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Printed Page:-4 **Subject Code:- BCSBS0502**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: V - THEORY EXAMINATION (2025 - 2026)
Subject: Compiler Design

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. The lexical analyzer takes ____as input and produces a list of ___of output. [CO1 K2] 1

(a) Machine code, mnemonic
(b) Tokens, source code
(c) Source code, tokens
(d) Both Machine code, mnemonic and Tokens, source code

1-b. Identify phase in compiler design do we check the grammar of the programming language. [CO1 K1] 1

(a) Lexical analysis.
(b) Syntax analysis.
(c) Semantic analysis.
(d) Code generation.

1-c. LL(1) parsing table is constructed between. [CO2 K2] 1

(a) terminals and terminals
(b) terminals and non-terminals
(c) non-terminals and non-terminals
(d) none of the above

1-d. Most powerful Parser is. [CO2 K2] 1

(a) LR(0)
(b) CLR
(c) LALR
(d) SLR

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1-e. Type checking is normally done during----------[CO3 K2] 1

(a) Lexical analysis
(b) Syntax Analysis
(c) Syntax directed translation
(d) Code optimization

1-f. Syntax directed translation scheme is desirable because-------[CO3 K3] 1

(a) it is based on the syntax
(b) its description is independent of any implementation
(c) it is easy to modify
(d) All of the above

1-g. Loop optimization is a process of. [CO4 K2] 1

(a) increasing execution speed
(b) decreasing execution speed
(c) Working of different machines
(d) None of above

1-h. Optimization phase in compiler generally. [CO4 K2] 1

(a) reduces the space of code
(b) optimizes the code to reduce execution time
(c) both option 1 and option 2
(d) None of above

1-i. A variable is called an _____ variable if its value is altered within the loop by a loop-invariant value. [CO5 K3] 1

(a) Invariant
(b) induction
(c) strength
(d) loop

1-j. In Directed Acyclic Graph, Leaf nodes represented by. [CO5 K2] 1

(a) identifiers
(b) names
(c) constants
(d) All of the above

2. Attempt all parts:-

2.a. Explain left most derivation and rightmost derivation. [CO1 K2] 2

2.b. Define Context Free Grammar (CFG). [CO2 K1] 2

2.c. Write two difference between synthesized and inherited attribute. [CO3 K2] 2

2.d. Define Local optimization. [CO4 K1] 2

2.e. Define Inheritance. [CO5 K1] 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	Create a cross compiler using bootstrapping when SSM runs on SAA. [CO1 K5]	6
3.a.(ii)	Describe the phases of compiler with suitable example in detail. [CO1 K2]	6
3.b. Answer any one of the following:-		
3.b.(i)	Construct the SLR parse table for the following Grammar: [CO2 K5] E→E+E E→E*E E→id	6
3.b.(ii)	Parse string “ccdd” using given grammar with the help of shift-reduce parsing: [CO2 K3] S -> CC C -> cC C ->d	6
3.c. Answer any one of the following:-		
3.c.(i)	Compare parse tree and annotated parse tree with example. [CO3 K4]	6
3.c.(ii)	Draw syntax tree for the arithmetic expressions "a * (b + c) – d/2". Also write the given expression in postfix notation. [CO3 K3]	6
3.d. Answer any one of the following:-		
3.d.(i)	Explain Loop unrolling, Loop invariant method, Loop fusion with example. [CO4 K2]	6
3.d.(ii)	Explain Control flow analysis and Data flow analysis. [CO4 K2]	6
3.e. Answer any one of the following:-		
3.e.(i)	Describe code optimization. Explain its role in compiler design. [CO5 K2]	6
3.e.(ii)	Explain the different issues in the design of a code generator. [CO5 K2]	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Construct the minimized DFA for the regular expression (0 + 1)*(0 + 1) 10. [CO1 K5]	10
4-b.	Finite automata useful for lexical analysis explain in detail. Define symbol table and explain the role of symbol table. [CO1 K2]	10

5. Answer any one of the following:-

5-a.	Discuss the left factoring and left recursion and how it is eliminated explain with example. [CO2 K3]	10
5-b.	Construct LR(0) parsing table for the following grammar. [CO2 K5] S ->cBccA A ->cAa B ->ccBb	10

6. Answer any one of the following:-

6-a.	Write the quadruples, triples, indirect triples for the following expression (a + b)*(b + c) + (a + b + c). [CO3 K3]	10
6-b.	Explain (a) Runtime environment & its need (b) Activation trees. [CO3 K2]	10

7. Answer any one of the following:-

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7-a.	Write short notes on: [CO4 K2] a) Code motion b) Induction-variable elimination c) Strength reduction	10
7-b.	Analyze the local optimization and global optimization with examples. [CO4 K4]	10

8. Answer any one of the following:-

8-a.	Describe the OOPs concept, Data Object and Functions. Write its characteristics. Also define Data hiding in brief. [CO5 K2]	10
8-b.	Discuss the various peephole optimization techniques in detail. [CO5 K2]	10