32. a. Explain about global data flow analysis.

(OR)

b.i. Explain loop optimization techniques.

ii. Write short notes on parameter passing.

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B.Tech. DEGREE EXAMINATION, NOVEMBER 2019
Third to Seventh Semester

15CS314J – COMPILER DESIGN
(For the candidates admitted during the academic year 2015 – 2016 to 2017 – 2018)

Note:
(i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
(ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours   Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

1. Give a NFA, with N states, the maximum number of states in a equivalent minimized DFA is atleast
   (A) N^2 (B) 2^N
   (C) 2^N-1 (D) N1

2. The output of lexical analyzer is
   (A) Set of regular expression   (B) Syntax tree
   (C) Set of tokens   (D) String character

3. Which concept of finite state automata is used in compiler?
   (A) Lexical analyzer   (B) Parser
   (C) Code generator   (D) Code optimization

4. _____ in the source program is done in translation process.
   (A) Classes   (B) Objects
   (C) Errors   (D) Text

5. A grammar that produces more than one parse tree is called
   (A) Ambiguous grammar   (B) Unambiguous grammar
   (C) Regular grammar   (D) Context free grammar

6. Parsing is also known as
   (A) Lexical analysis   (B) Syntax analysis
   (C) Semantic analysis   (D) Code generation

7. The grammar $A \rightarrow AA \mid (A) \mid e$ is not suitable for predictive because the grammar is
   (A) Ambiguous   (B) Left recursive
   (C) Right recursive   (D) Operator grammar

8. A top down parser generates
   (A) Left most derivation   (B) Left most derivation in reverse
   (C) Right most derivation   (D) Right most derivation in reverse

9. The postfix notation of the expression $A * B + C / D$ is
   - (A) $*AB / CD +$
   - (B) $AB * CD / +$
   - (C) $A * BC + / D$
   - (D) $ABCD + / *$

10. Inherited attribute of a node in parse tree is computed from
    - (A) Left sibling and child
    - (B) Sibling
    - (C) Sibling and child
    - (D) Child

11. A syntax directed definition 'S' attribute if
    - (A) Every attribute is inherited
    - (B) Every attribute is synthesized
    - (C) Synthesized and inherited
    - (D) Null

12. Back patching is done for
    - (A) Assembly statement
    - (B) Case statement
    - (C) Flow of control statement
    - (D) Syntax tree generation

13. The specific task storage manager performs
    - (A) Allocation, deallocation of storage to programs
    - (B) Protection of storage area allocated to a program illegal access by other programs in the sly
    - (C) Status of each program
    - (D) Allocation, deallocation and protection of storage area allocated to the program

14. Consider the grammar $E \rightarrow E + n / E \times n / n$ for the sentence $n + n * n$ the handles in right sentential form of the reduction are
    - (A) $n, E + n$ and $E + n \times n$
    - (B) $n, E + n$ and $E + E \times n$
    - (C) $n, n + n$ and $n + n \times n$
    - (D) $n, E + n$ and $E \times n$

15. At which phase the specific register is picked to access the variable
    - (A) Register assignment
    - (B) Register allocation
    - (C) Procedure calls
    - (D) Register evaluation

16. Selection of set of values that will reside on the register at each point in the program is
    - (A) Register allocation
    - (B) Register assignment
    - (C) Procedure calls
    - (D) Register evaluation

17. The optimization which avoids test at every iteration is
    - (A) Loop unrolling
    - (B) Loop jamming
    - (C) Constant folding
    - (D) Sub expression elimination

18. A compiler for a high level language that runs on one machine and produces code for a different machine is called
    - (A) Optimizing compiler
    - (B) One pass compiler
    - (C) Cross compiler
    - (D) Multipass compiler

19. The identification of common sub expression and replacement of runtime computations by compile time computation is
    - (A) Local optimization
    - (B) Loop optimization
    - (C) Constant folding
    - (D) Dataflow analysis

20. Fragment of code that resides in the loop and computes the same value at each iteration is called
    - (A) Invariant code
    - (B) Induction analysis
    - (C) Strength reduction
    - (D) Loop reduction

PART – B (5 × 4 = 20 Marks)
Answer ANY FIVE Questions

21. Write short notes on LEX.

22. Check whether the given grammar is ambiguous.

23. Construct the leading and trailing for the following grammar,
    $E \rightarrow E + T \mid T, T \rightarrow T * F \mid F, F \rightarrow id$

24. Construct the three address code for $a(a < b + c)$ $a = a - c$; $c = b * c$.

25. Give the applications of Directed Acyclic Graph (DAG).

26. Write the SDT (Syntax Directed Translation) for type declaration statement.

27. Write short notes on dead code elimination.

PART – C (5 × 12 = 60 Marks)
Answer ALL Questions

28. a. Explain how input buffering helps lexical analyzer in compilation process with example.

    (OR)

    b. Explain the process of constructing an NFA from the regular expression. Find the NFA for the expression $(a \mid b)^* abb$.

29. a. Check whether the given grammar is LL(1) or not $S \rightarrow iEtS \mid iEtSeS \mid a, E \rightarrow b$.

    (OR)

    b. Design a LALR parser for the following grammar $S \rightarrow L = R \mid R, L \rightarrow *R \mid id, R \rightarrow L$ and parse the string $"id = id"$.

30. a. Write down the SDD (Syntax Directed Definition) to produce three address code for assignment statement.

    (OR)

    b. Explain back patching which example and SDD (Syntax Directed Definition).

31. a. Design a simple code generator.

    (OR)

    b. Construct DAG (Directed Acyclic Graph) and target code for the expression.
    $x = ((a + b) / (b - c)) - (a + b) * (b - c) + f$
    and explain the same.