THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION
Professional Graduate Diploma

SOFTWARE ENGINEERING

2nd May 2002, 10.00 a.m.-1.00 p.m.
Answer THREE questions out of FIVE. All questions carry equal marks.
Time: THREE hours.

*The marks given in brackets are **indicative** of the weight given to each part of the question.*

1. Discuss the key principles of software engineering for the development of software systems that, when applied, can lead to solutions that are modifiable, efficient, reliable, and understandable. **(25 marks)**

2. *a)* Describe the SPIRAL software development process and comment critically on its suitability for a modern software development project. **(15 marks)**

b) Your Managing Director has asked you to recommend a life cycle model that he should implement for a RAD (Rapid Application Development) project recently contracted to your firm. Sketch the plan of a life cycle model you would choose, and identify three or four suitable milestones that would measure progress. Make sure you include justifications for the recommendations you plan to make. **(10 marks)**

3. A vending machine dispenses a wide range of products. The temperature of the machine is monitored on a regular basis and maintained between 15 and 21 degrees Celsius. If the temperature is outside of this range the machine will shut down.

A product will only be dispensed if the customer has tendered at least the minimum charge, selected an available product, and then pressed the “dispense” button. The machine will then return any change, but no greater than what was owed to the customer. Finally, the customer can cancel an order at any time by pressing the 'cancel' button and the money tendered will be returned.

Using an appropriate development method demonstrate how you would model the process, data, and the timing control aspects of the vending machine outlined.

[Note. Marks will be awarded for clear and relevant sets of diagrams with supporting annotation and descriptions.]

(25 marks)

4. A set of qualities for a software product has been described by the following set of discrete, separate 'abilities': functionality, reliability, usability, efficiency, maintainability and portability.

Briefly define any FIVE of these with short descriptions that clearly identify what is meant by each and how they differ one from another. **(25 marks)**

5. *a)* ISO 9001 has many paragraphs that describe compliance to quality. Compliance with ISO 9001 requires compliance with all the systems described in the standard. This form of quality compliance has been described as 'top down'. On the other hand, a method of complying with one system or subsystem at a time, as a way of obtaining gradual improvement, has been described as 'bottom-up'.

Comment on each of these descriptions. Give reasons for your answers. **(15 marks)**

b) You are asked to set up a training session for some staff because your manager is concerned that there is insufficient awareness of quality procedures in your firm. Describe, with reasons, four or five topics you would set for such a training programme and identify, with reasons, the particular sequence in which you would introduce them. **(10 marks)**

BCS Software Engineering – Professional Graduate Diploma - Additional Information for Q5

Systemic Requirements
Establish your quality system
Document your quality system

Management Requirements
Support quality
Satisfy your customers
Establish a quality policy
Carry out quality planning
Control your quality system
Perform management reviews

Resource Requirements
Provide quality resources
Provide quality personnel
Provide quality infrastructure
Provide quality environment

Realisation Requirements
Control realisation planning
Control customer processes
Control product development
Control purchasing function
Control operational activities
Control monitoring devices

Remedial Requirements
Perform remedial processes
Monitor and measure quality
Control non-conforming products
Analyse quality information
Make quality improvements