

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Fifth Semester

Computer Science and Business Systems

20CBPC501 - COMPILER DESIGN

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	Marks	K- Level	CO
1. Which of the following is known as a compiler for a high-level language that runs on one machine and produces code for a different machine? (a) Cross Compiler (b) Multipass Compiler (c) Optimize Compiler (d) Onepass Compiler	1	K1	CO1
2. The lexical analyzer uses which of the following to recognize tokens? (a) Pushdown automata (b) Finite automata (c) Turing machine (d) Context-free grammar	1	K2	CO1
3. The main function of a parser is to: (a) Recognize tokens (b) Check syntax of the source code (c) Generate machine code (d) Optimize intermediate code	1	K1	CO2
4. The handle in shift-reduce parsing represents: (a) Ambiguous symbol (b) Leftmost derivation (c) Rightmost derivation in reverse (d) Stack overflow	1	K1	CO2
5. A synthesized attribute is computed from: (a) The attributes of its parent node (b) The attributes of sibling nodes only (c) External functions (d) The attributes of its children nodes	1	K2	CO3
6. The heap is primarily used for: (a) Storing static variables (b) Storing activation records (c) Storing dynamically allocated data (d) Storing machine code	1	K1	CO3
7. In three-address code, a statement like $x = y + z * w$ is represented as: (a) $t1 = z * w; x = y + t1$ (b) $t1 = y + z; x = t1 * w$ (c) $t1 = y * w; x = z + t1$ (d) $x = y * z + w$	1	K1	CO4
8. Common subexpression elimination is a technique that: (a) Eliminates repeated computations (b) Removes unused variables (c) Reorders statements (d) Merges basic blocks	1	K1	CO4
9. The main purpose of a type system in a compiler is to: (a) Detect type errors (b) Optimize machine code (c) Allocate memory for variables (d) Translate intermediate code	1	K2	CO5
10. In code generation, temporary variables are used to: (a) Store constants only (b) Hold intermediate results (c) Replace variables in source code (d) Store final results only	1	K2	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Differentiate Compiler and Interpreter.	2	K2	CO1
12. What are the various parts in LEX program?	2	K1	CO1
13. Define Handle Pruning.	2	K1	CO2
14. Derive the String for the input “ ceaedae ” using the Grammar $S \rightarrow aA A, A \rightarrow AbB B, B \rightarrow cSd e$	2	K2	CO2
15. When does Dangling References occur?	2	K2	CO3
16. What is S-Attributed Syntax Directed Translation (SDT)?	2	K1	CO3

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| 17. What are the Intermediate Codes? | 2 | K1 | CO4 |
| 18. List the characteristics of Peephole Optimization. | 2 | K1 | CO4 |
| 19. What are the issues in the design of code generator? | 2 | K1 | CO5 |
| 20. What do you mean by sound type system? | 2 | K1 | CO5 |
| 21. What are the properties of optimizing Compilers? | 2 | K1 | CO4 |
| 22. Write about code motion in optimization technique. | 2 | K2 | CO4 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) (i) Classify the various phases of a compiler? Explain each phase in detail by using the input "Position: =initial+ rate*60". | 11 | K2 | CO1 |
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| b) (i) Explain the role of Lexical Analyzer in detail with necessary examples. | 6 | K2 | CO1 |
| (ii) Outline the Transition Diagram to recognize the relational operators and identifiers by the lexical analyser. | 5 | K2 | CO1 |

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| 24. a) Construct LR (0) items for the following grammar:
S -> CC
C ->aC
C -> d | 11 | K3 | CO2 |
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| b) Construct the SLR parsing table for the following grammar:
S -> AA
A ->aA/b
Construct the behavior of the parser on the sentence (a, (^, (a, a))) using the grammar specified above. | 11 | K3 | CO2 |
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| 25. a) Infer a syntax directed definition for constructing a syntax tree for assignment statements
S -> id: = E
E -> E1 + E2
E -> E1 * E2
E -> - E1
E -> (E1)
E -> id | 11 | K2 | CO3 |
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Apply the same to construct the Syntax Tree for the expression a=b+c*d

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| b) Discuss in detail about the activation tree and activation record with suitable example | 11 | K2 | CO3 |
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| 26. a) (i) Explain the various types of three address code. | 5 | K2 | CO4 |
| (ii) Explain the various methods of implementing three address code with an example. | 6 | K2 | CO4 |

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| b) Extend Peephole optimization with suitable examples. | 11 | K2 | CO4 |
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| 27. a) Explain in detail about the Specification of a Simple Type Checker. | 11 | K2 | CO5 |
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| b) Explain the Simple Code Generation Algorithm in detail with an example. | 11 | K3 | CO5 |
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28. a) (i) Apply the Grammar $E \rightarrow E + E \mid E * E \mid (E) \mid id$. Show the sequence of moves made by the Shift-Reduce Parser on the input $id_1 + id_2 * id_3$ and determine whether the given string is accepted by the parser or not. 6 K3 CO2
- (ii) Examine ambiguous grammar. Is it possible to construct parser from such a grammar. Justify your answer. 5 K3 CO2

OR

- b) Construct a parsing table for the following LL(1) grammar and find the string $id+id*id$ is valid or not 11 K3 CO2
- $E \rightarrow T E'$
 $E' \rightarrow + T E' \mid \epsilon$
 $T \rightarrow F T'$
 $T' \rightarrow * F T' \mid \epsilon$
 $F \rightarrow (E) \mid id$