Ahsanullah University of Science and Technology
Department of Computer Science and Engineering
Final Online Assessment
Session: Spring 2020 Course No: CSE4130
Course Title: Formal Languages and Compilers Lab
Year/Sems: 4/1 ID: 170104004

Question-1: Write a program to read a C program as input and find out the user defined functions in the program along with the line number. You must write the output as [*Function Name: Line Number*] in a file and display the output on console reading from the file.

Sample Input	Sample Output

#include<stdio.h>
void func()
{
}
int main(void)
{
int a, b;
printf("");
func();
scanf("");
return 0;
}
	func: Line No 2
	main: Line No 5

Answer:

```
/* Name: Umme Habiba ID:170104004 Lab Group:A1

Course No: CSE4130 Final Online Assessment, Spring 2020

*/

#include<stdio.h>

#include<string.h>

#include<stdlib.h>

FILE *f1,*f2;
```

```
char c,lex[10];
int ln=1,line,i,j,countIf=0,opening_brace=0,closing_brace=0;
int k;
void addLineNumber(){
   char  lna[10];
   int x;
   f1 = fopen("input.c", "r");
   f2 = fopen("output.txt", "w");
   if(!f1)
     printf("\nFile can't be opened!");
   else{
      while((c = fgetc(f1)) != EOF) {
         itoa(ln, lna, 10);
         for(x=0; x < strlen(lna); x++)
            fputc(lna[x], f2);
         fputc(' ', f2);
         while(c!='\n') {
            fputc(c, f2);
            c = fgetc(f1);
         }
         fputc('\n', f2);
         ln++;
}
   }
   fclose(f1);
```

```
    fclose(f2);
    f2=fopen("output.txt","r");
    fclose(f2);
}
void func(){
    f1 = fopen("input.c", "r");
    if(f1 == NULL) {
        printf("No such file\n");
        exit(1);  }
    else{
       printf("%s ",__func__);
    }
    fclose(f1);
}
void find(){
    ln=1;
    f1=fopen("output.txt","r");
    f2=fopen("output3.txt","w");
    fprintf(f2,"%d :",ln);
    if(!f1)
        printf("File can't be opened");
    else{
        while((c=fgetc(f1))!=EOF) {
            if(c=='\n') {
                ln++;
```

```
            fprintf(f2,"\n%d :",ln);
        }
        else{
            if(c=='(') {
                opening_brace++;
            }
            if(c==')') {
                closing_brace++;
                    printf(": Line no %d \n",ln);
            }
            fprintf(f2,"%c",c);
        }
      }
   }
   fclose(f1);
   fclose(f2);
}
int main(){
   addLineNumber();
   func();
   find();
   printf("%s ",__func__);
}
```

Question-2: Design a recursive-descent parser for the following grammar and mention some strings (at least one from each production rule) from the language generated by the grammar.

$$E \rightarrow aA \mid bAB$$
$$A \rightarrow b \mid bA$$
$$B \rightarrow a \mid \varepsilon$$

Answer:

```
/* Name:Umme Habiba ID:170104004 Lab Group:A1

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*/

#include<stdio.h>

#include<string.h>

void E(void);

void A(void);

void B(void);

char str[10];

int f=0;

int i=0;

int l;

int main(void) {

   printf("\nCFG:\n");

   printf("\n\tE -> aA | bAB\n\tA -> b | bA\n\tB -> a | E\n");

   printf("\nEnter a string to parse: ");

   scanf("%s", str);

   l = strlen(str);

   if (l>=1)  E();
```

```
    else
        printf("\nInvalid String\n");
    if (l == i && f )
        printf("\nValid String\n");
    else
        printf("\nInvalid String\n");
    return 0;
}
void E(){
    if (str[i] == 'a') {
        i++;
        f=1;
        A();
    }
    else if(str[i]=='b') {
        i++;
        f=1;
        A();
        B();
    }
    else{
        f=0;
    }
}
void A(){
```

```
    if (str[i] == 'b') {
        i++;
        f=1;
        if(i<l) {
            A();
        }
        return;
    }
    else{
        f=0;
        return;
    }
}
void B(){
    if (str[i] == 'a') {
        i++;
        f=1;
        if(i<l-1) {
            f=0;
        }
    }
    else{
        f=0;
        return;
    }}
```