Roll No.									

B.E. / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR / MAY 2012

COMPUTER SCIENCE AND ENGINEERING BRANCH

SIXTH SEMESTER

CS9353 – PRINCIPLES OF COMPILER DESIGN

(REGULATION 2009)

Time : 3 Hours **Max Mark : 100**

Answer ALL Questions

PART A – (10 x 2 = 20 marks)

1. What is panic mode error recovery?
2. Write regular definition for the language that has all strings of letters that contain the five vowels in order
3. Write the syntax directed translation scheme for the input expression (4 + 7.5 * 3) / 2 and construct annotated parse tree
4. Write type expressions for the C -function **fun** that has two character arguments and returns a pointer to a character.
5. Generate short circuit code for: **if (not (a or b) and c) stmts;**
6. Generate the 3 - address code for the statement in the above question 5 in quadruple and indirect triplet.
7. What are address descriptors and register descriptors
8. Generate target code for the instruction: *p + r = *q (assume enough registers are available)
9. What is code hoisting? Give its usage.
10. How unreachable code is identified ?

PART B – (5 x 16 = 80 marks)

11. i. Explain in detail the different parameter passing modes. (8)
    ii. Tabulate the comparison of storage allocation strategies used at run time. (8)

12. (a) i. Find the non recursive predictive parsing table, for the following grammar;

G -> S
S -> (L) | a
L -> L ; S | S (8)

12. (a) ii. Write the non recursive predictive parsing algorithm and parse for the input string (a;a) (8)

OR

12. (b) i. Construct the SLR Parsing table and parse the string "((( )) " for the grammar Y -> ( ) | (Y) (10)

12. (b) ii. Explain the front end of a compiler with a suitable arithmetic expression and mention the need for grouping the phases in a compiler. (6)

13.(a) For the given program fragment **A [i , j]= B [i , C [j], C [k] + k]** do the following:

i. Write the syntax directed translation scheme to convert to 3-address code (4)
ii. Draw the annotated parse tree with the translation scheme (4)
iii. Write the 3-address code (4)
iv. Determine the address of **A[4, 5]** where, all are integer arrays with size of A as10 x10, B as 10x10x10 and C as 10 and the start index position of all arrays is at 1. (Assume the base addresses) (4)

OR

13. (b) Consider the following program fragment:

```
begin
while a > b do
        begin
                x = y + z
                a = a - b
        end
        x = y - z
end
```

i. Determine a syntax directed translation scheme to convert to 3-address code using backpatching (6)
ii. Draw the annotated parse tree with the generated translation scheme (6)
iii. Write the 3-address code assuming a base address (4)

14. (a) i. Mention the issues related to the generation of code and explain any four in detail. (8)

14. (a) ii. Write the algorithm to generate code with shortest instruction sequence to evaluate statements in a basic block and apply the same to the following statements in a basic block:

```
t1 = a * b
t2 = c + d
t3 = e – t2
t4 = t1 – t3
```

(8)

OR

14.(b) i. Generate optimal code using Dynamic Programming technique for the assignment statement: x = (a / b + c) / (d – e). Assume the instructions and their associated cost as mentioned in Table 1. (8)

Table1. Instruction and its cost

Instruction	Cost	Instruction	Cost	Instruction	Cost
Ri = Ri op Rj	1	Ri = Mj	2	Mi= Mi op Mj	4
Ri= Ri op Mj	2	Mi = Rj	2	Ri=Rj	1