27. a.i. Consider the grammar

$E \rightarrow I$

$E \rightarrow E + E$

$E \rightarrow E * E$

$E \rightarrow (E)$

$I \rightarrow \in | 0 | 1 | 2 | ..... | 9$

Check whether the grammar is ambiguous or not for the input string $D = 3 * 2 + 5$. Justricy

5 4 2 1,3,5

ii. Construct the predictive parser table for the following grammar

$E \rightarrow E + T | T$

$T \rightarrow T * F | F$

$F \rightarrow (E) | id$

5 3 2 1,3,5

(OR)

b. Consider the grammar

$A \rightarrow abC | aBd | aAD$

$B \leftarrow bB | \in$

$C \rightarrow d | \in$

$D \rightarrow a | b | \in$

Parse the input string $w = aabba$ using recursive descent parsing.

10 3 2 1,3,5

28. a.i. Compute leading and trailing for the following grammar

$S \rightarrow S - B | B$

$B \rightarrow B * A | A$

$A \rightarrow (S) | id$

4 3 3 1,4,5

ii. Construct a SLR parsing table for the following grammar

$S \rightarrow AA$

$A \rightarrow bA | d$

6 3 3 1,4,5

(OR)

b. Perform canonical LR parsing for the following grammar $S \rightarrow L = R | R$, $L \rightarrow *R | id, R \rightarrow L$.

10 3 3 1,4,5

29. a.i. Write down the translation scheme for declaration statements.

6 4 4 1,4,5

ii. Write the three address code for the expression $x = a + a(b - c) + (b - c) * d$.

4 3 4 1,4,5

(OR)

b. Why we need back patching? Write down the translation scheme for the following expression using back patching. $x < 100$ 11 $x > 200$ && $x != y$

10 4 4 1,4,5

30. a. Explain about peephole optimization technique.

10 4 5 1,3,4,5

(OR)

b. Write down the algorithm for construction of DAG. With example, explain stage by stage construction.

10 4 5 1,3,4,5

* * * * *

Reg. No.

B.Tech. DEGREE EXAMINATION, MAY 2022

Sixth Semester

18CSC304J – COMPILER DESIGN

(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours Max. Marks: 75

PART – A (25 × 1 = 25 Marks) Marks BL CO PO

Answer **ALL** Questions

1. In a compiler, keywords of a language are recognized during 1 1 1 1,5
   (A) Parsing of the program (B) The code generation
   (C) The lexical analysis of the program (D) Data flow analysis
2. The output of a lexical analyzer is 1 1 1 1,5
   (A) A parse tree (B) Intermediate code
   (C) Machine code (D) A stream of tokens
3. The number of tokens in the following C statement is 1 2 1 1,5
   printf("i = %d, & i = %x", i, &i);
   (A) 3 (B) 26
   (C) 10 (D) 21
4. The lexical analysis for a modern computer language such as java needs the power which one of the following machine models in a necessary and sufficient sense? 1 2 1 1,5
   (A) Deterministic pushdown automata (B) Non deterministic pushdown automata
   (C) Finite state automata (D) Turning machine
5. Which one of the following statement is false? 1 1 1 1,5
   (A) Type checking is done before parsing (B) CFG can be used to specify lexical and syntax rules
   (C) High-level language programs can be translated to different intermediate representation (D) Arguments to a function can be passed using the program stack
6. A CFG is not closed under 1 1 2 1,3,5
   (A) Iteration (B) Concatenation
   (C) Dot operation (D) Union operation
7. Which one of the following is a top-down parser? 1 2 2 1,3,5
   (A) Operator precedence parser (B) Recursive descent parser
   (C) An LR(K) parser (D) An LALR(K) parser

8. Parsing is also known as — 1 1 2 1,3,5
   (A) Lexical analysis (B) Syntax analysis
   (C) Sematic analysis (D) Code generation

9. Which of the following derivation does a top-down parser use while parsing an input string? The input is assumed to be scanned in left to right order. — 1 2 2 1,3,5
   (A) Right most derivation (B) Left most derivation
   (C) Right most derivation traced out in reverse (D) Left most derivation traced out in reverse

10. Grammar that produces more than one parse tree for the same sentence is — 1 1 2 1,3,5
    (A) Ambiguous (B) Unambiguous
    (C) Complementation (D) Concatenation intersection

11. If a state doesnot know whether it will make a shift operation or reduction for a terminal is called — 1 2 3 1,4,5
    (A) Shift/ reduce conflict (B) Reduce/ shift conflict
    (C) Shift conflict (D) Reduce conflict

12. A bottom-up parser generates — 1 1 3 1,4,5
    (A) Right most derivation (B) Left most derivation
    (C) Right most derivation in reverse (D) Left most derivation in reverse

13. Consider the statements: — 1 1 3 1,4,5
    P: every regular grammar is LL(1)
    Q: every regular set has a LR(1) grammar
    Which is true?
    (A) P is true Q is false (B) P is false Q is true
    (C) Both P and Q are true (D) Both P and Q are false

14. An LR parser can detect a syntax error as soon as — 1 2 3 1,4,5
    (A) The parsing starts (B) Left to right scan of the input
    (C) Right to left scan of the input (D) Parsing ends

15. Which is not a shift reduce parser action? — 1 1 3 1,4,5
    (A) Goto (B) Shift
    (C) Reduce (D) Accept

16. In the Compiler, the function of using intermediate code is — 1 2 4 1,4,5
    (A) To improve the register allocation (B) To increase the error reporting and recovery
    (C) To make sematic analysis easier (D) To increase the chances of re-using the machine-independent code optimizer in other Compilers

17. Which is an abstract form of intermediate code? — 1 1 4 1,4,5
    (A) Zero address (B) One address
    (C) Two address (D) Three address

18. Synthesized attributes of a node in the parse tree computed — 1 2 4 1,4,5
    (A) From the attributes of the left siblings (B) From the attributes of the right siblings
    (C) From the attributes of the root node (D) From the attributes of the children

19. Backpatching is useful for handling — 1 1 4 1,4,5
    (A) Forward reference (B) Backward reference
    (C) Conditional jumps (D) Unconditional jumps

20. Identify the function which generates three-address code — 1 1 4 1,4,5
    (A) new-label( ) (B) lookup( )
    (C) emit( ) (D) gen_code( )

21. Which of the following comment about peephole optimization is true? — 1 1 5 1,3,4,5
    (A) It is applied to a small part of the code and applied repeatedly (B) It can be used to optimize intermediate code
    (C) It can be applied to portion of the code that is not contiguous (D) It is applied in the symbol table to optimize the memory requirements

22. Class of following statement usually produces no executable code when compiled? — 1 2 5 1,3,4,5
    (A) Assignment statement (B) Declaration statement
    (C) Input and output statement (D) Structural statement

23. Substitution of values for names (whose values are in constants) is done in — 1 2 5 1,3,4,5
    (A) Local optimization (B) Loop optimization
    (C) Constant folding (D) Strength reduction

24. Graph that shows basic blocks and their successor relationship is called — 1 1 5 1,3,4,5
    (A) Control graph (B) Flow graph
    (C) Hamiltonian graph (D) DAG

25. Dead code elimination in machine code optimization refers to — 1 1 5 1,3,4,5
    (A) Removal of all labels (B) Removal of a module after its use
    (C) Removal of values that never get used (D) Removal of function which are not involved

PART – B (5 × 10 = 50 Marks) — Marks BL CO PO
Answer **ALL** Questions

26. a. Give the significance of the lexeme begin and forward pointer in input buffering scheme, with pseudo code. — 10 4 1 1,5

(OR)

b. Convert the regular expression $(a|b)^*abb$ into a DFA. — 10 3 1 1,5