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**Code No.: 32113 AS**

# VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD
### B.E. (C.S.E.) III Year II-Semester Advanced Supplementary Examinations, June/July-2017

## Principles of Programming Languages

Time: 3 hours             Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE from Part-B*

### Part-A (10 × 2 = 20 Marks)

1. List the different aspects of the cost of a programming language.

2. Define the language specified by the given grammar
    $$<S> \rightarrow <A><B><C>$$
    $$<A> \rightarrow a<A> \mid a$$
    $$<B> \rightarrow b<B> \mid b$$
    $$<C> \rightarrow c<C> \mid c$$

3. Write the compile time descriptor and run time descriptor for static strings and dynamic strings respectively.

4. Identify two languages which follows Type coercion. Mention two issues of type coercion in those languages.

5. Consider the following program, if the language has dynamic scoping and parameters are passed by reference, what will be printed by the program?

    ```
    Program P2
        var n: int:
            procedure W(var x: int)
            begin
              x=x+1;
              print x;
            end
            procedure D
            begin
            var n: int;
              n=3;
              W(n);
            end
        begin //beginP2
         n=10;
         D;
        End
    ```

6. In the code below, If it is Static scoping foo() and bar() returns what in main function.

    ```
    int b = 5;
    int foo()
    {
    int a = b + 5;
      return a;
    }
    int bar()
    {
    int b = 2;
      return foo();
    }
    int main()
    {
    foo();
    bar();
      return 0;
    }
    ```

7. What is the purpose of a C++ constructor?

8. Identify the difference between binary semaphore and counting semaphore.

9. Give general definitions of resolution and unification.

10. Examine the differences between = , EQ?, EQV? and EQUAL?

### Part-B (5 × 10 = 50 Marks)
### (All bits carry equal marks)

11. a) Discuss the parameters of language evaluation criteria.

    b) Prove that the following grammar is Ambiguous

    <S>    → <A>
    <A>  →<A> +<A> | <id>
    <id>  → a | b| c

12. a) Use the following code to answer the following. Assume scope rules similar to Pascal and Algol.

```
Program A;
 x, y : integer;
Procedure B;
x : integer;
begin
      x := 3;
      print(x, y)
end procedure B;
Procedure C;
y : integer;
begin
      y := 7;
      call B
      print(x, y);
end procedure C;
begin {main program}
      x := 9;
      y := 1;
      call C;
end Program A.
```

    i)  What is the output of the program if static scoping is used?

    ii) What is the output of the program if dynamic scoping is used?

    b) Write the sequence of operations which may results in dangling pointers and memory leakage.

13. a) Consider the following 'C ' program ,which uses recursion to compute the factorial function.

```
int factorial(int n)
{ ←—————————————————— 1
    if(n<=1)
    return 1;
    else return(n*factorial(n-1));
} ←—————————————————— 2
void main()
{
    int value;
    value=factorial(3);
} ←—————————————————— 3
```

Construct the stack with all activation record instances, when execution reaches position 1 in the above skeletal program.

b) Consider the following program written in 'C' Syntax

```
void swap(int a,int b)
{
    int temp;
    temp=a;
    a=b;
    b=temp;
}
void main()
{
int value=2,list[5]={1,3,5,7,9};
swap(value, list[0]);
swap(list[0], list[1]);
swap(value, list[value]);
}
```

For each of the following parameter passing methods, what are the values of the variables value and list after each of the three calls to swap?
i) passed by value
ii) passed by reference
iii) passed by value-result

14. a) Explain various types of inheritance with examples

b) Implement Exception handling concept using C++

15. a) Write a PROLOG program to append two lists and trace it.

b) Write a LISP function no-of-occur with two arguments: an element and a list, which returns the number of occurrences of an element in the given list
Ex: (no-of-occur 'a' (a b a c a d)) then o/p is 3.

16. a) Explain what is meant by short-circuiting of boolean expressions. List a language that uses short-circuiting and one that doesn't.

b) i)   Construct the grammar for the language consisting of strings that have "n" copies of the letter 'a' followed by the same number of copies of the letter 'b', where n>0.

ii)   Draw parse trees for the sentences aabb and aaaabbbb as derived from the above grammar.

17. Answer any *two* of the following:

a)   Coroutines

b)   Java Threads

c)   Standard data types in Python.