

**BCS THE CHARTERED INSTITUTE FOR IT**

BCS HIGHER EDUCATION QUALIFICATIONS  
BCS Level 6 Professional Graduate Diploma in IT

**NETWORK INFORMATION SYSTEMS**

Monday 9<sup>th</sup> November 2020 – Morning

Answer **any** THREE questions out of FIVE. All questions carry equal marks.

Time: THREE hours

**Answer any Section A questions you attempt in Answer Book A**

**Answer any Section B questions you attempt in Answer Book B**

**For all questions illustrate your answers with diagrams where appropriate**

The marks given in brackets are **indicative** of the weight given to each part of the question.

Calculators are <b>NOT</b> allowed in this examination.
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**Section A**  
**Answer Section A questions in Answer Book A**  
**For all questions illustrate your answers with diagrams where appropriate**

**A1.**

A sales company operates out of two locations in two different cities. At site A they collate customer data including financial records. Site B is used to process and despatch orders, and must make use of the data collated by site A. Both sites are connected to the public Internet but there is no direct connection between them.

- a) Discuss the practical and security issues associated with transfer of the data in this scenario using the following three mechanisms:

- i) FTP;
- ii) Secure Shell (consider both scp and tunnelling);
- iii) A Virtual Private Network (VPN).

**(11 marks)**

- b) For **EACH** of the above, describe a mechanism for automating the transfer without the need to use a password.

**(9 marks)**

- c) Make a recommendation for the easiest and most secure mechanism of data transfer, describing briefly how the mechanism will be implemented.

**(5 marks)**

**A2.**

- a) Describe the ISO OSI 7-layer network model, naming **EACH** layer in order. You may use a diagram if required.

**(7 marks)**

- b) For the first **THREE** layers (layers 1-3) of this model, describe a device designed for network interconnection that works at this layer. In your answer, you **SHOULD** explain why the device is deemed to work at this layer and not another layer.

**(9 marks)**

- c) Consider the World Wide Web. This is provided by web clients making TCP connections to web servers and requesting information which is returned to them by TCP. What service is used to provide secure e-commerce on the web? Explain at what layer or layers this service is provided and discuss whether it is appropriately named.

**(9 marks)**

**Section B**  
**Answer Section B questions in Answer Book B**  
**For all questions illustrate your answers with diagrams where appropriate**

**B3.**

- a) Explain the term “heterogeneity” in a distributed processing system. Give examples for heterogeneity in a distributed system with reference to:
- i) Hardware;
  - ii) Operating Systems;
  - iii) Network;
  - iv) Programming languages.
- (8 marks)**
- b)
- i) With reference to distributed processing systems explain the term “Inter Process Communication (IPC)”.
- (4 marks)**
- ii) Explain how the Remote Procedure Call (RPC) for inter-process communication works.
- (7 marks)**
- c) How do threads and processes differ?
- (6 marks)**

**B4.**

- a) Define the concepts of SOAP, WSDL and UDDI.
- (6 marks)**
- b) The text below represents the general structure of a SOAP message. With reference to this, name and explain the basic building blocks of the SOAP standard.
- (8 marks)**

```
<?xml version = "1.0"?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV = "http://www.w3.org/2001/12/soap-
envelope"
  SOAP-ENV:encodingStyle = "http://www.w3.org/2001/12/soap-encoding">

  <SOAP-ENV:Header>
    ...
  </SOAP-ENV:Header>
  <SOAP-ENV:Body>
    ...
    <SOAP-ENV:Fault>
      ...
    </SOAP-ENV:Fault>
    ...
  </SOAP-ENV:Body>
</SOAP_ENV:Envelope>
```

- c) Explain what a RESTful Web Service is and how its **FOUR** methods – GET, POST, DELETE and PUT work.
- (11 marks)**  
**[Turn Over]**

**B5.**

- a) What is a router? (4 marks)
- b) Explain the difference between wired, wireless, core and edge router. (8 marks)
- c) Explain the **THREE** types of routing – default, static and dynamic. (6 marks)
- d) A router receives a packet with destination IP address of 10.15.31.42 and needs to forward the packet accordingly. Which next hop should be chosen for the forward delivery of the datagram according to the routing table below? In your answer give detailed explanation of the process of routing, listing **ALL** steps the router will have to go through including all necessary calculations. (7 marks)

Row	Network Destination ID	Net Mask	Next Hop
1	192.168.99.0	255.255.255.0	192.168.99.1
2	192.168.2.0	255.255.255.0	192.168.99.1
3	152.71.0.0	255.255.0.0	192.168.99.2
4	192.168.5.0	255.255.255.0	192.168.99.2
5	10.0.0.0	255.0.0.0	192.168.99.2
6	12.0.0.0	255.0.0.0	192.168.99.2
7	default	-	192.168.99.1

**End of Examination**