Amrita Vishwa Vidyapeetham

Amrita School of Engineering, Coimbatore.

Department of Computer Science and Engineering

Missed Evaluation Lab

19CSE205: Program Reasoning

Duration : 1 hour   **COs: CO2, CO4**

Total Marks = 25 Marks [10 + 10 + 5 (Viva)]

Instructions:

1. All answers require some explanation.
2. For Frama-c output, **you need to show the output by sharing the screen to the evaluators.**
3. Create a word document of answers along with the screenshot (please follow the question order, right question number). Accepted formats: .docx or .pdf. Other formats not accepted
4. Document should include the exam header, and your name and roll number.
5. The submission is due at 3.15pm and viva/evaluation will start immediately.

PART A (10 + 10 = 20 Marks)

1. Given the array of size n, set the value of an array element to 0, if the array element is negative else double its value.

```
void arrayinc(int* a, int n)

 {

 for (int i = 0; i < n; i++) {

if( a[i] < 0)

            a[i] = 0;

else

   a[i] = 2*a[i];

    }

  }
```

   i.   Define the pre-conditions and show them in Frama-C [1]
  ii.   Define the post-conditions and give a brief explanation for your choice. [2]
 iii.   Give the loop invariants to verify total and partial correctness and give brief justification for the same. [4]

iv.   Show the correctness of your verification conditions using Frama-C [3]

2. The program given below searches for an element in the array.

Arraysearch(int a[], int n)

{

  int x, p, found;

   p = 0;

   found = 0;

   while (p < n)

{

if (x = a[p])

 {

    found = 1;

    break;

 }

p = p + 1;

  }

     }

identify the following for the given program

   i.   output condition (2 marks)
   ii.   loop invariant(1 mark)
   iii.   Derive the inrtra loop condition(2 marks)
   iv.   Derive the exit loop condition and start condition(2 marks)
   v.   Verify the code in Altergo(3 marks). Hint : arrays are declared in Alt ergo as forall a : int farray.