

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2001

SUBJECT: SOFTWARE METHODOLOGY
CODE: SCS5205

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INSTRUCTIONS TO CANDIDATES

1. Answer all questions from Section A and any three from section B.

3 HOURS

SECTION A

QUESTION 1

- a) Give a detailed description of the COCOMO in software development. [10]
- b) Consider the problem of determining whether a bank statement is correct. The data needed include the balance at the beginning of the month, the number, date and amount of each cheque, the date and amount of each deposit, and the balance at the end of the month. Perform an object-oriented design of the product. [10]

QUESTION 2

In an automated library circulation system every book has a bar code affixed to it, and every borrower has a card bearing a bar code. When a borrower wishes to check out a book, the librarian scans the bar code on the back and on the borrower's card and enters C at the computer terminal. Similarly, when a book is returned, it is again scanned and the librarian enters R. Librarians can add books (+) to the library collection and remove them (-). Borrowers can go to a terminal and determine all the books in the library by a particular author (the borrower enters, A =, followed by the author's name), all the books with a specific title (T=, followed by the title), or all the books in a particular subject area (S=, followed by the subject area). Finally, if a borrower wants a book that is currently checked out by another borrower, the librarian can place a hold on the book so that when it is returned it will be held for the borrower who requested it. (H =, followed by the number of the book)

Draw a data-flow diagram showing the operation of the library circulation system.

[20]

SECTION B

QUESTION 3

You have joined Dlodlo Software Developers as a software manager. Dlodlo & Associates have 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 Vice President for software development explaining why you feel that the organisation should switch to the rapid prototyping model. [20]

QUESTION 4.

- a) Give a detailed description of Brooke's law. [8]
- b) Give a detailed description, supported by concrete examples of the types of interactions that occur among software modules. [12]

QUESTION 5

With the aid of annotated diagrams and concrete examples define the following terms in software development.

- a) Inheritance [4]
- b) Polymorphism [4]
- c) Encapsulation (information hiding) [4]
- d) Cohesion [4]
- e) Coupling [4]

QUESTION 6

- a) Define the following terms:
 - i) Perfective maintenance [2]
 - ii) Corrective maintenance [2]
 - iii) Adaptive maintenance [2]
 - iv) Enhancement [2]
- b) Why do you think that some software professionals consider software maintenance to be inferior to software development? What can be done to correct this myth? [12]

QUESTION 7

- a) Suppose that you have to write a product to complete the cube root of 713.475. When the product has been written and tested, it will be thrown away. What software life cycle model would you use and why? [10]
- b) What criteria are used in the selection of a programming language for a software development project. [10]

QUESTION 8

- c) You are a software engineer. Your client tells you that developing the prototype has cost him money and must not be thrown away, instead he insists that you extend the prototype rather than designing and implementing the product from scratch. Design your case.
- d) What constitutes good programming practices? [10]

END OF QUESTION PAPER