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Paper Code : PCC-CS501 Compiler Design

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

[1 x 10 = 10]

1. Answer any ten of the following :
   (i) If all the operators are binary, then a string of operands and operators is a postfix expression if and only if _____
   (ii) Given a grammar G=(V, T, P, S) and every production in P is of the form A->α where A is in V and α is in (V U T)*, then G is _____
   (iii) A compiler running on computes with a small memory would normally be
   (iv) Input to LEX is
   (v) A basic block is _____
   (vi) Given a finite automaton M=(Q,Σ, δ , q0, F). If δ maps Q × Σ to 2 Q, then _____
   (vii) Given a string abc , the string acc is a _____
   (viii) A garbage is _____
   (ix) How many descriptors are used for track both the registers (for availability) and addresses (location of values) while generating the code?
   (x) A synthesized attribute is an attribute whose value at a parse tree node is defined in terms of _____
   (xi) Elimination of loop invariant computation is a peephole optimization. True/False?
   (xii) _____ is a loop optimization

Group-B (Short Answer Type Question)

Answer any three of the following [5 x 3 = 15]

2. Describe input buffering in lexical analyser. [5]
3. Explain the model of a non recursive predictive parser with a diagram. [5]
4. Find the output, given grammar G1 and associated semantic rules and input: aadbd [5]
   - S->AS {print(1)}
   - S->AB {print(2)}
   - A->a {print(3)}
   - B->b C {print(4)}
   - B->d B {print(5)}
   - C->c {print(6)}
5. What is ambiguity? Show that G2:{S->aS|Sa|a} is ambiguous [5]
6. What is code optimization? Optimize the following C-code: [5]

```
count=0;
result= 0;
while(count++ < 20)
{
increment= 2*count;
result +=increment;
}
```

Group-C (Long Answer Type Question)

Answer any three of the following [15 x 3 = 45]

7. For the following grammar [3+5+5+2]
E-> E or T|T
T->T and F|F
F-> not F|(E)| 0|1
a) Eliminate left recursion from the above grammar
b) Find FIRST(X),Follow(X) for each variable in the grammar
c) Construct a predictive parser table for the grammar
d) Is the above grammar LL(1). Justify your answer

8. a) What is a compiler? [2+10+3]
b) Explain the different phases of compiler with an example
c) Compare and contrast between a compiler and an interpreter [9+6]

9. i) Express the expression y=(a+b)*c in
a.)postfix notation
b.) Abstract syntax tree
c). Three address code
ii) Implement the TAC using
a. quadruples
b. triples
c. Indirect triples [3+6+3+3]

10. Consider the regular expression (a+b)*a(a+b)(a+b)
I. Augment the expression and construct the syntax tree for the above regular expression
II. Find Firstpos() and Lastpos() for every internal node in the syntax tree
III. Find Followpos() for every position in the syntax tree
IV. Construct the corresponding DFA for the given RE using Followpos() [1+5+9]

11. a) What is LEX?
b) Explain the working of LEX
c) Show the step by step construction of a lexical analyzer with the following three tokens
- a
- abb
- a*b+

*** END OF PAPER ***