

BCS THE CHARTERED INSTITUTE FOR IT

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

NETWORK INFORMATION SYSTEMS

Thursday 21st March 2019 - 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

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

Calculators are NOT allowed in this examination.

For all questions illustrate your answers with diagrams where appropriate

Section A

Answer Section A questions in Answer Book A

A1.

- a) The Network File System (NFS) is a distributed file system protocol originally developed by Sun Microsystems that makes use of the Remote Procedure Calls (RPC) System. Describe the purpose and concept of Remote Procedure Calls, using NFS as an example. **(7 marks)**
- b) NFS introduces a concept of local caching of files. What negative aspect of client server operation does this combat? **(5 marks)**
- c) Although an open standard, RPC is not widely used in heterogeneous environments (that is, where clients and/or servers are not flavours of Unix). Describe the purpose and concept of Simple Object Access Protocol (SOAP) and what aspects of this system might lead to its preferential use in client server applications in heterogeneous environments. In your reply, also list any disadvantages of the SOAP system. **(13 marks)**

A2.

- a) ISO 27001 describes a security triad of Confidentiality, Integrity and Availability (CIA). Describe what is meant by each of these. **(6 marks)**
- b) Transport Layer Security (TLS), also known as Secure Sockets Layer (SSL) uses Public Key Encryption algorithms and Symmetric Encryption algorithms to achieve a secure layer of encryption over an insecure transport layer.

For each of the following describe, with reference to TLS/SSL, how the technique is used. For each you should consider which of the CIA triad this technique brings to TLS/SSL.

- i. Public key (asymmetric) and symmetric encryption. **(6 marks)**
- ii. Message Digest. **(6 marks)**
- iii. Digitally signed server certificate. **(7 marks)**

Section B

Answer Section B questions in Answer Book B

B3. This question is about Web Services and their design

- a) Explain the concept of Web Service. **(4 marks)**
- b) Describe the differences between SOAP and RESTful web services. **(4 marks)**
- c) Give a short description of the functionality of the RESTful methods POST, GET, PUT and DELETE. **(4 marks)**
- d) Give a short description of the key elements of the RESTful elements (Resources, Request Verbs, Headers, Request Body, Response and Response Status Codes). **(13 marks)**

B4. This question is about Wide Area Networks (WAN).

- a) Explain the concept of Wide Area Network. **(2 marks)**
- b) Provide a short description, and explain through the use of a diagram, on the way each of the following WAN connections works:
 - i. Leased Line. **(4 marks)**
 - ii. Circuit Switching. **(4 marks)**
 - iii. Packet Switching. **(4 marks)**
 - iv. Cell Switching (ATM). **(4 marks)**
- c) Considering the Layer 2 of the 7 Layer OSI network model:
 - i. Describe the name and purpose of the layer. **(4 marks)**
 - ii. Indicate the name of three (3) WAN protocols working at this layer. **(3 marks)**

B5. This question is about Network Operation/NIS management issues.

- a) Give a short description of what congestion and congestion control are. **(5 marks)**
- b) Give a short description of what Quality of Service (QoS) in computer networks means. **(6 marks)**
- c) Explain the four Quality of Service in computer networks characteristics (Bandwidth, Delay, Jitter, Loss). **(8 marks)**
- d) Briefly explain each one of the following queueing techniques used to provide Quality of Service for congestion management of network traffic. **(6 marks)**
 - i. First-In-First-Out (FIFO).
 - ii. Priority Queueing (PQ).
 - iii. Custom Queueing (CQ).
 - iv. Weighted Fair Queueing (WFQ).
 - v. Class-Based Weighted Fair Queueing (CBWFQ).
 - vi. Low-Latency Queueing (LLQ).

END OF EXAMINATION PAPER