
            stk[z] = 'E';
            stk[z + 1] = '\0';

            //printing action
            printf("\n$%s\t%s$\t", stk, a);
        }
    }

    for(z = 0; z < c - 2; z++)
    {
        //checking for another production
        if(stk[z] == '2' && stk[z + 1] == 'E' &&
                                    stk[z + 2] == '2')
        {
            printf("%s2E2", ac);
            stk[z] = 'E';
            stk[z + 1] = '\0';
            stk[z + 2] = '\0';
            printf("\n$%s\t%s$\t", stk, a);
            i = i - 2;
        }

    }

    for(z=0; z<c-2; z++)
    {
        //checking for E->3E3
        if(stk[z] == '3' && stk[z + 1] == 'E' &&
                                    stk[z + 2] == '3')
        {
            printf("%s3E3", ac);
            stk[z]='E';
            stk[z + 1]='\0';
            stk[z + 1]='\0';
            printf("\n$%s\t%s$\t", stk, a);
            i = i - 2;
        }
    }
    return ; //return to main
}

//Driver Function
int main()
{
    printf("GRAMMAR is -\nE->2E2 \nE->3E3 \nE->4\n");

    // a is input string
    strcpy(a,"32423");

    // strlen(a) will return the length of a to c
    c=strlen(a);

    // "SHIFT" is copied to act to be printed
    strcpy(act,"SHIFT");

    // This will print Labels (column name)
    printf("\nstack \t input \t action");

    // This will print the initial
    // values of stack and input
```

```
printf("\n$\t%s$\t", a);

// This will Run upto length of input string
for(i = 0; j < c; i++, j++)
{
        // Printing action
        printf("%s", act);

        // Pushing into stack
        stk[i] = a[j];
        stk[i + 1] = '\0';

        // Moving the pointer
        a[j]=' ';

        // Printing action
        printf("\n$%s\t%s$\t", stk, a);

        // Call check function ..which will
        // check the stack whether its contain
        // any production or not
        check();
}

// Rechecking last time if contain
// any valid production then it will
// replace otherwise invalid
check();

// if top of the stack is E(starting symbol)
// then it will accept the input
```

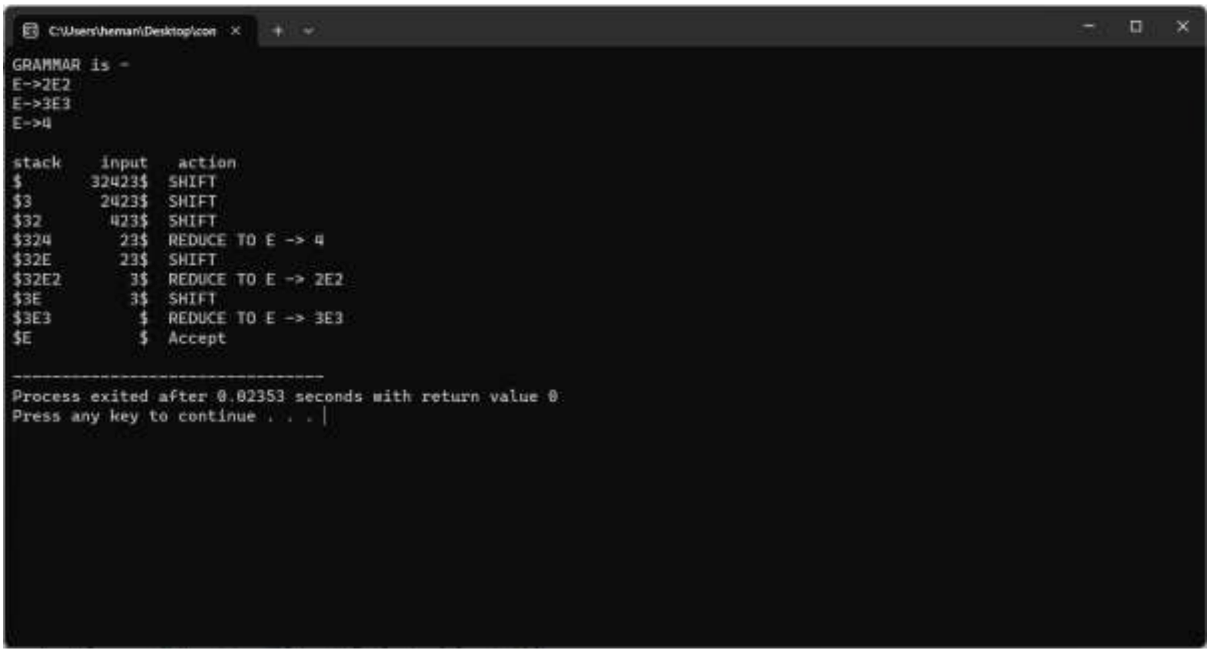
```
	if(stk[0] == 'E' && stk[1] == '\0')

		printf("Accept\n");

	else //else reject

		printf("Reject\n");

}
```



```
GRAMMAR is -
E->2E2
E->3E3
E->4

stack    input   action
$       32423$  SHIFT
$3       2423$  SHIFT
$32       423$  SHIFT
$324       23$  REDUCE TO E -> 4
$32E       23$  SHIFT
$32E2       3$  REDUCE TO E -> 2E2
$3E         3$  SHIFT
$3E3         $  REDUCE TO E -> 3E3
$E           $  Accept

--------------------------------
Process exited after 0.02353 seconds with return value 0
Press any key to continue . . .
```