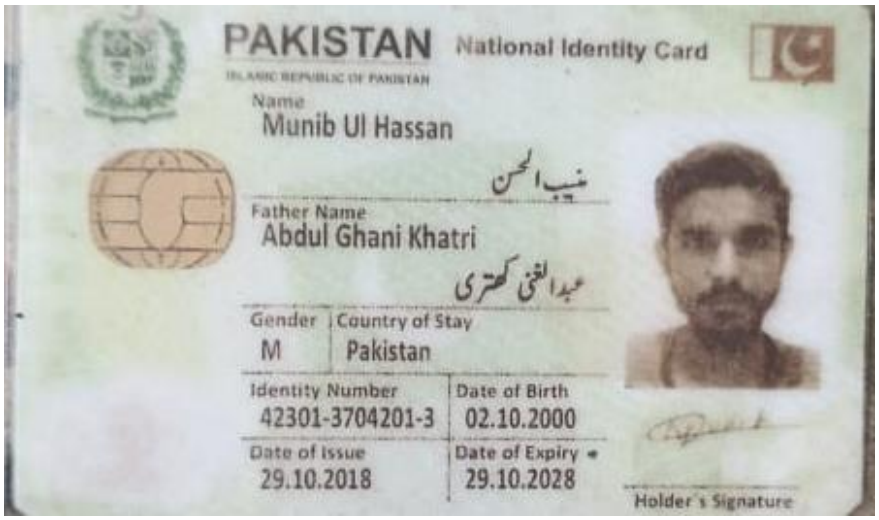
# Sir Syed University of Engineering & Technology

ANSWER SCRIPT

| | |
|---|---|
| Date: | June 15,2021 |
| Roll Number: | CS19-037 |
| Section: | A |
| Name: | Munib ul Hassan |
| Course Name: | CS-310: Compiler Construction |
| Degree Program: | BSCS |
| Total number of pages being submitted: | 7 |

**Answer 01(a):**

**CODE:**

```
#include <stdio.h>

int main(void) {

int Per; printf("Enter Per : ");

scanf("%d",&Per);

if(Per >= 50)

printf("\nResult is pass");

else printf("\nResult is fail")

; return 0;
```

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace Marksheet1
{
   class Program
   {
      static void Main(string[] args)
      {
         int r, m1, m2, m3, t;
         float p;
         string n;
         Console.WriteLine("Enter Roll Number :");
         r = Convert.ToInt32(Console.ReadLine());
         Console.WriteLine("Enter Student Name :");
         n = Console.ReadLine();
         Console.WriteLine("Mark of Subject1 : ");
         m1 = Convert.ToInt32(Console.ReadLine());
         Console.WriteLine("Mark of Subject2 : ");
         m2 = Convert.ToInt32(Console.ReadLine());
         Console.WriteLine("Mark of Subject3 : ");
         m3 = Convert.ToInt32(Console.ReadLine());
```

```
            t = m1 + m2 + m3;
            p = t / 3.0f;
            Console.WriteLine("Total : " + t);
            Console.WriteLine("Percentage : " + p);
            if (p >= 35 && p < 50)
            {
               Console.WriteLine("Grade is C");
            }
            if (p >= 50 && p <= 60)
            {
               Console.WriteLine("Grade is B");
            }
            if (p > 60 && p <= 80)
            {
               Console.WriteLine("Grade is A");
            }
            if (p > 80 && p <= 100)
            {
               Console.WriteLine("Grade is A+");
            }
            Console.ReadLine();
        }
    }
}
```

**CFG**

**Program → Begin body  End**
**Body → Stmnts**
**Stmnts → Stmnt_List; stmnt | Stmnt_List | Ɛ**
**Stmnt_List → dec_Stmnt | Print_Stmnt | input_Stmnt | assign_Stmnt | loop_Stmnt | if_stmnt |cond_Stmnt| func_Smnt| return_stmnt**
**dec_Stmnt → dt var**
**func_Smnt → dt var (dec_stmnt) {stmnt ; return_stmnt}| dt var ( ) {stmnt ; return_stmnt}**
**return_stmnt → return (var) | return (null) | Ɛ**
**Print_Stmnt → Print val | Print String| Ɛ**
**Print val →  Cout<< var ;**
**Print str → Cout << str**
**Str → "text"**
**Text → id | num | sp-char**
**input_Stmnt → input val | Ɛ**
**assign_Stmnt → var = E**
**E → EAE | id | num**
**A → + | - | * | /**
**if_stmnt → if (cond_stmnt){stmnt}else {stmnt}**

**cond_Stmnt → id relop id | id relop num**
**loop_Stmnt → for_loop**
**for_loop → for (init ; cond_stmnt ; inc_dec){stmnts}**
**init → dt id = digit | id = digit**
**inc/dec → id++ | id-- | ++id | id + num | id – num**
**relop → < | > |<= | >= | != | ==**
**dt → int | void | float | char | double**
**id → var | var digit | var var**
**var → a|b|c**
**num → 0|1|2 … |9**
**sp-char → @ | / | \ | ***

**Answer 01(b):**

E → EAE | id | num

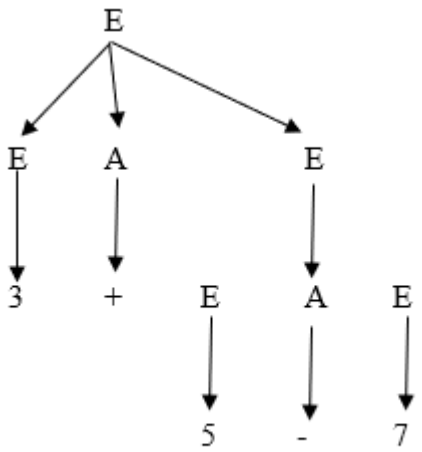
A → + | - | * | /

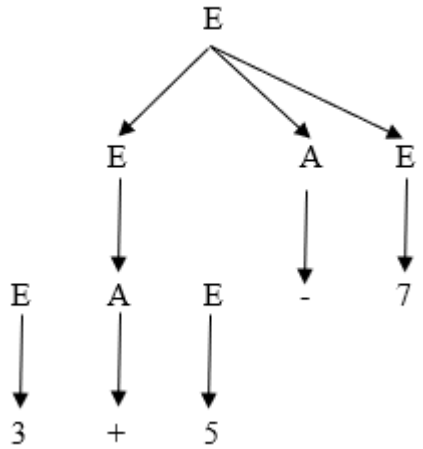
This is anbigous clause

Example:

Input string 3 + 5 – 7

**BY PARSE TREE:**



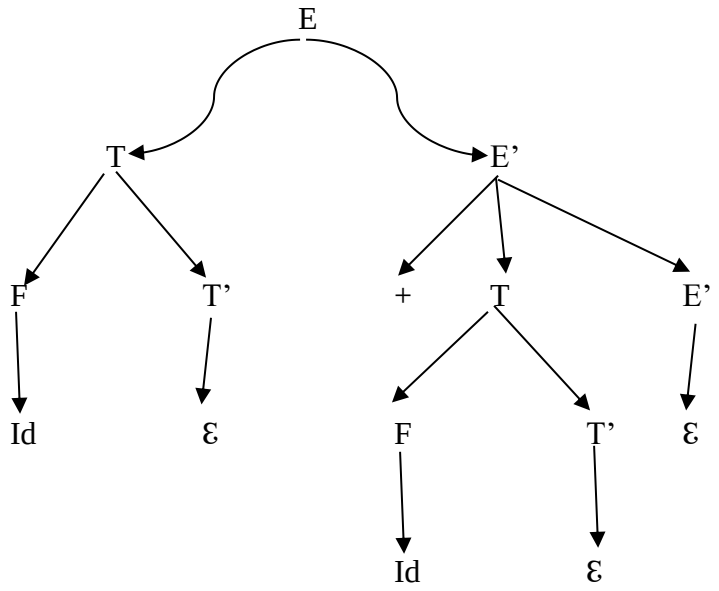




Two parse tree can be generated by this input string, therefore it is ambiguous grammer.

**Answer 02**

| Nonterminal | Nullable | First | Follow |
|---|---|---|---|
| S | X | (, id | |
| E | X | (, id | ), $ |
| E’ | X | +,37 | ), $ |
| T | X | (, id | +, 37 |
| T’ | X | * , 37 | +, 37 |
| F | X | (, id | * ,37 |

| | $ | + | 37 | * | ( | ) | Id |
|---|---|---|---|---|---|---|---|
| S | | | | | S ::= E$ | | S ::= E$ |
| E | | | | | E ::= TE’ | | E ::= TE’ |
| E’ | | E’ ::= + TE’ | E’ ::= 37 | | | | |
| T | | | | | T ::= FT’ | | T ::= FT’ |
| T’ | | | T’ ::= 37 | T’ ::=* FT’ | | | |
| F | | | | | F ::= (E) | | F ::= id |

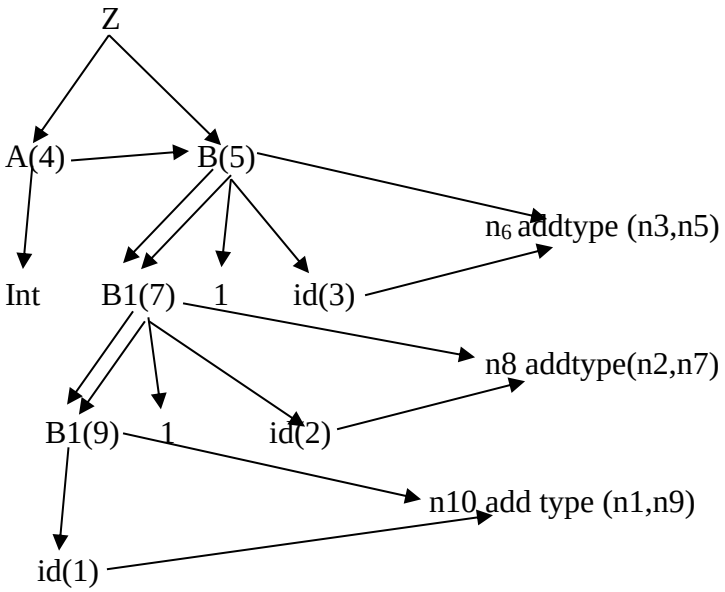



**Answer 03**

**PARSE TREE**

Z → AB
A → int
A → char
B → B1,id
B → id

Input String: Int 037




n1 = 0

n2 = 3

n3 = 7

n4 = int

n5 = n4

n6 = addtype(n3,n5)

n7 = n5

n8 = addtype(n2,n7)

n9 = n7

n10 = add type (n1,n9)

**Answer 04**

Rewriting the gramer
Start → Stmts n
Stmts → Stmts1 Detail
Stmts → Detail
Stmts → €
Detail → 0
Detail → 1
**SEMENTIC RULES:**

| PRODUCTION | SEMENTIC RULE |
|---|---|
| Start → Stmts n | Print {Stmts-val} |
| Stmts → Stmts1 Detail | Stmts.val := stmts1.val Detail.lexval |
| Stmts → Detail | Stmts.val := Detail.lexval |
| Stmts → € | Stmts.val := € |
| Detail → 0 | Detail.lecxval := 0 |
| Detail → 1 | Detail.lexval := 1 |

**Answer 05**

My RollNo is CS19-037

A = 0 + 3 + 7 = 10

My Date Of Birtth is October 02,2000

B = 0 + 2 + 1 + 0 + 2 + 0 + 0 + 0 = 5

a. pointer(Array(5….10 , Reals))
b. array [0-9][5-10]