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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR/ MAY 2019



COMPUTER SCIENCE AND ENGINEERING

VI Semester

CS 8602 – Compiler Design

(REGULATION 2012)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Define lexical analysis
2. Consider the grammar:  $S \rightarrow aSbS \mid bSaS \mid \epsilon$ . Show that the grammar is ambiguous for the sentence **abab**
3. What are Inherited and synthesized attributes?
4. How back patching process is used to avoid the problem of generating code in single pass?
5. What is register allocation and assignment?
6. Draw the expression tree labeled with Ershov Numbers for the expression:  $(a-b)+e*(c+d)$
7. Define basic blocks and flow graph
8. Comment on Forward flow and backward flow problems
9. Define Affine Partitioning and blocking
10. What is data dependence?

Part – B ( 5 x 16 = 80 marks)

- 11.(a) (i) Construct LALR Parsing Table for the following grammar (10)

$S \rightarrow Aa \mid bAc \mid Bc \mid bBa$

$A \rightarrow d$

$B \rightarrow d$

- (ii) Construct Predictive Parsing Table for the following Grammar:

$S \rightarrow (L)a, L \rightarrow L,S \mid S$  (6)

- 12.(a) (i) Translate the expression  $-(a+b)*(a+b)-(a+b)*d$  into a sequence of three address statements and explain the representation with Quadruple, triple and Indirect triple (10)

- (ii) Draw the dependency graph and indicate the order of evaluation from the topological sort of " real id1,id2,id3" (6)

(OR)

- (b) Write down the semantic rules and label them using Back patching technique. Assume the address of the first instruction generated is 100. (16)

$a = b \ \&\& \ (c = d \ || \ e = f)$

13. (a) (i) What is tree translation scheme and Generate code by Tree rewriting for Intermediate code :  $a[i]=b+1$  and explain (6)

(ii) Generate optimal code using Dynamic Programming technique for the assignment statement  $x := (a+b * c)$  and explain. Assume unit instruction cost (10)

(OR)

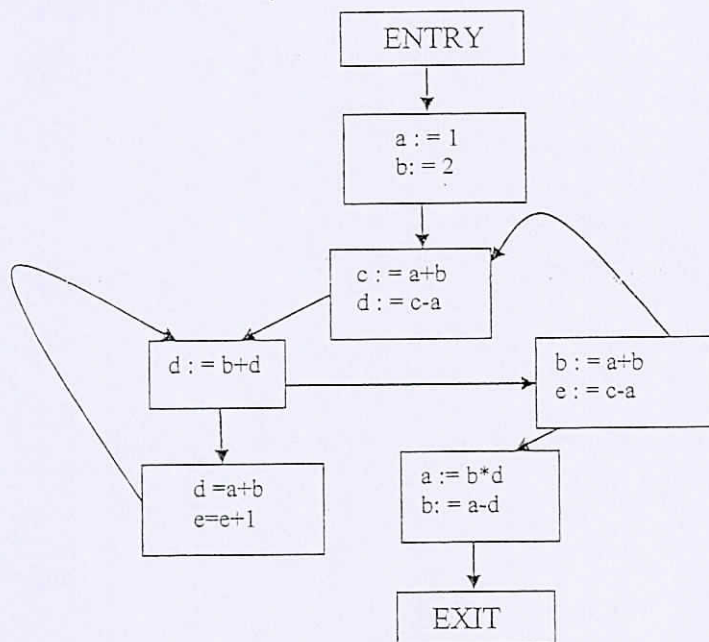
13. (b) Draw labeled expression tree for the Expression  $(a-b)+e * (c+d)$  and Generate optimal code from this tree with only two registers available and explain (16)

14. (a) (i) Explain constant propagation and partial redundancy elimination with suitable example (10)

(ii) Explain in detail about peephole optimization techniques with suitable example (6)

(OR)

14. (b) For the following flow graph, compute the definitions reaching each and every block and explain the data flow analysis (16)



15.(a).(i) Draw and explain about Iteration space, Data space, Processor space and mapping among them for the following program : (16)

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float z[50];
for(i=0;i<5;i++)
z[i+5]=z[i];
  
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(OR)

15.(b).(i) Explain Data Re-use with its various types. (10)

(ii) What is the need for Parallelism? Explain about loop level parallelism? (6)