NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: V - THEORY EXAMINATION (2022 - 2023)

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.   Lexical analysis is about breaking a sequence of characters into _____ .   1
(CO1)

                (a) Tokens

                (b) Lines

                (c) Groups

                (d) Packets

1-b.   _____ is/are parts of the compiler.   (CO1)   1

                (a) Execution part

                (b) Analysis part

                (c) Synthesis part

                (d) Both Analysis part and Synthesis part

1-c.   CLR parsing is a type of _____ .   (CO2)   1

                (a) Bottom-Up

                (b) Top-Down

(c) Both Bottom Up and Top Down Parsing

(d) None of above

1-d.   In which derivation, the Right-most non-terminal symbol is replaced at each step.   (CO2)   1

(a) Rightmost derivation

(b) Leftmost derivation

(c) Both Rightmost and Leftmost Derivation

(d) None of above

1-e.   Who is responsible for the creation of the symbol table?   (CO3)   1

(a) Assembler

(b) Compiler

(c) Interpreter

(d) None of above

1-f.   Full form of SDD is _____ .   (CO3)   1

(a) Syntax Directed Definition

(b) Syntax Directed Dictionary

(c) Both Syntax Directed Definition and Syntax Directed Dictionary

(d) None of the above

1-g.   Peephole optimization is _____ .   (CO4)   1

(a) Time Optimization

(b) Code Optimization

(c) Machine Code

(d) None of above

1-h.   Which of the following is Three address code form ?   (CO4)   1

(a) Quadruples

(b) Triples

(c) Indirect Triples

(d) All of the above.

1-i.   Code generation can be considered as the _____ .   (CO5)   1

(a) first phase of compilation

(b) second phase of compilation

(c) third phase of compilation

(d) final phase of compilation

1-j.   In Directed Acyclic Graph, Leaf nodes represented by _____ .   (CO5)   1

      (a) Identifiers

      (b) Names

      (c) Constants

      (d) All of the above

2. Attempt all parts:-

2.a.   Differentiate between Analysis and Synthesis phase.   (CO1)   2

2.b.   Define a context free grammar.   (CO2)   2

2.c.   Define Inherited attribute with example.   (CO3)   2

2.d.   Define Basic Block and flow graph.   (CO4)   2

2.e.   What are the advantages and disadvantages of register allocation and assignments? (CO5)   2

<center>SECTION B   30</center>

3. Answer any <u>five</u> of the following:-

3-a.   Analyze the given expressions a:= b*c-d with different phases of the compiler.   (CO1)   6

3-b.   Explain Language Processing System with neat diagram.   (CO1)   6

3-c.   Write a short note on: (CO2)   6
    (i) Ambiguity (with example),
    (ii) Recursive Descent Parser
    (iii) Handle pruning.

3-d.   Explain Operator Precedence Parsing with example.   (CO2)   6

3.e.   Draw the format of activation record in stack allocation and Explain each field in it.   (CO3)   6

3.f.   Write the Quadruples, Triples for the following expression (x + y)*(y + z) + (x + y + z) .   6
    (CO4)

3.g.   Write briefly about various loop optimization techniques.   (CO5)   6

<center>SECTION C   50</center>

4. Answer any <u>one</u> of the following:-

4-a.   What are the phases of compiler? Explain in detail.   (CO1)   10

4-b.   Define Lex and Lex specifications. How lexical analyzer is constructed using lex? Give an example.   (CO1)   10

5. Answer any <u>one</u> of the following:-

5-a.	What is the difference between CLR and LALR parsing? Explain using an example. (CO2)	10
5-b.	What do you understand by left factoring and left recursion and how it is eliminated? (CO2)	10

6. Answer any <u>one</u> of the following:-

6-a.   Consider the following Syntax Directed Translation Scheme (SDTS) using below SDTS   10
construct parse tree and annotated parse tree for the expression:

"S = 2+3*4."   (CO3)

E->E+T { E.val = E.val + T.val }

E -> T { E.val = T.val }

T -> T*F { T.val = T.val * F.val }

T -> F { T.val = F.val }

F -> INTLIT { F.val = INTLIT.lexval }

6-b.	What is the role of symbol table ? Discuss different data structures used for symbol table. (CO3)	10

7. Answer any <u>one</u> of the following:-

7-a.   Write short notes on: (CO4)   10
a) Code motion
b) Induction-variable elimination
c) Strength reduction

7-b.	Explain what constitute a loop in a flow graph and how will you do loop optimizations in code optimization of a compiler? (CO4)	10

8. Answer any <u>one</u> of the following:-

8-a.   Define Directed Acyclic Graph. Write the Algorithm for Construction of DAG. For the   10
following Basic Block , Construct DAG.   (CO5)

d = b * c;
e = a * b;
b = b + c;
c = b * c;

8-b.   Describe Following Concepts in Compilation: (CO5)   10
(i) Object-Oriented features,
(ii) Data abstraction
(iii) Register allocation