JYOTHI ENGG. COLLEGE LIBRARY THRISSUR EDUCATIONAL TRUST

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree (S,FE) Examination May 2022 (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 Discuss the relevance of symbol table in the compilation process. (3)

2 Define tokens, lexemes and patterns. (3)

3 Show that the following grammar is ambiguous by giving two parse trees for the string *abab*. Here ε is the empty string. (3)

$S \rightarrow aSbS \mid bSaS \mid \varepsilon$

4 Explain backtracking with an example. (3)

PART B

Answer any two full questions, each carries 9 marks.

5 a) What is the role of input buffering in lexical analysis? Explain with a figure. (4)

b) Write notes on compiler writing tools. (5)

6 Using the sentence **id*-(id)↑id**, prove that the following grammar is ambiguous. Also rewrite the grammar by removing the ambiguity. Here ↑ denotes exponentiation operator. (9)

$E \rightarrow E + E \mid E - E \mid E * E \mid E / E \mid E \uparrow E \mid (E) \mid - E \mid \mathbf{id}$

7 a) Check whether the following grammar is LL(1) by constructing a parse table. (5)

$S \rightarrow i\,E\,t\,S\,S' \mid a$

$S' \rightarrow e\,S \mid \varepsilon$

$E \rightarrow b$

b) Draw a transition diagram to recognize the following set of keywords: (4)

{*begin, end, else, elif, do, break, continue, case*}

PART C

Answer all questions, each carries 3 marks.

8 Define the precedence relations used in operator precedence grammar. (3)

9 What are the conflicts that could arise during shift-reduce parsing? (3)

10 Distinguish between inherited and synthesized attributes. (3)

11 Define (i) type system (ii) sound type system (iii) strongly typed language (3)

PART D

Answer any two full questions, each carries 9 marks.

12 Construct the LALR parsing table for the following grammar: (9)

$E \rightarrow E + T \mid T$

$T \rightarrow TF \mid F$

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

13 a) Write a syntax directed translation scheme for a simple desk calculator. (4)

b) Give an annotated parse tree for the input string 23*5+4. (5)

14 a) Consider the following grammar: (7)

$S \rightarrow a \mid (T)$

$T \rightarrow T, S \mid S$

For the string *(a, (a, a))*, show the actions of a shift reduce parser. Clearly indicate the stack and input configurations at each step.

b) Which are the two forms of type checking? (2)

PART E

Answer any four full questions, each carries 10 marks.

15 a) What are activation trees? Give an example. (3)

b) With relevant figures, explain how the activation records are managed in stack allocation and heap allocation strategies. (7)

16 a) Write the code generation algorithm. (5)

b) Translate the following code fragment to three-address code: (5)

while (a > b) && (a < 2 * c – 10) do

a = b + c

17 Consider the assignment statement $a = b * -c + b * -c$. Here '-' is the unary minus or the negation operator. Translate the statement into (10)

i. syntax tree.

ii. quadruples.

iii. triples.

iv. indirect triples

18	a)	Explain the problems that might be encountered during code generation.	(6)
	b)	With an example, explain copy propagation and dead code elimination.	(4)
19		Translate the expression W := (A-B) + (A-C) + (A-C) into three address code sequence and then generate the machine code for the three address code.	(10)
20	a)	Construct DAG for the following expression, ((a-b) – ((a-b)*(a+b))) + ((a-b)*(a+b))	(5)
	b)	How do you derive the cost of an instruction? Illustrate with a sample code fragment.	(5)

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