13. Write a C program to implement either Top Down parsing technique or Bottom Up Parsing technique to check whether the given input string is satisfying the grammar or not?

#include <stdio.h>

#include <string.h>

#include <stdlib.h>

#define MAX 100

char stack[MAX];

int top = -1;

void push(char c) {

if (top < MAX - 1) {

stack[++top] = c;

}

}

void pop() {

if (top >= 0) {

top--;

}

}

void displayStack() {

for (int i = 0; i <= top; i++) {

printf("%c", stack[i]);

}

printf("\n");

}

int checkReduction() {

if (top >= 0 && stack[top] == 'i') {

stack[top] = 'E';

return 1;

}

else if (top >= 2 && stack[top] == ')' && stack[top - 2] == '(' && stack[top - 1] == 'E') {

top -= 2;

stack[top] = 'E';

return 1;

}

else if (top >= 2 && stack[top] == 'E' && (stack[top - 1] == '+' || stack[top - 1] == '\*') && stack[top - 2] == 'E') {

top -= 2;

stack[top] = 'E';

return 1;

}

return 0;

}

void shiftReduceParser(char \*input) {

int i = 0;

while (i < strlen(input)) {

push(input[i]);

displayStack();

i++;

while (checkReduction()) {

displayStack();

}

}

if (top == 0 && stack[top] == 'E') {

printf("Accepted: The input string follows the grammar.\n");

} else {

printf("Rejected: The input string does not follow the grammar.\n");

}

}

int main() {

char input[MAX];

printf("Enter the input string (without spaces, use 'i' for id): ");

scanf("%s", input);

shiftReduceParser(input);

return 0;

}

