BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

COMPUTER NETWORKS

Friday 6th October 2023 - 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 allowed in this examination.

Section A
Answer Section A questions in Answer Book A

A1.

a) Explain what is meant by a routing metric.

(2 marks)

b) Describe **EIGHT** most utilized routing metrics for determining the best path(s) for data communication.

(16 marks)

c) Explain which routing metric(s) are used for the following dynamic routing protocols.

i. RIP;
ii. EIGRP;
iii. OSPF;
iv. IS-IS;
v. BGP.

(5 marks)

d) If a router is learning the same route via two different routing protocols, i.e., RIP and OSPF, how does it decide which route is the best one?

(2 marks)

A2.

a) Identify and explain the typical **TWO** most common errors detected in data transmission justifying which is the most disruptive.

(5 marks)

b) Describe the operation of the following error detection techniques.

i. Vertical Redundancy Check (VRC);
ii. Longitudinal Redundancy Check (LRC);
iii. Cyclic Redundancy Check (CRC);
iv. Checksum.

(8 marks)

c) Once an error has been detected, explain what techniques can be used to provide a mechanism for error correction.

(12 marks)

A3.

a) Summarise the **FOUR** main flow characteristics related to **QoS**?

(8 marks)

b) Explain the number of techniques that can be adopted to improve these flow characteristics

(12 marks)

c) Name **FIVE** technologies that can be adopted to police Quality of Service.

(5 marks)

[Turn Over]

Section B
Answer Section B questions in Answer Book B

B4..

a) From a computer network perspective what is meant by multicasting? What is the motivation for developing multicast-based applications?

(5 marks)

b) What are **TWO** different types of multicast routing?

(2 marks)

c) Discuss **FOUR** potential applications of multicasting on computer networks.

(8 marks)

d) Identify and briefly explain **FIVE** types of multicast routing protocol in current use.

(10 marks)

B5.

a) Define what is meant by multiplexing and de-multiplexing for the transmission of data either in analogue or digital form.

(5 marks)

b) Explain and illustrate the difference between the following multiplexing types:

i. Frequency Division Multiplexing (FDM);
ii. Time Division Multiplexing (TDM);
iii. Wavelength Division Multiplexing (WDM).

(12 marks)

c) Explain the concept of multiplexing and demultiplexing when considering the behaviour of TCP and/or UDP at the TCP/IP model at the Transport Layer.

(8 marks)

B6.

A multinational company requires its IPv4 private address range 192.168.0.0.0/16 to cover a minimum of 6 sites covering a minimum of 6012 devices/users per site.

a) Design an IP addressing scheme which will accommodate these requirements.

Clearly identify, showing your work, the subnet masks used.

For the first **TWO** subnets and the last **TWO** subnets detail the following

i. Network Address;
ii. First host IP address;
iii. Final host IP address;
iv. Broadcast address;
v. Actual number of available hosts.

(20 marks)

b) Discuss what technological solutions the company might have to implement if they wished to connect their private network to the Internet.

(5 marks)

END OF EXAMINATION