COMP-3-3 (RC 07-08)

S.E. (Computer) Semester III (Revised 2007-08) Examination, May 2009
PRINCIPLES OF PROGRAMMING LANGUAGES

Duration : 3 Hours Total Marks : 100

*Instructions : 1) Attempt **any five** questions by selecting at least **one** from **each** module.*
*2) Assume suitable data if **necessary**.*

MODULE – I

1. a) Define the following terms : Syntax, semantics, grammar, parser, and ambiguity. 5

b) Express the following informal syntax rules in XBNF (Extended BNF) : 9

i) An expression is the sum of a number of terms like this term 1+ term 2 + term 3.....

1*2
1*2+3
1*2+X*Y+4*a*c
2+1*(1+2*3)

ii) A term is the product of factors like this : factor 1* factor 2* factor 3.....

4*a*c

Compare the two representations.

c) State and explain the various reasons for studying programming. What is language standardization ? Mention and explain the types of standards. 6

2. a) Write short notes on : (3+5)

i) Virtual Computers.

ii) Phases of Compiler.

b) Construct a recursive descent parsing algorithm for arithmetic statements in PASCAL. 7

c) What is type definition ? Provide an example. 5

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MODULE – II

3. a) Examine the following program. Assume dynamic type checking. At which lines in the program will a type mismatch error be generated (assume execution begins in main and if a type error occurs the resulting test fails, that is evaluates to false, but execution continues) ? 5

```
Line #
        foo ( ) {
1       if (variable < 10)
2       variable = 4;
        else
3       Variable = "harry" ;
        return variable;
        }
        main ( ) {
4       variable = "joe";
5       if (foo ( ) < 23)) print "success !" ;
```

b) What do you mean by unification ? Explain with an example. 5

c) Explain the following storage management techniques : 8

a) Stack based storage management.

b) Heap based storage management.

d) Provide pros and cons of compilation and interpretation. 2

4. a) Explicit return by a programmer or system has problem of garbage and dangling references. Explain with an example, how reference technique handles this. 8

b) Explain the various control statements provided in C++. 7

c) Give proper specification and implementation for a recursive subprogram. 5

MODULE – III

5. a) Explain the concepts of retention and deletion with respect to local referencing environment. 5

b) Consider the following C function : 6

```
void multiply (int m, int n)
{     m = m * n;
      cout << m << "," << n << endl;
}
```

Suppose the function is called with actual parameters i, j where i=2, j=3. If we are using call-by-value show what is printed when called with :

i) multiply (i, j) and ii) multiply (i, i).

Now suppose that the parameters could be replaced by call-by-value-result parameters. Repeat parts (a) and (b) and explain the different effect (if any).

c) What do you mean by static scope ? Explain the importance of it ? 9

6. a) Explain block structure of C++ with respect to variables. 7

b) What do you mean by sharing explicit variables ? Explain with an example. 6

c) What do you mean by aliasing of objects. Give an example. 5

d) What is inheritance ? Why is it important ? 2

MODULE – IV

7. a) What do you mean by concurrent programming ? Explain with examples. 6

b) Write a PROLOG program to calculate factorial of a given number. 6

c) Explain abstraction and encapsulation in FORTRAN. 5

d) What do you understand by backtracking in PROLOG ? 3

8. a) Explain readers-writers problem. Discuss its solution using semaphores. 8

b) Write short notes on the following **(any two)** : 12

i) Sequence control in LISP.

ii) Storage management in PASCAL.

iii) Monitors.
