

BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

COMPUTER NETWORKS

Friday 28th 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)**