



Reg. No. :

Name :

First Semester M.Tech. Degree Examination, March 2014
Branch : Computer Science and Engineering
RCC 1006 : ADVANCED COMPILER DESIGN

Time : 3 Hours

Max. Marks : 100

Instruction: Answer **any 5** questions. **All** questions carry **equal** marks.

1. a) Explain Symbol Table Management.
b) Which are the alternative forms of Medium Level Intermediate Representation (MIR) ? Explain with suitable example.
2. a) Write the data flow equations for live variable analysis. Perform Live variable analysis on the following code segment.

```
i = 1
j = 1
k = 0
L1 : if k < 100 goto L4
      if j < 20 goto L2
      i = 1 + i
      call p()
      k = k-j
      goto L3
L2 : j = k + 5
      k = k/2
L3 : goto L1
L4 : end
```

- b) Explain Partial Redundancy Elimination (PRE). Also explain the concept of edge splitting with respect to PRE.



3. a) Give the algorithm for Loop Invariant Code motion and transform the following code :

```
do i = 1, 100
    1 = i * n + 2
    do j = i, 100
        a(i, j) = 100 * n + 10 * 1 + j
    enddo
enddo
```

- b) Apply value numbering over the following code and give the transformed code.

```
c = a + b
d = e + f
g = d + b
h = a + b
e = c + b
h = a + b
```

4. a) Write a note on different types of low level optimization.

- b) Write the algorithm for unreachable code elimination and remove the unreachable code from the following code fragment.

```
c = a + b ;
d = c ;
if e < c goto L1
f = c - g ; b = c + 1 ; d = 4 * a ; e = d - 7
f = e + 2 ;
goto L1
L2 : f = a + c ;
    g = e ;
    j = b + d ;
    a = e + c ;
if e < a goto L2
L1 : end
```



5. Name the analysis required to perform register allocation. Do register allocation for the following code with 5 registers. Make necessary assumptions.

```
a = 2 ; b = 3
d = c ; c = a
g = c + 1 ;
if a < c goto L2
    d = d + 1 ; f = a + b ; g = e + g
goto L2
L1 : b = b + 1
d = 2 * d
if b < 10 goto L1
L2 : print (b, d, e, g)
```

6. Write the equation for dominance frontier of a node. After finding the dominance frontier for each node transform the following code to SSA form.

```
i = 1 ; j = 1 ; k = 0
L1 : if k < 100 goto L4
    if j < 20 goto L2
        i = 1 + i ; k = k - j ; goto L3
L2 : j = k + 5 ; k = k/2
L3 : goto L1
L4 : return j
```
