

8. Which of the following language is generated by CFG given by production
 $S \rightarrow SS \mid aSb \mid bSa \mid \epsilon$

- $L = \{ a^n b^n : n \geq 0 \}$ $L = \{ a^n b^n : n \geq 1 \}$
 $L = \{ w : \text{number of a and b are equal} \}$ $L = \{ w : \text{a followed by b} \}$

9. Language accepted by the following DFA with $\Sigma = \{0,1\}$ is



- $L = \{ 0^m 1^n \mid n, m \geq 0 \}$ Accept only ending with 10
 $L = \{ 1^n 0^n \mid n \geq 0 \}$ Accept all ending with 0
10. Grammar of the programming is checked at..... phase of compiler
 Syntax Analysis Semantic Analysis Lexical Analysis Code Optimization
11. Which of the following derivation does a top-down parser use while parsing an input string?
 Right most derivation Right most derivation in reverse
 Left most derivation Left most derivation in reverse
12. Is the given grammar ambiguous?
 $S \rightarrow SS+ \mid SS^* \mid a$
 No Yes Can't say Yes for some input
13. Bottom up parser is also called.....
 Shift Reduce Parsing Recursive Descent Parsing
 Predictive Parsing LL(1) Parser
14. Which of the following statements about parser is correct?
 LR(0) is more powerful than SLR Canonical LR is more powerful than SLR
 SLR is more powerful than LALR SLR is more powerful than Canonical LR

Consider the following grammar

$S \rightarrow ACB \mid CbB \mid Ba$
 $A \rightarrow da \mid BC$
 $B \rightarrow g \mid \epsilon$
 $C \rightarrow h \mid \epsilon$

Question (15 to 16) are based on the given grammar

15. FIRST(A) is:
 $\{a,b,d,g,h\}$ $\{a,b,d,g,h,\epsilon\}$ $\{d,g,h\}$ $\{d,g,h,\epsilon\}$
16. FOLLOW(C) is:
 $\{\$ \}$ $\{g, \$, b, h\}$ $\{\$, h, g\}$ $\{\$, a, h, g\}$
17. The graph that shows the basic blocks and their successor relationship is called
 DAG Flow Graph Hamiltonian Graph Control Graph

18. Which of the following cannot be used as an intermediate code form?
 Post fix notation Syntax tree Quadruples Three address codes
19. The optimization which avoids test at every iteration is
 Loop Unrolling Local Optimization
 Constant Folding Loop Jamming
20. Which of the following best describes "unreachable code"?
1. Code that is never executed because it appears after a return statement in a function.
 2. Code that is executed but produces no output.
 3. Code that is executed only when an exception is thrown.
 4. Code that is never executed due to the control flow of the program.
- 1 only 1 and 4 2 only 3 and 4

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Course : COMP 409
Semester : II
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SECTION "B"

[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. What is compiler? Explain the six phases of compiler with block diagram. [1+3]
2. What is the use of deterministic finite automata in lexical analysis? Explain with example. [2+2]
3. Explain the importance of CFG in compilation. Consider the following grammar: [2+2]
bexpr → bexpr or bterm | bterm
bterm → bterm and bfactor | bfactor
bfactor → not bfactor | (bexpr) | true | false
Construct a parse tree for the sentence **not (true or false)**
4. Differentiate between top down and bottom up parsers.
5. What is annotated parse tree? Construct an annotated parse tree for input expression $(4*7+1)*2$ according to given syntax-directed definition. [1+3]

Production	Semantic Rule
$L \rightarrow En$	print(E.val)
$E \rightarrow E + T$	$E.val := E.val + T.val$
$E \rightarrow T$	$E.val := T.val$
$T \rightarrow T * F$	$T.val := T.val * F.val$
$T \rightarrow F$	$T.val := F.val$
$F \rightarrow (E)$	$F.val := E.val$
$F \rightarrow digit$	$F.val := digit.lexval$

6. Illustrate the advantages of type checking. Explain in brief about equivalence of type expressions with examples. [2+2]
7. Write short notes on
 - a. Single pass compiler
 - b. Flow graph

P.T.O.

SECTION "C"

[2Q.× 8 = 16 marks]

Attempt ANY TWO questions.

8. Write the algorithm for the construction of canonical collection of LR(1) item. Using the following grammar construct the SLR parsing table and also parse the input "a*b+a" [3+3+2]

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T F \mid F$$

$$F \rightarrow F^* \mid a \mid b$$

9. Write the steps to compute *firstpos*, *lastpos*, *followpos*. For the given regular expression convert the regular expression $a(a|b)^*ab$ to DFA directly. [3+5]
10. Illustrate the importance of code optimization in compiler design. Explain various code optimization techniques in detail. [2+6]