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| B.E/B.TECH DEGREE END SEMESTER EXAMINATIONS , NOV 2017 | | | | | | | | | |
| Sixth Semester | | | | | | | | | |
| Information Technology | | | | | | | | | |
| 14UIT602 – COMPILER DESIGN | | | | | | | | | |
| Duration: 3 Hours | | | | | | Maximum: 100 Marks | | | |
|  | | | | | | Answer ALL questions | | | |
| PART - A (10 x 1 = 10 Marks)- | | | | | | | | | |
| 1. | | | \_\_\_\_\_ is a mnemonic version of machine code  (a) high-level language (b) machine language  (c) assembly language (d) intermediate code | | | | | | |
| 2. | | | A language is represented by a regular expression (a)\*(a + ba). Which of the following string does not belong to the regular set represented by the above expression?  (a) aaa (b) aba c) ababa (d) aa | | | | | | |
| 3. | | | The grammar that produces more than one parse tree for some sentences is called \_\_\_\_\_  (a) Ambiguous (b) Unambiguous (c) CFG (d) Recursive | | | | | | |
| 4. | | | The \_\_\_\_\_\_ values are computed using children nodes.  (a) Synthesized attributes (b) Inherited attributes  (c) S-attributes (d) L-attributes | | | | | | |
| 5. | | | The \_\_\_\_\_\_\_representation uses pointers to refer to variables in the symbol table.  (a) Quadruple ( b) Triple (c) Indirect triples (d) Two-address code | | | | | | |
| 6. | | | Which of the following selections gives the input to the parser or syntax analysis stage of compilation and the output, respectively?  (a) String of tokens of the source program (input); syntax tree representing the (derivation structure of the source program and error messages  (b) String of tokens of the source program; intermediate code representation  (c) Source program; abstract syntax tree (AST).  (d) Source program; intermediate code representation | | | | | | |
| 7. | | | Which selection does NOT directly pertain to the runtime environment? Select the best answer.  (a) Memory locations for basic data types and structures  (b) Encoded bit patterns for instructions  (c) Address space of an executing program  (d) Abstract syntax tree | | | | | | |
| 8. | | | DAG stands for  (a) Direct Acyclic Graph (b) Directed Acyclic Graph  (c) Direct Ambiguous Grammar (d) Directed Ambiguous Grammar | | | | | | |
| 9. | | | \_\_\_\_\_\_\_ is an optimization technique in which the amount of code in a loop is decreased.  (a) Code motion (b) Code generation  (c) Code optimization (d) Local optimization | | | | | | |
| 10. | | | \_\_\_\_\_\_\_is used to eliminate the common sub-expressions.  (a) DAG ( b) Flow graph  (c) Syntax directed graph (d) Syntax tree | | | | | | |
| PART- B (5 x 2 = 10 Marks) | | | | | | | | | |
| 11. | | | Draw the structure of language processing system. | | | | | | |
| 12. | | | Do left factoring for the following grammar  A 🡪 aAB|aA|a  B 🡪 bB|b | | | | | | |
| 13. | | | Translate the arithmetic express a\* (b + c) into   * 1. syntax tree   2. postfix notation   3. 3 address code | | | | | | |
| 14. | | | Construct the DAG for the following basic block d: = b\*c e: =a + b b: =b\*c a: =e-d. | | | | | | |
| 15. | | | Write down the characteristics of peephole optimization. | | | | | | |
| PART - C ( 5 x 16 = 80 Marks) | | | | | | | | | |
| 16. | | (a) | | | (i) Explain in detail the process of compilation. Illustrate the output of each phase of compilation for the input “a = ( b+c )\* ( b+c ) \* 2”.  (ii) Define the flowing terms Compiler, Interpreter, Translator and differentiate between them. | | | | (10)  (6) |
| Or | | | | | | | | | |
|  | | | (b) | | | (i) Write briefly about input buffering technique. Summarize the role in lexical analysis?  (ii) Write the regular definitions for the language of C identifiers like string of characters, digits, underscores and unsigned numbers (integer and floating point). | | | (8)    (8) |
| 17. | | | (a) | | | (i) Consider the following grammar  S 🡪 (L) | a  L 🡪 L, S |S  a) What are the terminals, non-terminals and start symbol?  b) Construct Parse trees for the sentences i) (a,(a,a)) ii) (a,((a,a),(a,a)))  c) Construct a leftmost derivation for the sentence (a,(a,a)).  d) Construct rightmost derivation for the sentence (a,((a,a),(a,a))).  e) What language does the grammar generate?  (ii) Summarize the approaches that are used for storage allocation with an appropriate example. | | | (10)  (6) |
| Or | | | | | | | | | |
|  | | | (b) | | | (i) Find the item I0 for the following grammar using CLR parsing  method.  G:S🡪AS,S🡪b A🡪SA, A🡪a  (ii) Explain briefly about type checking. | | | (10)  (6) |
| 18. | | | (a) | | | Generate the three address code and the equivalent semantic action for the following program fragment  While(a<c and b>d) do  If(a=1) then c=c+1;  Else while a<=d do  a=a+b | | | (16) |
| Or | | | | | | | | | |
|  | | | (b) | | | Using the translation of back patching for Boolean expressions, translate the following expression (a==b || c==d) || e==f. Show the true and false list for each sub expression. You may assume the address of the first instruction generated is 100. | | (16) | |
| 19. | | | (a) | | | (i)Write the code generation algorithm using Dynamic programming and generate code for the statement x= a/(b-c)-s\*(e+f).[Assume all instructions to be unit cost]  (ii) Explain the issues in the design of code generator | | (10)  (6) | |
| Or | | | | | | | | | |
|  | | | (b) | | | Construct DAG and optimal target code for the expression x=((a+b)/ (b-c))-(a+b)\*(b-c)+f. | | (16) | |
| 20. | | | (a) | | | What is copy propagation? Illustrate how the copy propagation facilitates other optimization opportunities. | | (16) | |
| Or | | | | | | | | | |
|  | | | (b) | | | What is the optimization techniques applied on procedure calls? Explain with example. | | (16) | |