CS6235 Quiz 2 Exam: Apr 02 2025 (QP Code: A)

Maximum marks = 24, Time: 50.00 minutes

Name:	Roll:

• Write your roll number on the main answer book and all the additional sheets.

- There are two sections in the question paper.
 - Descriptive type: Answer the first three questions. The fourth question can be answered for bonus marks.
 - True or False: Each incorrect True/False answer will lead to a deduction of 0.5 mark.
- Start the answer to each question on a new page.
- Advise: work out each question separately and legibly.

Section 1. Descriptive type

1. Escape Analysis

- (a) Write the transfer functions for computing intra-procedural escape-analysis. [2 marks]
- (b) Write a Java application that show two uses of escape-analysis, and illustrate the uses. [2 marks].
- (c) How are points-to and escape analysis interdependent on each other? [2 marks]

2. **IR**.

- (a) Given a program (with N statements), how many nodes and edges be present in its PEG [2 marks].
- (b) Draw the PEG for the following Java program [4 marks].

```
class A extends Thread{
 Object f;
 public A(Object x) { f = x;}
 public static main(String[] args){
   Object o = new Object();
   x = new A(o);
   y = new A(o);
   x.start();
   y.start();
   synchronized(o) {
     o.notifyAll();
   }
   x.join();
   y.join();
 }
public void run(){
   S1:
   synchronized(f) { f.wait();
   S2;}
}
}
```

3. MHP analysis.

- (a) Write the iMHP-addAsync algorithm. [3 marks]
- (b) Argue the correctness of the algorithm, assuming that only finish and async constructs are present in the function. [3 marks]

4. Flow sensitivity.

Consider the snippet of Java code:

```
class A{
  A fld;
  void foo(){
    ... (optional) your code ...
    do {
        ... (optional) your code ...
        x=new A();
        ... (optional) your code ...
    } while (..);
    ... (optional) your code ...
}
```

Propose some code to be filled and illustrate using it why we cannot do strong-update even if we are doing flow-sensitive points-to analysis (like the ones discussed in the class) [4 marks]. What can we do support such strong-updates? [2 marks]

Section 2. True/False (1 mark each)

During the MHP analysis (Naumovich-Avrunin-Clarke-1999) $(OUT(n) \cap KILL(n))$ will always be empty.

If two statements have an HB relation between them, they may not happen in parallel.

_____ Given two statements S1 and S2, it is possible during static analysis that S1 depends on S2 and S2 depends on S1.

A unique CFG is created for each function.

In a program P, if a function is called from two different places, the PSG of P will have two entries for the body of the function.

____ A cycle in static resource allocation graph (RAG) implies that the program will lead to a deadlock.