# Question 1

## Part a

## FIRST()

Symbol	FIRST() set
\$	\$
d	d
a	a
b	b
$\mathbf{c}$	$\mathbf{c}$
S	d, b, c, a,
A	a,
В	b, c
S'	d, b, c, a,

## FOLLOW()

Symbol | FOLLOW() set — |— S' |  $\$  S |  $\$  A | d, a,  $\$  B | a,  $\$ 

## Part B

## FIRST()

Symbol	FIRST() set
a	a
b	b
c S'	$\mathbf{c}$
S'	a
S	a
A	a, b
В	a,
$\mathbf{C}$	b,
D	c,

#### FOLLOW()

```
Symbol | FOLLOW() set —
|— S' | # S | a A | a,b,c B | a C | b,c D | c
```

## Question 2

```
main(){
 get-token();
 call block();
 if(token!="$")
    Error;
 }
 else{
    SUCCESS;
}
block(){
    if(token != "begin")
    throw_error();
    else{
    get-token();
    call decls();
    }
}
decls(){
    while(token=="D"){
        get_token();
    }if(token == ";"){
    call decls();
    }else{
```

```
if(token==""){
        get-token();
        call stmts();
    }else{
    throw_error();
    }
    }
}
stmts(){
    while(token!=";"){
        get_token();
        call statement();
    }
    if(token==""){
        get-token();
    }else{
    throw_error();
}
statement(){
    if(token == "begin"){
        call stmts();
    else if(token == "end"){
        get-token();
    }
    else if(token == "if"){
        get-token();
    }
    else if(token == "while"){
        get-token();
    else if(token == "ass"){
        get-token();
    else if(token == "scan"){
        get-token();
```

```
}
else if(token == "print"){
    get-token();
}
else if(token != "" || ";"){
    throw_error();
}
}
```

# Question 3

$$S' -> S \$ 1 \\ S -> iCSE 2 \mid a \ 3 \\ E -> eS \ 4 \mid \ 5 \\ C -> c \ 6$$

Symbols	FIRST() set
S	i, a
E	e,
$\mathbf{C}$	$\mathbf{c}$
S'	i, a

Symbols	FOLLOW() set
S'	\$
S	e, \$
$\mathbf{E}$	e, \$
$\mathbf{C}$	i, a

$VN\backslash VT$	i	a	e	$\mathbf{c}$	\$
S'	1	1			
S	2	3			
$\mathbf{E}$			4,5		5
С				6	

There is a conflict, this table is not  $\mathrm{LL}(1)$ 

b. S -> iCSE | a becomes S -> iCSEd | a

$\overline{\mathrm{VN} \backslash \mathrm{VT}}$	i	a	e	c	d	\$
<u>S</u> '	1	1				
S	2	3				
E			4		5	
$\mathbf{C}$				6		