National Institute of Technology, Rourkela

Name of the Examination: M. Tech./PhD End-Semester (Autumn 2021-22)

Branch : CS **Semester : I**

Title of the Course : Advanced Software Engineering

Course Code : CS6401

Time : 2 Hours **Maximum Marks: 50**

General Instruction :

1. Attempt all questions from **Section A.**
2. Attempt any **five (5)** questions from **Section B.**

Section-A **(50 x 0.5 = 25)**

(Attempt all of the MCQ questions)

1. This section contains 50 Multiple Choice Questions. Each question carries 0.5 Marks.

Section-B **(5 x 5 = 25)**

(Attempt any five (5) of the following questions)

1. What are different ways of writing a system's requirements specification? Explain each briefly along with their advantages and disadvantages? **(5 Marks)**

(2+2+1=5 Marks)

2. You have been assigned to a software team that is developing software, called MemoryDoubler that provides greater apparent memory for a PC than physical memory. This is accomplished by identifying, collecting, and reassigning blocks of memory that have been assigned to an existing application but are not being used. The unused blocks are reassigned to applications that require additional memory. Making appropriate assumptions and using natural language, define

(a) The data invariant
(b) The state
(c) The operations that are likely

(5 Marks)

3. Look carefully at how messages and mailboxes are represented in the e-mail system that you use. Model the object classes that might be used in the system implementation to represent a mailbox and an e-mail message.

(2.5 x 2= 5 Marks)

4. Draw state diagrams of the control software for:

(i) An automatic washing machine that has different programs for different types of clothes.

(ii) A telephone answering system that records incoming messages and displays the number of accepted messages on an LED. The system should allow the telephone customer to dial in from any location, type a sequence of numbers (identified as tones), and play any recorded messages.

(5 Marks)

5. Explain the similarities in the objectives and practices of the RAD, agile, and extreme programming (XP) models of software development. Also, explain the dissimilarities among these three models.

(5 Marks)

6. Explain how Putnam's model can be used to compute the change in project cost with project duration. What are the main disadvantages of using the Putnam's model to compute the additional costs incurred due to schedule compression? How can you overcome them?

(1+2+2=5 Marks)

7. Answer the following three questions:

(a) Distinguish between a test scenario and a test case?

(b) What are driver and stub modules in the context of integration and unit testing of software? Why are the stub and driver modules required?

(c) What do you understand by positive and negative test cases? Give one example of each for a function that checks whether a triangle can be formed from three sides whose lengths have been specified.