Roll Number												

Narula Institute of Technology

An Autonomous Institute under MAKAUT

2023

END SEMESTER EXAMINATION - ODD 2023

CS501 - Compiler Design

TIME ALLOTTED: 3Hours **FULL MARKS: 70**

Instructions to the candidate:

Figures to the right indicate full marks.
Draw neat sketches and diagram wherever is necessary.
Candidates are required to give their answers in their own words as far as practicable

Group A
(Multiple Choice Type Questions)
Answer any ten from the following, choosing the correct alternative of each question: 10×1=10

1. White space and tabs are removed in …… phase (1) CO1 BL1
a) lexical analysis
b) syntax analysis
c) semantic analysis
d) none of these

2. A language L from a grammar G = {VN, Σ, P, S} is _____ (1) CO2 BL1
a) Set of symbols over VN
b) Set of symbols over Σ
c) Set of symbols over P
d) Set of symbols over S

3. A useful data structure for automatically analyzing basic blocks is (1) CO4 BL1
a) Control flow graph (CFG)
b) directed acyclic graph (DAG)
c) Hash Table
d) Linear List

4. Consider the following grammar: (1) CO3 BL1
S → C C

C → c C | d

The grammar is _____

a) LL(1)
b) SLR(1) but not LL(1)
c) LALR(1) but not SLR(1)
d) LR(1) but not LALR(1)

5. Top down parser generates …… (1) CO3 BL1

a) left-most derivation
b) right-most derivation
c) left-most derivation in reverse
d) right-most derivation in reverse

6. YACC builds up (1) CO1 BL1
a) SLR parsing table
b) canonical LR parsing table
c) LALR parsing table
d) none of these

7. If x is a terminal then FIRST(x) will be …… (1) CO3 BL1
a) a
b) {x}
c) x
d) none of these

8. The transitional function of a NFA is _____ (1) CO2 BL1
a) Q x Σ→Q
b) Q x Σ→2Q
c) Q x Σ→2n
d) Q xΣ→Qn

9. The grammar A → AA | (A) | e is not suitable for predictive-parsing because the grammar is _____ (1) CO1 BL1
a) Ambiguous
b) Left recursive
c) Right recursive
d) An operator grammar

10. If ∑ = {a, b, c, d, e, f} then number of strings in ∑ of length 4 such that no symbol is used more than once in a string is _____ (1) CO2 BL1
a) 35
b) 360
c) 49
d) 720

11. The most powerful parser is (1) CO3 BL1
a) SLR
b) LALR
c) Canonical LR
d) Operator-precedence

12. The phases of a compiler are Lexical analysis,Syntax analysis,Semantic Analysis,Intermediate code generation, _____,Code generation (1) CO1 BL1
a) Code Translation
b) Dynamic Optimization
c) Code Optimization
d) None of the above

Group B
(Short Answer Type Questions)
(Answer any three of the following) 3x5=15

13. Explain Symbol Table and its organization with suitable diagram.	(5)	CO1	BL2
14. Consider the grammer: S->aABb A->c| Є B->d| Є Find out the FOLLOW(A) and FOLLOW(B) and Draw the parse table.	(5)	CO1	BL3
15. What is type checking? Differentiate between static and dynamic type checking?	(5)	CO3	BL3
16. What do you mean by synthesized attribute and inherited attribute? Give example.	(5)	CO3	BL2
17. What do you mean by Lexeme, Tokens and Patterns ? Give Example.	(5)	CO1	BL1

Group C
(Long Answer Type Questions)
(Answer any three of the following) 3x15=45

18a. . Explain the different stages of compilation with proper diagram?	(5)	CO1	BL1
18b. Consider the following statement, X=a+b*c. Explain what will be the output at each stages of compilation.	(5)	CO1	BL1
18c. Differentiate : Compiler Vs Interpreter	(5)	CO1	BL3
19a. Construct predictive parsing table for the following grammar. E ->T E′ E′ -> +T E′|ε T -> F T′ T′ -> ∗FT′|ε F -> (E)|id	(10)	CO3	BL3
19b. Consider the following expression and represent it into quadruple, triple, indirect three address mode representation: x=(a+b)*(c+d)+(a+b+c)	(5)	CO3	BL4
20a. What do you mean by three address code? Give an example?	(2)	CO3	BL1
20b. What is DAG? Give example.	(2)	CO3	BL2
20c. Explain the concept of Nesting Depth Approach? Give one example.	(3)	CO1	BL2

20d. What is an annotated parse tree? What do you mean by terminal table and literal table?	(3)	CO3	BL2
20e. Write short note on LEX and YACC	(5)	CO3	BL2
21a. What do you mean by Activation record? Why it is important?What are the contents of activation of records?	(5)	CO1	BL3
21b. What do you mean by machine independent and machine dependent code optization? Explain with example.	(4)	CO5	BL2
21c. Consider some interblock code optimization without any data flow analysis by treating each extended basic block as if it is basic block. Give algorithms to the following optimizations within an extended basic block. In each case, indicate what effect on other extended basic blocks a change within one extended basic block can have. i) Common sub- expression elimination ii) Constant folding iii) Copy propagation	(6)	CO5	BL4
22a. What do you mean by basic block and control flow graph? Explain with a example how they are related in scope optimization?	(5)	CO3	BL4
22b. Convert the following NFA to the equivalent DFA: Diagram is given below: Then minimize the DFA.	(10)	CO2	BL6