Printed Page:-04 Subject Code:- AMICSE0504

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech (Integrated)

SEM: V - THEORY EXAMINATION (2024 - 2025)

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. Finite state Automaton are extensively used in compiler design for _____ . (CO1,K3) 1

(a) Code optimization

(b) Code generation

(c) Parser.

(d) Lexical Analysis

1-b. The grammar of the programming is checked at _____ phase of the compiler. (CO1,K2) 1

(a) Lexical analysis.

(b) Syntax analysis.

(c) Semantic analysis.

(d) Code generation.

1-c. Left-Factoring is used to obtain____. (CO2,K3) 1

(a) Non-Deterministic Grammer

(b) Deterministic Grammer

(c) Context-Free Grammer

(d) Ambiguous Grammer

1-d. _____ parser is the most powerful In the following parsers. (CO2,k2) 1

(a) LR(0)

(b) CLR
(c) LALR
(d) SLR

1-e. An SDD that involves only synthesized attributes is called _____ . (CO3,k2) 1

(a) S-attributed
(b) L-attributed
(c) S and L attributed
(d) None of the above.

1-f. In syntax directed translation, along with the grammar we associate some informal notation are called as. (CO3, K2) 1

(a) Semantic Rules
(b) Syntax Rules
(c) parsing Rules
(d) None of these

1-g. Missing parenthesis is a _____(CO4,k2) 1

(a) Semantic error
(b) Syntax error
(c) Both Semantic Error and Syntax Error
(d) None of above

1-h. Symbol table can contain which of the following as an entry (CO4,K2) 1

(a) function names
(b) Variable names
(c) Both Function Names and Variable Names
(d) none of above

1-i. In Directed Acyclic Graph, Leaf nodes represented by _____ . (CO5,k2) 1

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

1-j. The machine independent optimization techniques are _____.(CO5,k2) 1

(a) Loop Optimization.
(b) Redundancy elimination.
(c) Folding.
(d) All of the above.

2. Attempt all parts:-

2.a. Define bootstrapping with example.(CO1,K1) 2

2.b.	Write algorithm for Follow. (CO2,K2)	2
2.c.	Differentiate between Synthesized Attribute and Inherited attribute. (CO3,K1)	2
2.d.	List out the benefits of Symbol Table. (CO4,K1)	2
2.e.	Mention the applications of DAG in compiler design. (CO5,K1)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Describe how a compiler or interpreter works in the context of language processing. How do they contribute to generating machine code from a source program.(CO1,K2)	6
3-b.	Define the term lexeme, token, Pattern with examples. Consider the following statement in c programming- printf(" i= %d,&i= %x",i,&i); find all the tokens generated by lexical analyzer. (CO1,K3)	6
3-c.	Explain recursion and its types with examples, Remove left recursion from given grammar :(CO2,K3) E->E(T) / T T->T(F) / F F->id .	6
3-d.	Differentiate between CLR and LALR parsing. Explain with an example.(CO2,K4)	6
3.e.	Define syntax directed translation with example. Also explain the three address code for switch case and procedure call. (CO3,K3)	6
3.f.	Explain Symbol table with various operations in details. (CO4,K2)	6
3.g.	Discuss function preserving optimization techniques. how does affect the generation of machine code**.** (CO5 ,K4)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain the various phases of a compiler in detail. Also write down the output for the following expression after each phase P: = I+R*60. (CO1,K4)	10
4-b.	Describe the Significance of automata into compiler Design and Define Thompson method rule also Solve the given regular expression (a/b)* abb (a/b)* into NFA using Thompson construction. (CO1,K4)	10

5. Answer any one of the following:-

5-a.	Define and describe LL(1) parsing. What does the "1" signify. Check whether the grammar is LL(1) or not. (CO2,K3) E --> TE' E' --> +TE' / ε T --> FT' T' --> *FT' / ε F --> id / (E)	10

5-b.	Write the algorithm to construct SLR parsing table. Construct the SLR parsing table for following grammar:(CO2,K4) S-> AA A ->aA / b .	10
6. Answer any <u>one</u> of the following:-		
6-a.	Define Three Address Code also discuss the representations of three address code. Write the quadruples, triples, Indirect Triples for the following expression. (x + y)*(y + z) + (x + y + z). (CO3,K3)	10
6-b.	Illustrate parse tree,syntax tree and annotated parse tree. Create the annotated parse tree and solve expression 5+4*6 using desk calculator. (CO3,K4)	10
7. Answer any <u>one</u> of the following:-		
7-a.	Given a scenario where a program has a lexical error,syntax error,semantic error which error recovery method would you apply to fix it? explain with example. (CO4,K3)	10
7-b.	Explain following (a) Runtime environment & its need (b) Activation tree& Activation Record (CO4,K3)	10
8. Answer any <u>one</u> of the following:-		
8-a.	Illustrate your answer with an example.How does the structure of a DAG help in eliminating common sub-expressions during computations?(CO5,K4)	10
8-b.	Identify the importance of loop optimization? Explain in details about various loop optimization techniques with proper examples.(CO5,K3)	10