

**BCS THE CHARTERED INSTITUTE FOR IT**

**BCS HIGHER EDUCATION QUALIFICATIONS**  
**BCS Level 5 Diploma in IT**

**COMPUTER NETWORKS**

**Friday 28<sup>th</sup> September 2018 - Morning**

Answer **any** FOUR questions out of SIX. All questions carry equal marks  
Time: TWO 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.

Only **non-programmable** calculators are allowed in this examination.

## Section A

### Answer Section A questions in Answer Book A

A1. This question focuses on TCP/IP and the OSI model.

- a) State the 7 layers of the OSI model in the correct order and briefly describe the function of each layer. **(7 marks)**
- b) Explain the difference between TCP and UDP protocols. Provide an example of an application that uses TCP and an application that uses UDP. **(6 marks)**
- c) Explain the purpose of the 3-way handshake in TCP/IP connections and briefly describe the steps involved in it. **(8 marks)**
- d) Describe the use of port numbers for both TCP and UDP. Define the term 'well-known' ports. **(4 marks)**

A2. This question focuses on Local Area Networks (LAN) and Ethernet technologies.

- a) Provide a definition for the networking devices known as router and switch and explain the operational difference between them. **(6 marks)**
- b) Discuss THREE differences between distance-vector and link-state routing protocols. **(9 marks)**
- c) Discuss concisely two reasons why Quality of Service is necessary in IP networks. **(4 marks)**
- d) Describe THREE Quality of Service parameters that are used to characterise the behaviour of a network connection. **(6 marks)**

A3. This question focuses on error control in communications systems.

- a) Discuss the operational functionality of Cyclic Redundancy Check. **(8 marks)**
- b) Explain the difference between single-bit and burst errors and suggest an error technique that can be used to detect each of them. **(6 marks)**
- c) Explain the term residual error rate as an error detection control technique. **(5 marks)**
- d) Describe transverse parity check and longitudinal parity check, including how the combination of these can provide error correction capability. **(6 marks)**

**Turn over**

## Section B

### Answer Section B questions in Answer Book B

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

- a) Describe the key differences between circuit switching and packet switching networks. For each type, provide examples of TWO typical technologies. **(10 marks)**
- b) Explain the problems that a large international organisation might have when operating a large leased line full mesh network. Detail how a managed service, such as Frame Relay, might alleviate those problems. **(7 marks)**
- c) Explain how a cost-conscious business with multiple sites might benefit from using the Internet as a public network to provide WAN connectivity between its sites. Detail the technical considerations, technologies and security operation necessary to utilise this option. **(8 marks)**

B5. This question focuses on Local Area Networks (LAN) and Ethernet technologies.

- a) Explain the types of networking media that would be most appropriate for the following scenarios and justify the reasons for selecting it: **(15 marks)**
  - i. Two hundred end users in a large office block, working for a financial trading company with fast-changing financial data.
  - ii. An IT research lab researching big data search and storage solutions, with data centre research facilities located across a large geographic area.
  - iii. A festival venue based at a farm with a fixed broadband connection, where the fields are usually used for sheep grazing, but host several thousand festival goers several times a year.
- b) Discuss why fibre optic cables are more suitable than copper wired or wireless media for high voltage AC environments. **(5 marks)**
- c) Explain the key protocol and operational differences between Ethernet (IEEE 802.3) and Wireless LAN's (IEEE80.11) **(5 marks)**

**Turn over**

B6. This question focuses on IP Internetworking and Wide Area Networks

- a) Briefly discuss the meaning of each of the following terms and explain their relationship to WAN connectivity:
- i. DCE. **(3 marks)**
  - ii. DTE. **(3 marks)**
  - iii. CSU/DSU/NTU. **(3 marks)**
  - iv. CPE. **(3 marks)**
  - v. Demarcation point. **(2 marks)**
  - vi. Local loop. **(2 marks)**
- b) Explain and justify which IP routing protocol is best for WAN connectivity in a scenario where an organisation wants to utilise all its WAN links between all its sites, even though the links have different bandwidths. **(4 marks)**
- c) Explain and justify which IP routing protocol is best for WAN connectivity in a scenario where two large businesses have merged together, have routers from different vendors and want to minimise the impact of routing changes between the organisations. **(5 marks)**