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Printed Page:-4 **Subject Code:- ACSE0504/ACSEH0504**

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. 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 process of searching for matched tokens is typically described using ___. (CO1,K2) 1

(a) Finite automata
(b) Regular expressions
(c) Context free grammar
(d) Both Finite automata and Regular expressions

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. SLR parsing uses. (CO2,K2) 1

(a) LR(0)
(b) LR(1)
(c) None of the above
(d) Both of the above

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1-e. A parse tree showing the value of attributes at each node is called _____ . (CO3, K1) 1

(a) Syntax tree
(b) Annotated parse tree
(c) parse tree
(d) All of the above.

1-f. Postfix notation of a + b * c is __ . (CO3,k3) 1

(a) abc*+
(b) abc+*
(c) ba+c*
(d) None of the above

1-g. Activation Record is a _____ . (CO4, K1) 1

(a) Attibute
(b) Non-Contiguous block of memory
(c) Contiguous block of memory
(d) None of above

1-h. Compiler makes use of___. (CO4,K2) 1

(a) Symbol tree
(b) Symbol Table
(c) Symbol list
(d) None of the above

1-i. Optimization can be categorized broadly into ____ types. (CO5,K1) 1

(a) 2
(b) 3
(c) 4
(d) 5

1-j. Code generation can be considered as the _____ . (CO5, K1) 1

(a) first phase of compilation
(b) second phase of compilation
(c) third phase of compilation
(d) final phase of compilation

2. Attempt all parts:-

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

2.b. Define leftmost derivation.(CO2,K2) 2

2.c. Define Parse Tree. (CO3, K1) 2

2.d. Explain the main purpose of using symbol table. (CO4, K2) 2

2.e. Define inner loop.(CO5,K2) 2

SECTION-B 30

3. Attempt all parts:-

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

3.a.(i)	Explain the front-end and back-end phases of a compiler. (CO1,K2)	6
3.a.(ii)	Compare and contrast compiler, interpreter, assembler, linker, and loader. (CO1, K4)	6
3.b. Answer any one of the following:-		
3.b.(i)	Construct LR(0) parsing table for the given grammar : (CO2,K3) S->AA A->aA A->b	6
3.b.(ii)	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.c. Answer any one of the following:-		
3.c.(i)	Define term array also write difference between one dimension and two dimension array with example.(CO3,K2)	6
3.c.(ii)	Explain the three address code for procedure call with example. (CO3,K3)	6
3.d. Answer any one of the following:-		
3.d.(i)	Describe the various data structure of the symbol table.(CO4, K2)	6
3.d.(ii)	Explain format of symbol table with example.(CO4,K2)	6
3.e. Answer any one of the following:-		
3.e.(i)	Compare machine dependent code optimization techniques with example.(CO5,K2)	6
3.e.(ii)	Describe Peephole optimization with various techniques. (CO5,K2)	6
SECTION-C		50
4. Answer any one of the following:-		
4-a.	Describe the Cross Compiler with example. Explain the analysis and synthesis model of compilation. (CO1, K2)	10
4-b.	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
5. Answer any one of the following:-		
5-a.	State the algorithm for FIRST and FOLLOW functions . Also Identify FIRST ( ) and FOLLOW ( ) for given production rules. (CO2, K2) S -> aBDh B -> cC C -> bC / ε D -> EF E -> g / ε F -> f / ε	10
5-b.	Explain the different types of LR parser? Explain any one of them by using example.(CO2,K2)	10
6. Answer any one of the following:-		
6-a.	How is the switch case statement translated into three address code? Illustrate with	10

example. (CO3,K3)

6-b. 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

7. Answer any one of the following:-

7-a. Discuss the various Storage Management techniques available. What are their importance in compiler design.. (CO4,K2) 10

7-b. Explain Dynamic storage allocation with examples and diagram.(CO4,K2) 10

8. Answer any one of the following:-

8-a. Define the terms basic blocks, flow graphs and loop in flow graph also write the algorithm for partitioning of basic block. Generate the basic block and flow-graphs for the following expressions - (CO5,K4) 10

1) r = 1
2) c = 1
3) t1 = 10 * r
4) t2 = t1 + c
5) t3 = 8 * t2
6) t4 = t3 - 88
7) a[t4] = 0.0
8) c = c + 1
9) if c <= 10 goto (3)
10) r = r + 1
11) if r <= 10 goto (2)
12) r = 1
13) t5 = c - 1
14) t6 = 88 * t5
15) a[t6] = 1.0
16) r = r + 1
17) if r <= 10 goto (13)

8-b. List and explain the name of Loop optimization technique with suitable example.(CO5,K2) 10