Marks Scored:

KATHMANDU UNIVERSITY
End-Semester Examination
February/March, 2018

Level : B.E./B.Sc. Course : COMP 409
Year : III/IV Semester : II / I
Exam. Roll No. : Time: 30 mins. F. M. : 10

Registration No.: Date MAR 2 1 2018

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Tick (√) the correct answer(s) or fill in the blanks with most appropriate word/phrase.

1. An integrated set of routines for constructing various phases of a compiler is provided by
   [A] Virtual Machine Compiler [B] JIT Compiler
   [C] Compiler-construction toolkits [D] Native Code Compiler

2. In a compiler, grammar of the programming is checked during
   [A] Code optimization [B] Code generation
   [C] Semantic analysis [D] Syntax analysis

3. What is the output of a list of tokens ?
   [A] A parse tree [B] Intermediate code generation
   [C] Syntax Analyzer [D] lexical analyzer

4. In some programming languages, an identifier is permitted to be a letter followed by any number of letters or digits. If L and D denotes the sets of letters and digits respectively, which of the following expressions define an identifier?
   [A] (L U D)* [B] L(L U D)*
   [C] (L . D)* [D] L .(L.D)*

5. Type conversion is also called
   [A] Coercion [B] Name Mangling
   [C] Padding [D] A parse tree

6. The language which is generated by the grammar S → cSc | dSd | c | d over the alphabet {c,d} is the set of
   [A] All odd length palindromes
   [B] All even length palindrome
   [C] String that begins and end with the different symbol
   [D] All odd and even length palindromes

7. What are items used?
   [A] Shift reduce parser [B] LR parsing
   [C] Recursive descent parsing [D] Predictive parsing

8. A shift reduce parser carries out the actions specified within braces immediately after reducing with the corresponding rule of grammar

E → eeE (PRINT "3")
E → a (PRINT "2")
T →Eb (PRINT "1")

What is the translation of eeeeabb using the syntax directed translation scheme described by the above rules?

[A] 33211 [B] 21332 [C] 11233 [D] 21313

9. How many operators are there on the right side of the statement in there-address code?

[A] Only one [B] Two [C] Three [D] Four

Consider the following grammar

S → AS'
S' → +AS' | ε
A → BT'
A' → *BA' | ε
B → (S) | id

Question (10 to 11) are based on the given grammar.

10. FIRST(S) is:

[A] {+, ε} [B] {+,), $} [C] {*, ε } [D] { (, id}

11. FOLLOW(A) is:

[A] {+, ε } [B] {+,), $} [C] {*, ε } [D] { (, id}

12. Determination of exactly which register to place a given variable is called

[A] Register allocation [B] Register assignment
[C] Memory allocation [D] Variable assignment

13. The regular expression have all strings of 0's and 1's with no two consecutive 0's is

[A] (0+1) [B] (0+1)* [C] (0+ε) (1+10)* [D] (0+1)* 011

14. A parse tree showing the value of attributes at each node is

[A] Annotated parse tree [B] Syntax tree
[C] Semantic tree [D] Phrase marker

15. Consider node for production **T → T1*F,** so the T.val at this node is defined by

[A] T.val := T1.val * F1.val [B] T.val := T.val * F.val
[C] T.val := T.val * F.val [D] T.val := T1.val * F.val

16. During code optimization, which of the following is not local transformations?

[A] Algebraic Transformation [B] Dead Code Elimination
[C] Register Assignment [D] Interchange of Statements

17. A directed graph that contains attributes as nodes and dependencies across attributes as edges is

[A] Dependency graph [B] Hamiltonian graph
[C] Sub-graph [D] Parse tree

Consider the following grammar G':

S→ FR
R →*S | ε
F → id

Question (18-20) depends on given grammar G'

18. Which of the following string is generated by the given grammar?

[A] id*id*id [B] id*id* [C] *id [D] **id

19. For the correct answer in 17, how many steps are required to derive the string from S and how many parse trees are there?

[A] 6 and 1 [B] 6 and 2 [C] 7 and 1 [D] 9 and 1

20. The number of states in SLR automation for G' is:

[A] 5 [B] 6 [C] 7 [D] 8

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SECTION "B"
[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. Define finite automata. Construct finite automata that will accept a string at zeros and ones that contains an odd number of zeros and an even number of ones.

2. Explain lexical analyzer with diagram. Consider the context free grammar:
   S → SS+ | SS* | b
   a) Show how string bb+b* can be generated.
   b) Construct the parse tree for the string.
   c) What language does this grammar generates.

3. Consider the grammar:
   E→ E+T | T
   T→ T*F | F
   F → (E) | id
   a) Show the steps of shift-reduce parsing for the input string id+id*id
   b) Identify conflicts during the parsing.

4. Consider the grammar
   C→AB
   A→a
   B→b
   Calculate the canonical LR(0)items.

5. Describe the inherited and synthesizes attributes of grammar using an example.

6. Define three address code. Write three address code for
   a = - b *(c+d)

7. What is code optimization? Explain different types of loop optimization technique.

SECTION "C"
[2 Q × 8 = 16 marks]

Attempt *ANY TWO* questions.

8. Construct the LR (1) parsing table for the following grammar and explain whether there is shift reduce conflict or not.
   S → L=R
   S → R
   L → *R
   L →id
   R → L

9. What is LR parsing technique? Construct the SLR(1) parsing table for the following grammar .

S →Aa
S →Bc
A→ d
B→aA

10. Construct the Non-Recursive Predictive Parsing table for the following grammar and show the steps for input string: id+id.

E→ TE'
E'→ +TE' | ε
T → FT'
T'→ *FT' | ε
F →(E) | id