

COMPUTER SCIENCE TRIPOS Part IB – 2013 – Paper 3

5 Compiler Construction (TGG)

(a) When is it useful to eliminate left-recursion from a grammar and why? [2 marks]

(b) Write a recursive descent parser for the language generated by the following grammar.

$$\begin{aligned} E &::= E + F \\ &\quad | E - F \\ &\quad | F \end{aligned}$$
$$\begin{aligned} F &::= \text{NUM} \\ &\quad | \text{ID} \\ &\quad | (E) \end{aligned}$$

[6 marks]

(c) This section deals with how object-oriented classes are typically implemented by a compiler when only simple inheritance (each class has exactly one parent) is supported.

(i) Describe in detail how objects are represented in memory and how this representation captures inheritance of attributes. [6 marks]

(ii) Discuss how virtual methods can be implemented. [6 marks]