COMPUTER SCIENCE TRIPOS Part IA – 2024 – Paper 1

3 Object-Oriented Programming (rkh23)

(*a*) Explain the effect of the access modifiers `public`, `protected`, `private`, or default (no modifier) in Java. [4 marks]

(*b*) Consider the statement "public state of a Java class should be final and static"

(*i*) Explain why this is considered good programming practice. [4 marks]

(*ii*) Give one example of a member variable that should *not* be declared `public`, even if `final` and `static`. [3 marks]

(*c*) Consider a language identical to Java except that all class member variables are `private`. Class methods can still be `public`, `protected`, `private`, or default. The rationale for this change is that access can be provided via methods and so this simplifies the language. Compare and contrast this approach with the Java approach. [4 marks]

(*d*) The Python programming language does not have explicit private access modifiers in its classes. Instead all variables and methods are public and a *convention* is used whereby names prefixed with an underscore are to be considered hidden despite there being no enforcement of this by the compiler. Compare this to Java's explicit access modifier approach. [5 marks]