

Name

Reg. No.

FIRST SEMESTER M.TECH DEGREE EXAMINATION, JANUARY 2014**MCS 10 104-COMPILER DESIGN****Time : Three Hours****Maximum 100 Marks****MODULE I**

1. a. What are the different phases of a compiler? Explain in detail the process of compilation. Illustrate the output of each phase of compilation for the input

$$"a = (b+c) * (b+c) * 2"$$
 (15)
 - b. What is the need for intermediate code representation? What are the different forms of intermediate code representations? (5)
2. a. What is symbol table? How it is implemented? Explain the structure of the symbol table in detail. (10)
 - b. What is LEX tool? Write a LEX program to recognize an arithmetic expression. (10)

MODULE II

3. a. Consider the following code in intermediate representation: (10)


```

Step1: int a, b, c;
Step2: a = 0;
Step3: c = 1;
Step4: L1:
Step5: b = a+1;
Step6: c = c+b;
Step7: a = b*2;
Step8: if(a < 10) goto L1;
Step9: return c;

```

 - i. Draw a control flow graph for the code.
 - ii. Which variables are live between steps 5 and 6?
 - iii. Which variables are live between steps 7 and 8?
 - iv. Define a data flow analysis that will determine, at each program point, and for each integer variable, whether the values that it holds may be positive, negative, zero, or some combination of these three. State any assumptions that you make.
- b. List out the basic assumptions of dataflow algorithms. How the segments are transformed using data flow analysis? (10)
4. a. Explain the framework of structure based data flow analysis. (10)
 - b. With example briefly discuss about the dependency analysis. (10)

Turn over

MODULE III

5. a. Consider the following code in intermediate representation: (10)
- ```

A: read a, b, c, d, e, f, g
B:a=b+c
C: b=f*g
E:c=d-a
 if(a < c) goto G
F:e=e+b
 goto C
G: if(b == f) goto I
H:f= 5*d
 if(f <= a) goto H
J:g=b+c
I: d = a - 6
 if(c > d) goto E
D: if(d <= a) goto B

```
- i. Identify the basic blocks, and draw a basic block graph.
  - ii. Draw the dominator tree for the basic block graph.
  - iii. Determine the dominance frontier for each node in the basic block graph.
- b. What is the need for redundancy elimination? Discuss the redundancy elimination with example. (10)
6. a. Discuss the need for loop optimization and procedure optimization. (10)
- b. Explain the different loop optimization techniques with example. (10)

**MODULE IV**

7. a. What is register allocation? List its importance. Explain the different register allocation approaches. (10)
- b. Explain the local and global instruction scheduling with example. (10)
8. a. Discuss about the interprocedural analysis and scheduling in detail. (10)
- b. What is DAG? How it is constructed? How it is useful in finding common sub expressions. (10)

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