

Code : 051610

B.Tech 6th Semester Exam., 2015

PRINCIPLES OF PROGRAMMING
LANGUAGES

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. **1** is compulsory.

1. Choose the correct option of the following
(any seven) : $2 \times 7 = 14$

- (a) The most appropriate matching for the pairs

X : Indirect addressing	1. Loops
Y : Immediate addressing	2. Pointers
Z : Auto-decrement addressing	3. Constants

is

- (i) X—3, Y—2, Z—1
- (ii) X—1, Y—3, Z—2
- (iii) X—2, Y—3, Z—1
- (iv) X—3, Y—1, Z—2

(2)

- (b) Aliasing in the context of programming languages refers to
- multiple variables having the same memory location
 - multiple variables having the same value
 - multiple variables having the same identifier
 - multiple uses of the same variable
- (c) What is printed by the print statements in the following program P1 assuming call by reference parameter passing?

Program P1()

```
{
    x=10;
    y=3;
    func1(y, x, x);
    print x;
    print y;
}
func1 (x, y, z)
{
    y=y+4;
    z=x+y+z;
}
```

- 10, 3
- 31, 3
- 27, 7
- None of the above

AK15—820/590

(Continued)

(3)

- (d) Consider the following program

ProgramP2

```

varn: int;
procedureW(varx: int)
begin
    x=x+1;
    print x;
end
```

procedureD

begin

```

varn: int;
n=3;
W(n);
end
begin//beginP2
n=10;
D;
End
```

If the language has dynamic scoping and parameters are passed by reference, what will be printed by the program?

- 10
- 11
- 3
- None of the above

AK15—820/590

(Turn Over)

(4)

- (e) The results returned by functions under value-result and reference parameter passing conventions
- do not differ
 - differ in the presence of loops
 - differ in all classes
 - may differ in the presence of exceptions

- (f) Consider the following program in C language :

```
#include <stdio.h>
main()
{
    int i;
    int *pi = &i;
    scanf("%d", pi);
    printf("%d\n", i+5);
}
```

Which one of the following statements is true?

- Compilation fails
- Execution results in a run-time error
- On execution, the value printed is 5 more than the address of variable i
- On execution, the value printed is 5 more than the integer value entered

(5)

- (g) Consider the function func shown below :

```
intfunc(intnum)
{
    intcount = 0;
    while(num)
    {
        count++;
        num >= 1;
    }
    return(count);
}
```

The value returned by ~~func(435)~~ is

- 7
- 8
- 9
- 10

- (h) Consider the C function given below :

```
intf(intj)
{
    staticinti = 50;
    intk;
    if(i==j)
    {
        printf("something");
        k = f(i);
        return0;
    }
    else return0;
}
```

Which one of the following is true?

- The function returns 0 for all values of j

- (ii) The function prints the string something for all values of j
- (iii) The function returns 0 when $j = 50$
- (iv) The function will exhaust the run-time stack or run into an infinite loop when $j = 50$
- (v) Consider the C function given below. Assume that the array listA contains $n (> 0)$ elements sorted in ascending order :

```
intProcessArray(int*listA, intx, intn)
{
    inti, j, k;
    i = 0;
    j = n-1;
    do{
        k = (i+j)/2;
        if(x <= listA[k])
            j = k-1;
        if(listA[k] <= x)
            i = k+1;
    } while(i <= j);
    if(listA[k] == x)
        return(k);
    else
        return-1;
}
```

Which one of the following statements about the function ProcessArray is correct?

- (i) It will run into an infinite loop when x is not in listA

- (ii) It is an implementation of binary search
- (iii) It will always find the maximum element in listA
- (iv) It will return -1 even when x is present in listA

- (v) Consider the following function :

```
doublef(doublex)
{
    if(abs(x*x - 3) < 0.01) returnx;
    else returnf(x/2 + 1.5/x);
}
```

Give a value q (to 2 decimals), such that $f(q)$ will return

- (i) $q : 1.854$
 (ii) $q : 1.732$
 (iii) $q : 1.975$
 (iv) $q : 1.284$

2. (a) What is polymorphism? How can run-time and compile-time polymorphisms be achieved? Explain with program example.

1+6=1

- (b) Write a program in C++/Java to create a class Vehicle, the properties of which are—vehicle number, number of wheels and maximum speed. Also create two child classes—Car (new property is—

(8)

number of passengers) and Truck (new property is—load limit). Now create several objects of both the child classes and find out the average speed of which type is greater.

7

3. (a) State different types of inheritances. What are the differences between abstract class and interface? $3+4=7$

- (b) Write a program to create an abstract class Employee, the abstract method of which is salary(). Now create a child class to inherit the class Employee and define its abstract method.

7

4. (a) Find out the output of the following code :

7

```
#include<iostream.h>
int n=10;
void main()
{
    int n=5;
    {
        int n=20;
        cout<<"Inside block \n"<<n;
    }
    cout<<"Outside block \n"<<n;
    cout<<"Outside block and scope
          resolved \n"<<n;
}
```

- (b) Explain different storage classes in C language.

7

(9)

5. (a) What is heap? Create a heap with the following numbers :

24, 45, 76, 49, 65, 29, 50

Now sort the heap.

7

- (b) Explain the organization of a conventional computer with proper block diagram.

7

6. Write short notes on the following : $7+7=14$

(a) Firmware computer

(b) ADT

7. (a) Explain call by value and call by reference with example.

7

- (b) Describe scalar and composite data types.

7

8. (a) Describe BNF notation.

7

- (b) What are the different types of grammar for programming languages?

7

9. (a) Illustrate well-known skeleton patterns for parallel programming with example.

7

- (b) What are the different translation phases for programming languages? Write the characteristics of translation phases.

 $3+4=7$
