

KATHMANDU UNIVERSITY  
End Semester Examination  
February/March, 2018

Marks Scored:

Level : B.E.  
Year : III

Course : COMP 301  
Semester: I

Exam Roll No:

Time: 30 mins.

F.M. : 10

Registration No.:

Date MAR 13 2018

SECTION "A"

[20 Q.×0.5=10 marks]

Tick (✓) the best answer.

1. What was the first language for scientific application?  
[a] ALGOL 60      [b] FORTRAN      [c] COBOL      [d] SIMULA 67
2. The first language to provide even limited support for data abstraction was  
[a] ALGOL 60      [b] Prolog      [c] COBOL      [d] SIMULA 67
3. Having more than one way to accomplish a particular operation is called  
[a] Operator overloading      [b] Orthogonality  
[c] Feature multiplicity      [d] Abstraction
4. In von Neumann architecture  
[a] Both data and program are stored in the same memory.  
[b] Data is stored in memory and program is stored in CPU.  
[c] Both data and program are stored in the different memory.  
[d] Data is stored in CPU and program is stored in memory.
5. Which of the following is the metalanguage for programming language?  
[a] C++      [b] BNF      [c] List      [d] Structure
6. The hierarchical syntactic structure of the sentence of the language are called \_\_\_\_\_.  
[a] Parse tree      [b] Sentential form      [c] Derivation      [d] Grammar
7. Axiomatic semantics is based on mathematical logic called \_\_\_\_\_.  
[a] Assertions      [b] Modal logic  
[c] Propositional logic      [d] Computational logic
8. Finite automata can be designed to recognize a class of languages called \_\_\_\_\_.  
[a] Regular language      [b] Procedural Language  
[c] Imperative Language      [d] Infinite Language
9. Given a CFG \_\_\_\_\_.

$S \rightarrow 0AS|0, A \rightarrow S1A|SS|10$

The string produced by above grammar is

- [a] 1001101      [b] 001001100      [c] 011001100      [d] 001001001

10. Left recursion is not accepted by \_\_\_\_\_.
- [a] SLR parser [b] LALR parser  
[c] Shift-Reduce parser [d] LL(1) parser
11. A special word of a programming language that cannot be used as a name
- [a] Variable [b] Reserved word  
[c] Dynamic Variable [d] Static Variable
12. The process of placing memory cell that has been unbound from a variable back into the pool of available memory is
- [a] Allocation [b] Lifetime [c] Deallocation [d] Reallocation
13. Nameless(abstract) memory cells that are allocated and deallocated by explicit run-time instructions specified by the programmer are
- [a] Stack-Dynamic Variable [b] Static Variable  
[c] Explicit Heap-Dynamic Variable [d] Implicit Heap-Dynamic Variable
14. The collection of all variables that are visible in the statement is called
- [a] Static Variable [b] Dynamic Variable  
[c] Stack-Dynamic Variable [d] Referencing Environment
15. A variable that is bound to a value only once is \_\_\_\_\_.
- [a] Named Constant [b] Readonly Constant  
[c] Final Reserved Word [d] l-value of a variable
16. An area of memory that store the attributes of a variable is
- [a] A Descriptor [b] A Primitive Data Types  
[c] Register [d] Reference Substring
17. Variable without names are called \_\_\_\_\_.
- [a] Dynamic Variable [b] Heap-Dynamic Variable  
[c] Referencing Environment [d] Anonymous Variable
18. A general data-based iteration statement uses a user-defined data structure and a user-defined function to go through the structure's element. This function is called
- [a] Iteration [b] Iterator  
[c] Unconditional Branching [d] User-Defined Function
19. A subprogram that has the same name as another subprogram in the same referencing environment is \_\_\_\_\_.
- [a] Generic Subprogram [b] Overloaded Subprogram  
[c] Subprogram Call [d] Subprogram Header
20. The issue of referencing environment for executing the passed subprogram where the environment of the call statement that enacts the passed subprogram is \_\_\_\_\_.
- [a] Deep Binding [b] Ad Hoc Binding  
[c] Shallow Binding [d] Ad Hoc Polymorphism

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F.M. : 40

SECTION "B"  
[6 Q.×4=24 marks]

Attempt ANY SIX questions.

1. The two mathematical models of language description are generation and recognition. Describe how each can define the syntax of a programming language.
2. Define a left-recursive grammar rule. Compute the weakest precondition for each of the following assignment statements and postconditions:
  - i.  $a = 2 * (b-1) - 1 \{a > 0\}$
  - ii.  $b = (c+10) / 3 \{b > 6\}$
3. Give short description about *lifetime*, *scope*, *static scope*, and *dynamic scope* of a variable.
4. What is a *mixed-mode expression*? Also, explain a *heterogeneous array*.
5. What is *short-circuit evaluation*? Define *operator precedence* and *operator associativity*.
6. Give the definition of *control structure*. Explain about the design issues for *selection structure*.
7. What are the three general characteristics of *subprograms*? Also explain about *subprogram protocol*.

SECTION "C"  
[2 Q.×8=16 marks]

Attempt ALL questions.

8. Why is it needed to study concepts of programming language and language evaluation criteria?
9. What are the two distinct goals of syntax analysis? Distinguish between top-down and bottom-up parsers.

Given the following BNF grammar:

$\langle \text{assign} \rangle \rightarrow \langle \text{id} \rangle = \langle \text{expr} \rangle$   
 $\langle \text{id} \rangle \rightarrow A | B | C$   
 $\langle \text{expr} \rangle \rightarrow \langle \text{id} \rangle + \langle \text{expr} \rangle$   
                  |  $\langle \text{id} \rangle * \langle \text{expr} \rangle$   
                  |  $(\langle \text{expr} \rangle)$   
                  |  $\langle \text{id} \rangle$

Draw a parse tree for the statement  $A = B*(A+C)$  and express the grammar in EBNF form.

