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

Tuesday 21 May 2019 (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. The emergency management information system (EMIS) has a multitier architecture.
    - (a) Identify **two** functions of the Data Tier of the EMIS. [2]
    - (b) Identify **two** characteristics of a TCP/IP Socket. [2]
  
  2. (a) Tania is considering purchasing an off-the-shelf emergency response system rather than a bespoke system as an implementation option in the proposed EMIS.
    - (i) Other than cost, explain **one** advantage of purchasing an off-the-shelf emergency response system rather than a bespoke system. [2]
    - (ii) Other than cost, explain **one** disadvantage of purchasing an off-the-shelf emergency response system rather than a bespoke system. [2]

(b) Explain **two** advantages of using URL rewriting as a strategy for making the HTTP connection stateful. [4]
  
  3. Some citizens have used the citizen reporting function of the app through a VPN.

Explain why the use of a VPN would reduce the effectiveness of the citizen reporting app. [6]
  
  4. Rahul has suggested that the use of the citizen reporting function of the app might be much higher than initially requested and this could affect the emergency assistance function if they share the same server.

As a result of this, Rahul has decided to put citizen report on a separate cluster of servers and use a load balancing algorithm to manage the workload of the server.

Evaluate the appropriateness of the following load balancing algorithms for use in the Bangbai EMIS:

    - client side random
    - source IP Hash.

[12]
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