

B.E. Computer Science & Engineering (Model Curriculum) Semester - VI  
**TEE201CS - Compiler Design**

P. Pages : 3

Time : Three Hours



**GUG/S/23/13821**

Max. Marks : 80

- Notes :
1. All questions are compulsory.
  2. All questions carry equal marks.
  3. Assume suitable data wherever necessary.

1. a) What is LEX? What are the different functions used in lex? Also explain the structure of lex program with example. 8

b) What is compiler? Explain various compiler construction tools in detail? 8

**OR**

2. a) Explain in detail LEX compiler. Write a lex program to copy an input file while adding three to every positive number divisible by 15. 8

b) Explain the different phases of compiler with the help of suitable diagram. Illustrate the translation of following statement on all the phases of compiler. 8  
$$x = y + z * 80$$

3. a) Consider the following grammar. 8

$S \rightarrow aAC \mid bB$

$A \rightarrow eD$

$D \rightarrow bE \mid \epsilon$

$E \rightarrow eD \mid dD$

$B \rightarrow f \mid g$

$C \rightarrow h \mid i$

i) Compute the FIRST and FOLLOW sets for the grammar.

ii) Construct a predictive parsing table for the grammar (LL(1)) parser.

b) Write short note on Recursive descent parsing. 8

Construct a recursive descent parser for the following grammar.

$E \rightarrow TE'$

$E' \rightarrow +TE' \mid \epsilon$

$T \rightarrow FT'$

$T' \rightarrow *FT' \mid \epsilon$

$F \rightarrow (E) \mid id$

**OR**

4. a) Get LR(0) parsing table for the grammar and show whether the grammar is LR(0) or not 8  
 $S \rightarrow IS \mid OS \mid 10$

- b) Construct (LR(1) parsing table for the following grammar. 8
- $S \rightarrow aA$   
 $S \rightarrow Bb$   
 $A \rightarrow aA$   
 $A \rightarrow b$   
 $B \rightarrow b$   
 $B \rightarrow a$

5. a) Explain different methods for the construction of intermediate code generation? Write Quadruplets, Triples and indirect triples for the following expression. 8
- $(x * y) + (x * y + z)$
- b) Write SDTS (syntax directed translation scheme) for the following.
- i) AND 2  
 ii) OR 2  
 iii) If-then-else 4

**OR**

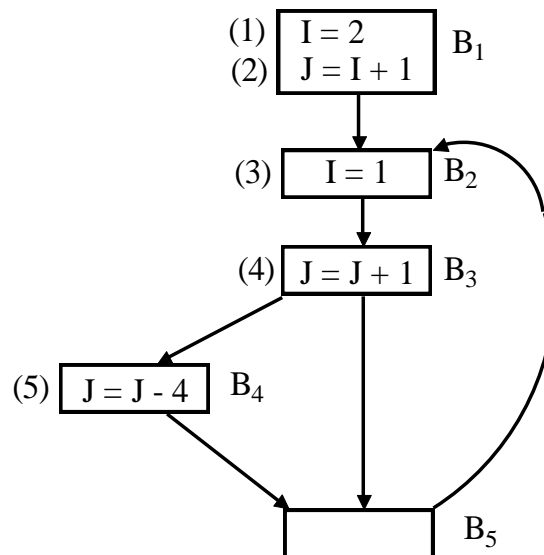
6. a) Give translation scheme and generate three address code for the following program. 8
- while (A < C and B > D) do  
 If A > Z then,  
     C = C + 1  
 else  
     A = A + 3
- b) Generate the translation scheme for array reference and intermediate code along with annotated parse tree for the following statement. 8
- $B[I, J, K] = A$   
 where B is an array of size 10 x 20 x 30 and bpw = 4.
7. a) Explain the working of labelling algorithm for the statement given below. 8
- $x = (a + b) - [(c + d) - e]$
- b) Explain various data structure available for the construction of symbol table. 8

**OR**

8. a) Generate code for the following TAC using simple code generation algorithm. 8
- $T_1 = P + Q$   
 $T_2 = M * N$   
 $T_3 = G + T_2$   
 $T_4 = T_1 - T_3$
- b) Write short note on- Heuristic algorithm for optimal ordering of code. 8
9. a) Write short note on 8
- i) Loop jamming  
 ii) Loop Unrolling

b) Consider the flow graph.

8



Compute GEN, KILL, IN & OUT of each block after second iteration.

OR

10. a) What is code optimization. Explain various kinds of optimization that can be performed in a loop. 8

b) What is a leader statement? Write the steps are algorithm partition a sequence of three address statement into basic block. 8

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