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Printed Pages : 4

MCA - 204

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1469

Roll No.

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M. C. A.

(SEM. II) EXAMINATION, 2006-07

PARADIGMS OF PROGRAMMING

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions.

- 1 Answer any **four** parts : 5×4=20
- a. Programming languages can be implemented 5
via compilation or via interpretation. The output produced by a program should be the same regardless of which of these approaches is used. Why then might one prefer compilation over interpretation or vice-versa.
 - b. For the following statement of a programming 5
language discuss various types of bindings and the time when these bindings are done.
 $X := X + 10$
 - c. What are the various phases in the structure 5
of a compiler. Define semantic analysis in brief.
 - d. Describe the four basic computational models 5
that describe most programming languages.
 - e. What is extended BNF notation? Illustrate 5
through an example?
 - f. Discuss the pros and cons of virtual 5
computer approach.

Answer any **four** parts of the following :

5×4=20

- a. Why use structuring concepts such as Cartesian product and power sets to define a language composite types? Explain the relationship between types and sets.
- b. Consider the following code fragment

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

```

Suppose the function is called with actual parameters i, j when I = 2, j = 3, what is printed when called with

- (i) multiply (i, j) (ii) multiply (i, i) by using call by value and call-by-value-result parameter transmission scheme.
- c. State the visibility, lifetime initialized value and purpose of local, global and static variables in programming languages.
- d. Show the lifetimes of the variables in the following C programme and indicate which are statically vs. dynamically allocated

```
Int m;
    Void s( ) {
        Float z;
        Z=1.0;
    }
Void R (int n) {
    If (n>0)
        R (n-1)
        S( );
}
Int main ( ) {
    M = 3;
    R (1);
    Return 1 ;
}

```

- e. What is an activation record? Describe the role of current instruction pointer (CIP) and current environment pointer (CEP) in the implementation of recursive sub-programs. **5**
- f. In many programming languages strings are defined to be arrays of characters. Compare the consequences of this when a string variable is : **5**
1. a static array
 2. a dynamic array
 3. a flexible array.

Attempt any **two** parts of the following : **10×2=20**

- a. Define the following terms : **10**
- i) object
 - ii) class
 - iii) polymorphism
 - iv) inheritance
 - v) abstraction
- b. Why virtual functions are required? Illustrate the use through an example in any object oriented language. **10**
- c. Define a polymorphic function “reverse” in M/L that takes a list of objects of some type and reverses the order. **10**

Attempt any **two** parts of the following : **10×2=20**

- a. What are eager, normal-order and lazy evaluation? Consider the following ML functions. **10**

Fun $sqr (n ; int) = n * n$; and function call $Sqr (p + q)$ with $p=2$ & $q=5$ show the binding and evaluation of the function in case of eager, normal – order and lazy evaluation.

- b. What are curried functions in functional programming? Write a procedure to merge two sorted lists (with arbitrary lengths) producing a third list. **10**
- c. Discuss the advantages and disadvantages of functional programming. **10**

Attempt any **two** parts of the following : **10×2=20**

a. Given that : **10**

i) $\forall x$ [physician) (x) \rightarrow knows surgery (x)]

ii) physician (Bhaskar)

Prove that knows_surgery (Bhaskar)

b. What is first order predicate logic? Convert the following formula into clause form. **10**

$$\forall x \left[\forall y P(x, y) \rightarrow \forall y (Q(x, y) \rightarrow R(x, y)) \right]$$

c. What is the unification algorithm? Find the most general unifier (MGU) of $A(x, f(g(x)), 9)$ and $A(b, y, z)$ **10**

