

B

03000CS304052101

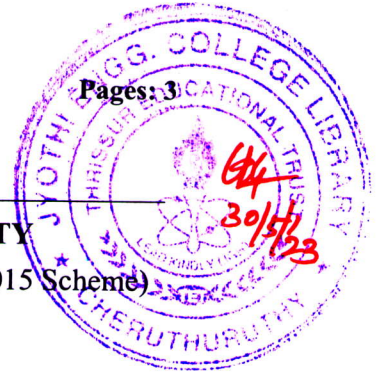
Pages: 3

Reg No.: _____

Name: _____

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 language statement. (6)
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)
 $S \rightarrow AaAb \mid BbBa$
 $A \rightarrow \epsilon \quad B \rightarrow \epsilon$
- 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 carries 3 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 carries 9 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 carries 10 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: $s = (a+b) * (a-b) + (a+b) * b$ (5)
- 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: $s := (a-b) + (a-b)$
