

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Fifth Semester

Computer Science and Engineering

CS3501 – Compiler Design

Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	Questions	BLT	CO	Marks
1.	Define tokens, patterns and lexemes.	L1	1	2
2.	Apply the regular expression for identifier and white space.	L3	1	2
3.	Eliminate the left recursion for the grammar. $S \rightarrow Aa \mid b$ $A \rightarrow Ac \mid Sd \mid \epsilon$	L3	2	2
4.	Compute FIRST for the following grammar. $S \rightarrow AS$ $S \rightarrow b$ $A \rightarrow SA$ $A \rightarrow a$	L3	2	2
5.	List out the two rules for type checking.	L1	3	2
6.	Illustrate the methods of implementing three-address statements.	L2	3	2
7.	List out limitations of the static memory allocation.	L1	4	2
8.	Distinguish between static and dynamic storage allocation.	AN	4	2
9.	Illustrate the concepts of copy propagation.	L2	5	2
10.	How is liveness of a variable calculated? Identify it.	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11. a	Solve the given regular expression into NFA using Thompson construction (i) $(a/b)^* abb (a/b)^*$ (ii) ab^*/ab	L3	1	16
Or				
b	Find the minimized DFA for the regular expression: $(0+1)^* (0+1) 10$.	L3	1	16
12. a i	Explain left recursion and left factoring.	L4	2	8
ii	Eliminate left recursion and left factoring for the following grammar. $E \rightarrow E + T \mid E - T \mid T$ $T \rightarrow a \mid b \mid (E)$	L4	2	8

Or

	b	Analyze the following grammar is a LALR grammar. S→CC C→cC d	L4	2	16
13.	a	Suppose that we have a production $A \rightarrow BCD$. Each of the four non terminal A, B, C and D have two attributes: S is a synthesized attribute and i is an inherited attribute. Analyze For each of the sets of rules below tell whether (i) the rules are consistent with an S-attributed definition (ii) the rules are consistent with an L-attributed definition and (iii) whether the rules are consistent with any evaluation order at all? (i) $A.s = B.i + C.s$ (ii) $A.s = B.i + C.s$ and $D.i = A.i + B.s$.	L4	3	16
Or					
	b	Create the following for the given arithmetic expression $a + (b + c)^*$ (i) Syntax tree (ii) Quadruples (iii) Triples (iv) Indirect triples	L4	3	16
14.	a i	Interpret the storage organization memory in the perspective of compiler writer with neat diagram.	L4	4	8
	ii	Compare static versus dynamic memory allocation.	L4	4	8
Or					
	b	Explain the simple code generator and generate target code sequence for the following statement: $d := (a - b) + (a - c) + (a - c)$.	L4	4	16
15.	a i	Explain in detail about optimization of basic blocks.	L2	5	8
	ii	Construct the DAG for the following basic block & explain it. 1. $t1 := 4 * i$ 2. $t2 := a[t1]$ 3. $t3 := 4 * i$ 4. $t4 := b[t3]$ 5. $t5 := t2 * t4$ 6. $t6 := \text{Prod} + t5$ 7. $\text{Prod} := t6$ 8. $t7 := i + 1$ 9. $i := t7$ 10. if $i \leq 20$ goto (1)	L2	5	8
Or					
	b i	Summarize in detail about the dataflow analysis of available expression with suitable example.	L2	5	8

- ii Identify the methods to eliminate the unreachable code, load and store data. L2 5 8