2.5.14

# Indian Institute of Engineering Science and Technology, Shibpur
## B.E. (CST) 8th Semester Examination, 2013-14
### Software Engineering (CS 801)

**Full Marks: 70**                                                                 **Time: 3 hours**

**Attempt questions 1 and 2, and any three from the rest**
**All questions must be answered in a single answer booklet**

## Question 1 (compulsory)

A certain project can be split into 7 distinct activities A, B, ..., G. The time (in days) to complete each activity is as given below, along with the dependencies between the tasks.

| Activity | Order / dependency | Estimated time |
|----------|-------------------|----------------|
| A | Must be done first | 4 |
| B | Can only start when A is completed | 6 |
| C | Can only start when A is completed | 7 |
| D | Can only start when B is completed | 8 |
| E | Can only start when C is completed | 10 |
| F | Can only start when D and E are completed | 9 |
| G | Can only start when D, E and F are completed | 5 |

(a) Draw the activity network for the project.

(b) For each activity, compute the earliest time at which it can start, and the latest time at which the activity must start so that the project can be completed as early as possible.

(c) Find the slack time for each activity, and identify the critical path.                     $[5 + (5 + 5) + 5]$

## Question 2 (compulsory)

Consider the following function in C programming language, which computes the Greatest Common Divisor of two integers:

```c
int gcd ( int m, int n ) {
        int r ;
        if (m <= 0 || n <= 0) {      return -1 ;        }        /* invalid inputs */
        else {
                while ( r != 0 ) {
                        r = m % n ;
                        m = n ;
                        n = r ;
                }
        }
        return n ;
}
```

(a) If the above function is to be tested using a *black-box* testing methodology, describe some of the test cases that should be included in the test suite.

(b) Draw the control flow graph for the function. Find all linearly independent paths in the control flow graph and suggest a test case that covers each of these paths.

(c) Define McCabe's cyclomatic complexity of a code. Compute the cyclomatic complexity of the above function.                                                                     [5 + 10 + 5]


**Attempt any THREE of the remaining questions (3 x 10 = 30)**

**(3)** Compare the waterfall and agile life cycle models of software development, stating the major differences in the philosophy of the two models.


**(4)** State the various documents (apart from source code) which are developed in the course of a software development project, briefly describing the contents of each.


**(5)** State and explain five important characteristics of a good user-interface for software.


**(6)** Explain the following metrics for software reliability: ROCOF, MTTF, MTTR, Availability. Describe the statistical testing method of estimating reliability of software.


**(7)** Describe briefly the five levels of the SEI Capability Maturity Model. How does SEI CMM compare with the ISO 9000 standard?