

Total No. of Questions : 8]

SEAT No. :

P2061

[Total No. of Pages : 2

[5059] - 666

B.E. (Information Technology) (Semester - I)

MODERN COMPILERS (Elective - I)

(2012 Pattern)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data wherever necessary.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) a) Define callee-save and caller-save registers. How do the use of registers save time for programming languages? [6]

b) Draw control-flow graph for the given code. Find the live ranges of a, b, c. [6]

```
a = 0
L 1 : b = a + 1
c = c + b
a = b * 2
if a < N goto L1
return c
```

c) Explain reference counting for garbage collection. Discuss the problems with this technique using suitable example. [8]

OR

Q2) a) Describe tree operators for intermediate representation. [6]

b) Define Basic Block. What are the steps for converting a long sequence of statements into basic blocks? [6]

c) Explain copying garbage collection with a neat diagram. Write Cheney's algorithm and comment on its cost. [8]

Q3) a) Explain Higher-order functions and Functional programming language in brief. What are three flavors of Functional programming language? [6]

b) Explain call-by-name and call-by-need with respect to lazy evaluation. [6]

c) Explain tail position with suitable example. Write the steps to implement tail call. [6]

P.T.O.

OR

- Q4)** a) Define inline expansion. Explain the rules for inline expansion. [6]
b) What is Closure? How it can be implemented using Heap-allocation?[6]
c) What is meant by private field in programming language? What are various ways to support it in programming language? [6]

- Q5)** a) Explain Inter-procedural data-flow analysis in brief. Describe different functions for flow-insensitive side effect analysis. [8]
b) What are possible caches in a system ? Describe different approaches for instruction-cache optimization. [8]

OR

- Q6)** a) Differentiate between register allocation and assignment? Discuss different approaches for the same. [8]
b) What is inter-procedural optimization? Describe different kinds of inter-procedural optimizations. [8]

- Q7)** a) What are reasons for variable aliases? Explain variable aliases based on type and based on flow. [8]
b) What is reaching expressions and available expressions? Explain with suitable code. [8]

OR

- Q8)** a) Explain transformations using dataflow analysis using suitable examples.[8]
b) How to avoid repeated computation of dataflow information? [8]

