# Kenya Methodist University
# End of Trimester Exam, April 2007

**Faculty** : **Sciences**
**Department** : **Mathematics and Computer Science**
**Course Code** : **COMP 420**
**Course Title** : **Software Engineering Principles**
**Time** : **3 Hours**

**Instructions:** Answer **ALL** questions in **SECTION A** and only **TWO** questions in **SECTION B**.

**Section A.   Answer all questions (33 marks total)**

1   Who are the expected readers of a requirements specification and what properties do they want the specification to have? (3 marks)

2   Briefly explain how you can ensure traceability of requirements through software development?  (3 marks)

3   Briefly explain what activities would be done if a requirement
   a   was altered; (3 marks)
   b   added (3 marks)

4   Briefly explain how one can measure whether executable code is good enough to present to the customer for evaluation. (3 marks)

5   Consider the construction of software for the market versus software ordered by a customer. Describe briefly how this distinction influences each phase of a project in the waterfall model. (3 marks)

6   Explain the difference between white box and black box testing. (3 marks)

7   Compare and contrast top-down and bottom-up testing. What are the advantages and disadvantages of each? (3 marks)

8   A serious, non-trivial bug is detected in a program. A version that works around the bug is installed the next day. What further steps have to be taken? (3 marks)

9   Why is random testing insufficient even for relatively small programs? (3 marks)

10 Define the terms Verification and Validation.  Why is each insufficient on its own?  What makes validation particularly hard?  (3 marks)

11 The traditional approach to software verification is testing.  However, studies have indicated that inspection can be more cost effective at detecting errors.  Why is this?  (3 marks)

**Section B Answer any 2 questions (12-15) and specifically identify which are to be graded (20 Total Marks)**

12 A railway signaling system consists of two parts: the traffic direction system (allowing operators to send trains to their correct destinations) and the control system (that prevents collisions and derailments). (a+b: 10 marks)

    a   Why are these systems separated?
    b   The control system is obviously safety-critical. Argue why the traffic direction system also can be safety-critical.

13 Would you want to work in a company that fully applies the Cleanroom model in every project, and that only accepts projects for which the Cleanroom model is suitable? Motivate your answer.

    a   (Since both "yes" and "no" and even "it depends" are correct answers, points are given for motivation only. Your motivation must show that you know what Cleanroom is.) (10 marks)

14 Briefly describe the following strategies for OO analysis and design, and give advantages and disadvantages of each strategy. (10 marks, 5 each)
    a   CRC cards,
    b   UML class diagrams.

15 The following figure demonstrates the flow of variables into and out of modules. Module A has 3 subordinate modules, B, C and D. A passes a value $w$ to B and to C. A passes a value $x$ to D which returns a value $y$. Module C uses $w$ to calculate the $z$ it passes to D. B writes to the global Data Structure and C and D read from it. What are the FanIn-FanOut measures for each module and the total IF4, Information Flow value. (10 marks)