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**Computer science**  
**Higher level**  
**Paper 3**

Monday 2 November 2020 (morning)

1 hour

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**Instructions to candidates**

- Do not turn over this examination paper until instructed to do so.
- A clean copy of the **computer science case study** is required for this examination paper.
- Read the case study carefully.
- Answer all questions.
- The maximum mark for this examination paper is **[30 marks]**.

Answer **all** questions.

1. (a) Identify **two** characteristics of a peer-2-peer (P2P) network. [2]  
(b) Identify **two** sources of entropy. [2]
  
  2. (a) Describe the steps that need to be carried out by the blockchain system to find a user’s current MONS balance. [4]  

Dolores states, “one of the great things about the blockchain is that we can ensure that the solution time remains at 10 minutes, and we can do this even as the number of MONS miners increases” (lines 63–65).

  
(b) Explain why it is important to ensure the solution time remains at 10 minutes. [4]
  
  3. Critics have complained about the potential environmental effects caused by the computing resources required by a blockchain network.  

Analyse the potential effects that the use of MONS could have on the environment. [6]
  
  4. Pablo states: “In a traditional banking system, users trust the banks to keep everyone’s money safe; but with MONS, the whole blockchain, right from the very first transaction, would be visible to all MONS users, so it is important to be able to explain to citizens how their money is guaranteed to be safe” (lines 109–112).  

With reference to the key technologies, to what extent do you believe the MONS project will ensure the safety of the residents’ money? [12]
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