

Total No. of Questions : 8]

SEAT No. :

P2353

[Total No. of Pages : 2

**[5254] - 686**

**B.E. (Information Technology) (Semester - I)**  
**MODERN COMPILERS**  
**(2012 Pattern) (Elective - I)**

*Time : 2:30 hours]*

*[Max. Marks : 70]*

**Instructions to the candidates:**

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.

**Q1)** a) Draw a stack frame. Explain the concepts of static linking, display array, lambda lifting with respect to stack frame. [6]

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

c) What is incremental garbage collection? Describe tricolor marking. [8]

OR

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

b) What is a trace? Write the algorithm for traces generation. [6]

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

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

b) Explain different techniques for optimization of lazy functional programming. [6]

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

OR

**Q4)** a) Define inline expansion. Explain the rules for inline expansion. [6]

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

c) Discuss function - types for a simple functional language with a sample program. [6]

**P.T.O.**

- 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) How to avoid the repeated global calculations of dataflow information? Write value-numbering algorithm to justify the same. [8]
- b) What is reaching definitions? Write in and out definitions for reaching definitions. [8]

OR

- Q8)** a) Explain transformations using dataflow analysis with suitable examples. [8]
- b) Explain explicit and implicit parametric polymorphism with suitable examples. [4]
- c) Draw IR tree representation for quadruple:  $X = C1 * Z[i] + C2$ . [4]

