Sixth Semester Regular Examination – 2014
COMPILER DESIGN
BRANCH : CSE
QUESTION CODE : F 252
Full Marks – 70
Time : 3 Hours

Answer Question No. **1** which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.

1. Answer the following questions :   2×10
    (a) What is a syntax Tree ?
    (b) What is the significance of semantic analyzer ?
    (c) What changes should be made in the semantic analyzer to add type casting ?
    (d) What is DAG ? What are its applications ?
    (e) Write a regular expression to describe unsigned numbers.
    (f) What is meant by Peephole optimization ?
    (g) Why SLR and LALR are more economical to construct than canonical LR ?
    (h) What do you mean by dangling reference ?
    (i) What is meant by shot-circuit or jumping code ?
    (j) What is the difference between activation of the procedure and the activation record ?

2. (a) The regular expression (cc* | dd*) is given. Construct NFA for the expression and convert this NFA into DFA.   5
    (b) Explain in detail the various phases of compiler. Consider the following fragment of C code.

        float i,j;
        i=i*10+j+2;

    Write the output at all phases of the compiler for this C code.   5

3. (a) What is inherited attribute? Write the syntax-directed definition with inherited attributes for type declaration for list of identifiers. Show the annotated parse tree for the sentence real id1, id2, id3.   5

   (b) Compare three different storage allocation strategies.   5

4. Show that the following grammar :   10

   S → Aa | bAc | dc | bda

   A → d

   is LALR (1) but not SLR(1).

5. (a) Using back patching, generate an intermediate code for the following expression :   5

   A < B OR C < D AND P < Q

   (b) What is DAG ? Write an algorithm to construct DAG from the block of three address code. Construct the DAG for the following basic block :   5

   a : = b + c

   b : = a − d

   c : = b + c

   d : = a − d

6. (a) Discuss different symbol table organizations. Explain how scope rules and the block structure of a programming language influence symbol table organization strategies.   5

   (b) Generate the code for the following statement for the target machine (target machine is a byte addressable machine with 4 bytes to a word and N general purpose registers). Assume all variables are static. Assume three registers are available.   5

   a[i][j]=b[i][k]*c[k][j]

7. (a) Explain different code optimization techniques used in compilation process to generate optimized code.   5

   (b) What is the purpose of next use information in code generation ? Explain with examples.   5

8. (a) Write the role of error detector in compilation process with example. Discuss different errors in Lexical phase. 5

    (b) Discuss LL(1) parsing method for the following grammar :

    $$E \to TE'$$
    $$E' \to +TE' \mid \in$$
    $$T \to FT'$$
    $$T' \to *FT' \mid \in$$
    $$F \to (E) \mid id$$

    Consider the predictive parsing table and show the stack implementation for the input string id+id*id. 5

_____