BCS Higher Education Qualification

Professional Graduate Diploma

April 2023

EXAMINERS' REPORT

Programming Paradigms

General comments

A good response by candidates in most areas of the paper with results that are in-line with recent years, with candidates showing good knowledge of several areas of the syllabus.

There appears to be limited knowledge of some aspects of functional and logic programming. Few candidates attempted the functional programming question on this paper. It is encouraging to see some more people attempt the logic programming question this time.

Given that this paper is about programming paradigms, we think that it is important for candidates to get the broader education that goes beyond class imperative (and mostly object oriented) programming. Candidates are encouraged to allocate some of their study time to these paradigms.

Questions Report:

A1	
	This question is based on section 1.2 and 1.3 of the syllabi and deals with the nature of programming languages. Many students attempted this question. Students were given a context for part a) and were required to discuss specific programming approaches and how they could be applied to the context. Part b) asked the students to consider the role of standardisation bodies in the improvement of the industry. Students displayed understanding of the relevant approaches but did struggle in mapping them to the context. Equally, the majority displayed an understanding of who the standardisation bodies were but did not have a strong understanding of how they impacted upon the industry. More emphasis needs to be placed in helping students develop contextualisation of the knowledge they clearly have gained.
A2	
	This question is based on section 2.4 of the syllabus and deals with programming environments. Many students attempted this question. The question is in three parts. Part a) considered the automation of a key task within the development process. Part b) asked the students to define the process and supporting tools for a key task within the development process and part c) looked at key concepts in the production and maintenance of the development process. Students seemed confident on the basic approaches to the concepts, but they were less confident in considering issues relating to automation and many answers lacked detail. Some answers talked about general techniques (such as Black Box and White Box testing and Integration testing) without discussing any automation issues related to them. There was limited understanding of build tools (e.g., Gradle, Maven) but knowledge of CI tools (such as Jenkins) and their role in the build process. Version

	Control Systems did seem to have strong levels of understanding which suggests that this topic is well covered by the delivery teams.
A3	
	This question is based on section 3.1 of the syllabus and deals with object orientation. Many students attempted this question. Both part a) and part b) related to key Object Oriented concepts and asked the students to show understanding of their role and how they are achieved programmatically. Responses to this question were varied, with some students appearing to have a strong understanding and others not. Students were asked to provide examples of the concepts in code and unfortunately, if they did not understand the concept then they lost marks from the practical examples. The majority of students clearly understood the concepts, but they could not necessarily produce suitable examples to support their answers often repeating the code they had used for part a).
B4	
	This question dealt with functional programming. Few students attempted this question. There are three parts to the question; parts a) and b) asked students to explain features of functional programming and part c) required the students provide a solution to a given problem in a functional programming language. Part a) was answered well with most students understanding the concept and supporting their answers with appropriate code. Part b) appeared to challenge the majority of students, there was evidence of confusion over the terms, though those that did have understanding produced excellent supporting code. Part c) was not answered by all students but those that did provide a functional-based, recursive solution provided excellent answers. Some students produced results that did not use recursion.
B5	
	This question dealt with logic programming. Several students attempted this question, the average mark was marginally below the pass threshold. Part a) required the students to describe a key concept from the paradigm. Part b) required the students to comprehend and then discuss key aspects of logical programming in the context of the example provided. Part a) was consistently well answered with many students able to describe and demonstrate an understanding of the advantages and disadvantages of the paradigm. For part b), many students were able to show comprehension of the example but only a small number could discuss the aspects of logical programming required and illustrate them appropriately using the example. More focus is needed on applying the concepts and features of Logic Programming and being able to discuss it in context. The basic understanding appears to be evident with most students selecting this question, but they do not appear to be confident in some fundamental constructs and how they can be applied.