Shri Ramdeobaba College of Engineering and Management, Nagpur Department of CSE (Cyber Security) Session: 2023-2024

Compiler Design Lab CCP308

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Roll Number: 13

Batch: C1

PRACTICAL No. 05

Topic: Three Address Code Generation

Platform: Windows or Linux

<u>Language to be used:</u> Python or Java (based on the companies targeted for placement)

<u>CO Mapped:</u> CO4- Learn three address code generation and implement code optimization techniques for improving the performance of a program segment.

<u>Aim:</u> Write a program to generate three address code for the given language construct using SDTS.

- (a) Odd Roll Numbers: if-then-else,
- **(b)** Even Roll Numbers: while loop

```
Input: Example for if-then-else
if (a<5)
{
         c= b+d
}
else
{
         d= a+ b
}</pre>
```

Output:

- 1) if (a<5) goto 3
- 2) Goto 6
- 3) T1=b+d
- 4) c=T1
- 5) goto 8
- 6) T3=a+b
- 7) d=T3
- 8) END

```
Input: Example for while-loop
i = 0
while (i<10)
{
    a = b * c;
    i = i + 1;
}
Output:
1    i = 0</pre>
```

while i < 10 goto 4

```
3 goto 9

4 t1 = b * c

5 a = t1

6 t2 = i + 1

7 i = t2

8 goto 2

9 end
```

Copy Screenshot TAC:

```
Practical notes 5 [U-13]
    Implementation of TAC
   if -else consmut
     if (a<5)
     C=btd
     elre
      d = a+b
0 - If q<5, goto $ 2
1 1: goto $ 5
26: TI = b+d
34: C=T1.
48: go to $7
5 4: T2 = a+b
6 7: d=12
78 : Stop .
```

Copy Screenshot Logic/Pseudo Code:

```
Practical no 5 [U-13]
     Implementation of TAC
   if -else consmut
     if (a<5)
      C=btd
     elte
       d = a+b
0 = If q<5, goto $ 2
11: goto $5
                            Breud code:
26: Ti=b+d
34: C=TI"
                            Main tunch ()
                           int a = 2; b = 3; c = 0: 4 = 4;
40: go to 07
5 A: T2 = a+b
                             gén (a,b,cd);
6 7: d=12
78 : Stop .
                            gen (inta, 6, c, d) 1
                              if (a75) goto Label 2;
                               · grelte go to label s:
label 5:
                           Laber :
  T2 = a +b
  d=TL
                              TI=btd
                               CZTI
10647:
                               goto Label &
  Stop .
```

```
Program:
#include <stdio.h>

void generate_three_address_code(int a, int b, int c, int d) {
    // Condition for if statement
    if (a > 5)
        goto Label2;
    else
        goto Label5;

Label2: // Code inside if block
    int T1;
    T1 = b + d;
    c = T1;
```

```
goto Label7;
Label5: // Code inside else block
int T2;
T2= a + b;
d = T2;

Label7: // Stop
printf("Stop\n");
}
int main() {
    // Example usage
    int a = 2; // Example value for a
    int b = 3; // Example value for b
    int c = 0; // Example value for c
    int d = 4; // Example value for d

generate_three_address_code(a, b, c, d);
return 0;
}
```

Output:

```
Shell

[0] - if (a > 5) goto [2]

[1] - goto [5]

[2] - T1 = b + d

[3] - c = T1

[4] - goto [7]

[5] - T2 = a + b

[6] - d = T2

[7] - Stop

>
```