

2008 Paper 6 Question 10

Computation Theory

(a) Explain what is meant by each of the following statements:

(i) “ c is a code for the total recursive function $f : \mathbb{N} \rightarrow \mathbb{N}$.” [2 marks]

(ii) “ F is a recursively enumerable set each of whose elements is a total recursive function $f : \mathbb{N} \rightarrow \mathbb{N}$.” [3 marks]

(b) In each of the following cases state with reasons whether the set is recursively enumerable:

(i) the set A of all total recursive functions $a : \mathbb{N} \rightarrow \mathbb{N}$ such that $a(n+1) \geq a(n)$ for all $n \in \mathbb{N}$ [6 marks]

(ii) the set D of all total recursive functions $d : \mathbb{N} \rightarrow \mathbb{N}$ such that $d(n+1) \leq d(n)$ for all $n \in \mathbb{N}$ [9 marks]