NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2002

SUBJECT: ADVANCED SOFTWARE ENGINEERING
CODE: SCS 5205

INSTRUCTION TO CANDIDATES
1.   Answer the two questions in section A and any three from Section B.
2.   All questions carry equal marks

Time: 3 hours

SECTION A

QUESTIO ONE

a)   Describe to a layman what the COCOMO model is all about. Include in
      your description information about modes, cost drivers, and the different
      levels of the COCOMO model.   [12]

b)   You are in charge of developing two 25KDSI organic mode products. Both
      are nominal in every respect except that product P1 has extra high
      complexity and product P2 has very low complexity. To develop the
      products, you have two teams at your disposal. Team A has very high
      analyst capability applications experience and programmer capability and
      high virtual machine experience and programming language experience.
      Team B is rated very low on all five attributes.

      (i)   What is the total effort if team A develops product P1 and B
             develops P2?
      (ii)   What is the duration of the whole project?   [8]

QUESTION TWO

There are generally:
a)   What are the strengths and weaknesses of top down implementation and
      integration?   [4]

b)   What are the strengths and weaknesses of bottom-up implementation and
      integration?   [4]

c)   What are the strengths and weaknesses of sandwich implementation and
      integration?   [4]

d)   Distinguish between logic functions and operational function in the
      implementation and integration phase.   [2]

e)   Give reasons why implementation and integration much proceed in
      parallel.   [2]

f)   Distinguish between product testing and acceptance testing. What are
      the similarities and what are the major differences between the two?
                                                                         [2]

g)   Defensive programming is a good software engineering practice. At the
      same time it can prevent operational functions from being tested
      sufficiently for reuse purposes. How can this be resolved?   [2]

SECTION B

QUESTIO THREE

a)   What are the basic concepts underlying object-oriented design?   [5]

b)   The benefits of using a rapid prototype as a specification tool far outweigh
      its disadvantages. Discuss.   [5]

c)   Draw a data flow diagram for a payroll system.   [10]

QUESTION FOUR

a)   Initially structured programming was understood to mean goto-less
      programming. What is your opinion of structured programming?   [5]

b)   Define the three testing techniques

      (i)   Code inspection.   [2]
      (ii)   Black box test.   [2]
      (iii)   Glass box test.   .   [2]

c)   What is Brook's law.   [2]

c)   Produce an object-oriented design to the following problem

A hospital file contains records of staff and patients sorted into ascending order of surname within ward. It is required to print all the names of the staff in ward order, with a heading at the start of each ward.

QUESTION FIVE

a)   Define the following terms:

    (i)   Perfective maintenance.   [1]
    (ii)   Corrective maintenance.   [1]
    (iii)   Adaptive maintenance.   [1]
    (iv)   Enhancement.   [1]
    (v)   Version control.   [1]
    (vi)   Configuration control. .   [1]
    (vii) Regression fault.   [1]

b)   What problems arise when maintenance is performed by a team as opposed to a single programmer and how can this be resolved.   [4]

d)   You are the manager in charge of the software controlling the navigation system of a nuclear submarine. Three different users reported faults have to be fixed and you assign Zinzile, Nomsa and Sithabile to do the job. A day later you learn that in order to implement each of the three fixes, the same five compilation units have to be changed. However, your configuration tools is inoperative, so you will have to manage the charge yourself. How will you do it?   [9]

QUESTION SIX

a)   You have just joined Software Developers as a software manger. Software Developers has been developing software for years using the waterfall model, usually with some success.
On the basis of your experience you feel that rapid prototyping is a far superior way of developing software. Write a report addressed to the president for software development telling him why you feel the organisation should switch to the rapid prototyping model.   [10]

b)   You are the Vice-president for Software Developers. Reply to the memo in (a).   [10]

END OF QUESTION PAPER

GOOD LUCK!