

Roll No: _____

CS6843 Program Analysis

MidSem March 1, 2017

Duration: 45 minutes

Answer in the same sheet.

1. Write the name of Tamilnadu Chief Minister. [1 mark]
2. For the following program, **write** intra-procedural path-sensitive points-to information. [4 marks]

```
1 main() {  
2   int x;  
3   int n;  
4   int *a = &x;  
5   int *b = &n;  
6   int *c = malloc(4);  
7   int **p = &a;  
8   int **q = &b;  
9   int i;  
  
10  scanf("%d", &i);  
11  if (i > 0) {  
12      *q = c;  
13      if (i < 100)  
14          a = *q;  
15      else  
16          *p = a;  
17  } else  
18      *p = b;  
19 }
```

3. For the above program, **compute Steensgaard's hierarchy**. Show only the final state. [4 marks]

4. If your analysis is tracking one bit each for conditions $y == 0$ and $x < 2$ and $y < 4$, **find the bit-values** after every statement below in a C program. Conservatively, each bit is set to 0. Your analysis does not have any other information, apart from that x and y are unsigned integers. The program strictly follows the C semantics. [4 marks]

```
{ 0 0 0 }  
y = 2;  
{ 0 0 1 }  
x = y / 2;  
{           }  
y = y - x;  
{           }  
y = y % 1;  
{           }  
x = ++y;  
{           }
```

5. **Construct a C example** wherein adding any one of the four sensitivities (path, context, field or flow) to an analysis would provide a different solution than the analysis which is insensitive in all four dimensions. Show the differences. [4 marks]

6. Recall replication-based parallel pointer analysis. Can you apply a similar parallelization to flow-sensitive live-variables analysis? **Explain.** [3 marks]