

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S6 (S,FE) (FT/WP/PT) Examination December 2025 (2019 Scheme)

Course Code: CST302**Course Name: COMPILER DESIGN**

Max. Marks: 100

Duration: 3 Hours

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

Marks

- | | | |
|----|---|-----|
| 1 | What is the role of regular definition in lexical analysis? | (3) |
| 2 | Find pattern for identifier and unsigned numbers. | (3) |
| 3 | Check whether the given grammar is ambiguous or not.
$S \rightarrow AA, A \rightarrow aA, A \rightarrow b$ | (3) |
| 4 | Explain left factoring with an example. | (3) |
| 5 | Illustrate operator grammar with an example. | (3) |
| 6 | Which is the most efficient LR parser? Justify. | (3) |
| 7 | Describe L attributed definitions. | (3) |
| 8 | Identify three-address code for array access. | (3) |
| 9 | Explain compile time evaluation. | (3) |
| 10 | What is the role peephole optimization? | (3) |

PART B*Answer one full question from each module, each carries 14 marks.***Module I**

- | | | |
|----|--|-----|
| 11 | a) Write regular definition and corresponding finite automata for identifier, unsigned numbers and arithmetic operators. | (7) |
| | b) Write code according to above design(Question no.11a.) for identifier, unsigned numbers and arithmetic operators. | (7) |

OR

- | | | |
|----|---|-----|
| 12 | a) Explain LEX program structure. | (7) |
| | b) Write LEX program for identifying tokens such as identifiers, arithmetic operators and relational operators. | (7) |

Module II

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|----|--|-----|
| 13 | a) Explain limitations of top-down parsing. | (7) |
| | b) Illustrate left most and right most derivation with an example. | (7) |

OR

- | | | |
|----|--|-----|
| 14 | a) Write and explain methods for finding FIRST and FOLLOW. | (5) |
|----|--|-----|

- b) Construct predictive parsing table for given grammar. (9)

$$\begin{aligned} E &\rightarrow E + T \mid E - T \mid T \\ T &\rightarrow T * F \mid T / F \mid F \\ F &\rightarrow (E) \mid id \end{aligned}$$

Module III

- 15 a) Perform operator precedence parsing for input string “ $id_1 + id_2 * id_3$ ” according to the given grammar. (7)

$$S \rightarrow S + S \mid S * S \mid id$$

- b) Explain item set construction method in SLR. (7)

OR

- 16 Construct LALR parsing table for the given grammar. (14)

$$\begin{aligned} S &\rightarrow L = R \mid R \\ L &\rightarrow * R \mid id \\ R &\rightarrow L \end{aligned}$$

Module IV

- 17 a) Write translation scheme for the evaluation of arithmetic expressions. Also perform evaluation of a valid expression. (7)

- b) Explain type checking of arithmetic operations, array access and function call. (7)

OR

- 18 a) Draw syntax tree representation for the given expression and write corresponding 3-address code. (5)

$$a * (a + b) + c$$

- b) Construct quadruple, triple and indirect triple tables for the given expression. (9)

$$a * (b+c) + d * (b+c)$$

Module V

- 19 a) Differentiate machine dependent and machine independent optimizations. (5)

- b) Perform common sub expression elimination globally for the given code segment. (9)

1) $t1 = a + b$
 2) $t2 = t1 * c$
 3) $t3 = a + b$
 4) $t4 = t2 + t3$
 5) $x = t4$
 6) $t5 = a + 1$
 7) $a = t5$

8) $t6 = a + b$
 9) $y = t6$
 10) $t7 = a + b$
 11) $c = t7$
 12) If $c < 100$ goto 10

OR

- 20 a) Explain issues in the design of a code generator. (6)
- b) Convert to optimized three-address code and write machine code for the given code segment. (8)

$x = a * (b - c) + d / e$

$b = b + 1$

$y = (b - c) * d / e$
