Faculty of Science & Technology

Seventh Semester B.Tech. (Information Technology) (CBCS) Examination

COMPILER DESIGN

ELE. – IV

Time : Three Hours] [Maximum Marks : 70

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Solve Question **1 OR** Question No. **2**.

(3) Solve Question **3 OR** Question No. **4**.

(4) Solve Question **5 OR** Question No. **6**.

(5) Solve Question **7 OR** Question No. **8**.

(6) Solve Question **9 OR** Question No. **10**.

(7) Due credit will be given to neatness and adequate dimensions.

(8) Assume suitable data wherever necessary.

(9) Illustrate your answers wherever necessary with the help of neat sketches.

1. (a) List the different types of compilers. Explain the compiler writing tool LEX or FLEX. 7

(b) Describe various phases of compiler. 7

OR

2. (a) Explain the term token. Find the tokens and count the number of tokens used or generated by the following program fragment :

scanf ("% d % d % f", & marks, & total, & percentage) ; 5

(b) Construct transition diagram and regular expression for the following : 6

(i) Identifier

(ii) Unsigned number (integer and real number).

(c) Explain Cross compiler with appropriate example. 3

3. (a) Construct the parsing table for SLR (1) and test whether the grammar is SLR (1) or not for following grammar : 8

$G = \{S \rightarrow PQP$

$P \rightarrow aP \mid \epsilon$

$Q \rightarrow bQ \mid \epsilon$

$\}$

(b) Compare LALR and SLR parsing techniques. 6

OR

4. (a) Construct a LL (1) parsing table and test whether the given grammar is LL (1) or not.

$A \rightarrow NiNs \mid a$

$N \rightarrow \in \mid b \mid G$

$G \rightarrow \in \mid j$. 7

(b) What are the issues of CFG for the programming languages that need to be considered while designing top-down parser ? 7

5. (a) Explain data structures used for symbol table organization. 6

(b) Give SDTS for array translation. Generate three address code for the statement :

$A[i, j] = B[i, j] + C[i + j + k]$

Where,

array A is 2D size 10 * 10

array B is 2D size 10 * 10 and

array C is 1D size 30

assume bpw = 4. 8

OR

6. (a) State the difference between syntax tree and annotated parse tree. Generate Annotated parse tree and syntax tree for the given expression :

$s + (r * (r - d)) + ((r - d) * d)$. 7

(b) Comment on use of symbol table for the compiler. What information should be associated with a symbol name in the symbol table ? Describe the data structure for the symbol table and compare them. 7

7. (a) Write the 3 types of representation used by intermediate – code generation phase by compiler. Explain any two of them. 7

(b) What are different loop optimization techniques ? Explain. 7

OR

8. (a) Give SDTS for mixed mode arithmetic expression. 7

(b) What do you mean by semantic action or semantic rules used for SDT ? Explain with suitable example. Write SDT for evaluation of Boolean expression. 7

9. (a) Explain the evaluation of number of registers to be allocated for the expression given below. And generate the code using code generation procedure :

$$S := -(z+y)+x+(x*(z+y))+((z-y)*t).$$ 7

(b) Explain with suitable example loop invariant computation elimination from the code. Explain its importance in loop optimization. 7

OR

10. (a) Explain different code generation techniques. Which technique generate efficient object code ? 7

(b) What are the principal sources of optimization ? Also write importance of code optimization. 7

PRS/KS/24/2901

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(8) Assume suitable data wherever necessary.

1. (a) Explain various phases of compiler. 8

(b) Explain Compiler writing tools. 6

OR

2. (a) List the different types of compiler. And explain the compiler writing tool LEX or FLEX. 6

(b) Give structure of a LEX program. Write a program in LEX, to recognize signed decimal constant in 'C'. 8

3. (a) What is an ambiguous and unambiguous grammar ? 3

(b) Compare SLR, CLR and LALR parser. 5

(c) What type of preprocessing is required in LL (1) parsing ? Give the 3 rules to determine whether the grammar is LL (1) or not ? 6

OR

4. (a) Explain Bottom – up parsing techniques with example. 6

(b) Consider the following grammar : 8

$S \rightarrow AA$

$A \rightarrow aA$

$A \rightarrow b$

and construct the LALR parsing table.

5. (a) Explain data structure for symbol table in block structure language. 8

(b) Give SDTS for mixed mode arithmetic expression. 6

OR

6. (a) Explain memory allocation in procedure call and return statement. 7

(b) Give run time storage management for call and return statement. 7

7. (a) What are different types of intermediate codes ? Comment following statement into all intermediate code : 7

a = SQRT (b * b – 4 * a * c) 2 * a

(b) Write short note on peephole optimization. 7

OR

8. (a) What are different loop optimization techniques ? Explain. 7

(b) What are the principle sources of optimization ? Also write importance of code optimization. 7

9. (a) Explain use of algebraic properties for reducing register requirement. 7

(b) What are the problems in the way of good code generation ? 7

OR

10. (a) Describe different storage allocation strategies. 6

(b) Use simple code generation algorithm to generate the code for following three address code. Assume two registers are available : 8

$T_1 = a + b$

$T_2 = c + d$

$T_3 = e - T_2$

$T_4 = T_1 - T_3$