BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

COMPUTER NETWORKS

Monday 13th October 2025 – 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.

Networking reference models are fundamental frameworks for understanding network communication and data transfer.

a) Compare and contrast the ISO 7-Layer OSI model and the TCP/IP Reference Model with the aid of a supporting diagram.

(13 marks)

b) Provide real-world examples of protocols used in **each** layer in the TCP/IP Reference Model along with corresponding PDUs.

(12 marks)

A2.

TCP/IP is the de facto standard for internetworking and hence IP addressing for public communication networks.

a) Describe the limitations of IPv4 and how IPv6 addresses them.

(8 marks)

b) A manufacturing company has assigned 192.168.1.0/24 as its internal addressing scheme to support its 6 sites. Divide the network into **six** subnets, each supporting up to 30 hosts, calculating the correct subnet mask notation and provide the subnet masks, subnet IDs and broadcast addresses.

(17 marks)

A3.

Interior gateway protocols form the basis for most private based Wide Area Networks (WAN).

a) Compare Distance Vector and Link-State routing protocols. Discuss the advantages and disadvantages of **each** protocol.

(10 marks)

b) Explain the operation of the OSPF routing protocol, highlighting its key features.

(15 marks)

Section B
Answer Section B questions in Answer Book B

B4.

a) Explain the differences between analogue and digital communication in terms of data representation, transmission, and noise resilience.

(12 marks)

b) Describe the process of modulation and demodulation in digital communication. Provide examples of modulation techniques used in modern networks.

(13 marks)

B5.

Quality of Service (QoS) is crucial in modern networks to deliver resilient network applications.

a) Define QoS in the context of computer networks. Why is it important for modern applications?

(7 marks)

b) Discuss the different QoS mechanisms, such as traffic shaping, queuing, and prioritisation.

(9 marks)

c) Explain how QoS is implemented in IP networks, with examples of protocols and technologies used to ensure QoS.

(9 marks)

B6.

Transmission errors in modern communication networks are a common hazard.

a) Define **two** different types of error that can occur in data communication over networks (other than single bit errors). Provide examples of scenarios where **each** type of error might occur.

(4 marks)

b) Explain the mechanisms used for error detection, including parity checks and cyclic redundancy checks (CRC). Highlight the advantages and limitations of **each** method.

(10 marks)

c) Describe error correction techniques used in computer networks, such as Hamming codes and forward error correction (FEC). Discuss their real-world applications.

(6 marks)

d) Consider a data packet 1011010 that is transmitted with even parity. During transmission, a single-bit error occurs.
Demonstrate how the error is detected using the parity check method.

(5 marks)

END OF EXAMINATION