B
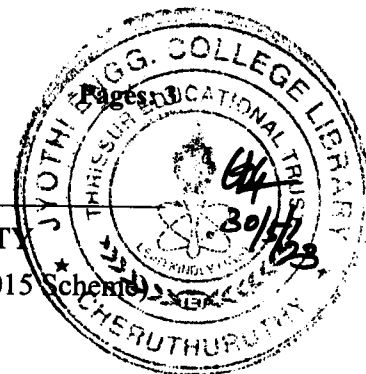
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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S6 (S,FE) / S6 (PT) (S,FE) Examination May 2023 (2015 Scheme)

Course Code: CS304
Course Name: COMPILER DESIGN

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 3 marks.
Marks

1   Explain input buffering used in lexical analysis.   (3)

2   Draw a transition diagram to recognize all valid identifiers in C language.   (3)

3   Find FIRST and FOLLOW of each nonterminal in the following grammar.   (3)

$E \rightarrow E A E \mid (E) \mid - E \mid id$

$A \rightarrow + \mid *$

4   Construct a recursive descent parser for the following grammar.   (3)

$D \rightarrow T L$

$T \rightarrow int \mid float$

$L \rightarrow id , L \mid id$

PART B
Answer any two full questions, each carries 9 marks.

5   a) Explain the working of different phases of a compiler. Illustrate with a source   (6)
        language statement.

    b) Find the lexemes in the following programming language statement.   (3)
        int sum = a * (b -5);

        Define tokens and patterns for the above statement.

6   a) Explain bootstrapping with an example.   (4)

    b) Show that the following grammar is LL(1) .   (5)

        $S \rightarrow AaAb \mid BbBa$

        $A \rightarrow \varepsilon$ $B \rightarrow \varepsilon$

7   a) Explain non recursive predictive parsing algorithm.   (5)

    b) i. Show that the grammar   (4)

            $E \rightarrow E + E \mid E * E \mid (E) \mid id$ is ambiguous.

        ii. Eliminate ambiguity from the above grammar.

PART C

Answer all questions, each carries3 marks.

8	Explain shift/reduce, reduce/reduce conflict with an example.	(3)
9	Define LR(k) grammar.	(3)
10	Differentiate between synthesized attributes and inherited attributes with an example.	(3)
11	Write the translation scheme for checking the type of expressions.	(3)

PART D

Answer any two full questions, each carries9 marks.

12 Consider the following grammar: (9)

$E \rightarrow E + T \mid T$

$T \rightarrow T F \mid F$

$F \rightarrow F * \mid a \mid b$

Construct the SLR parsing table.

13 a) Explain operator grammar and operator precedence parsing. (5)

   b) Write the SDD for constructing a syntax tree for an arithmetic expression. (4)

14 a) Explain how synthesized attributes are evaluated by a bottom up parser. (6)

   b) Define L-attributed definition. (3)

PART E

Answer any four full questions, each carries10 marks.

15 a) What is the role of activation record in compiler design? Name and specify the purpose of different fields of activation record. (6)

   b) Write the call sequence and return sequence when a procedure is called. (4)

16 a) Explain any two storage allocation strategies used in compiler design. (5)

   b) Construct the syntax tree and DAG for the statement: s = (a+b) *(a-b) + (a+b) *b (5)

17 a) Write SDD to produce three address code for assignment statements. (5)

   b) Write the different three address code representations for the statement: (5)
      s = (a+b) *(a-b) + (a+b) *b

18 Explain any three function preserving optimization techniques with examples. (10)

19 a) Explain any two loop optimizing techniques. (5)

b) Consider the following program statement: (5)

for i : = 1 to n do

    for j : = 1 to n do

        for k : = 1 to n do

            c[i,j] : = c[i,j] + a[i,k] * b[k,j]

Generate three address statement and construct flow graph.

20   Write the code generation algorithm. Using this algorithm write the code generated (10)

for the expression: s : = (a-b) + (a-b)

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