B6.

a) Identify the following types of digital communication media, typical transmission speeds and the medium used to provide a communications link

i) 

ii) 

iii) 

iv) 

(12 marks)

b) Rank the media in Part (a) in terms of fastest first to slowest.

(1 mark)

c) Explain which answer(s) from part (a) would be best suited for use in high voltage and electromagnetic environments? Justify your answer.

(4 marks)

d) Explain which answer(s) from part (a) would be best suited for use to provide high-density access to fixed locations in large office buildings. Justify your answer.

(4 marks)

e) Explain which answer(s) from part (a) could provide global coverage connecting communities in the world. Justify your answer.

(4 marks)

End of Examination

BCS THE CHARTERED INSTITUTE FOR IT

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BCS Level 5 Diploma in IT

COMPUTER NETWORKS

Friday 7th October 2022 – 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. An international organisation is proposing to design a network with three geographically dispersed sites (approximately 100km apart) within the same country (as shown in Figure 1).

Figure 1. Network design for international organisation

a) Determine what edge network devices you would recommend for use at each site to interconnect each site to the others across a wide area network based on OSI layers 1, 2 and 3.

Justify your choice and why other devices might not be suitable?

(10 marks)

b) Recommend a suitable topology and WAN technology for use for this organisation that is cost-effective to use.

Outline how resilience might be achieved between the sites with this solution.

(15 marks)

b) Another Router R_A has the following routing table

Destination Network	Subnet Mask	Next Hop
128.96.39.0	255.255.255.128	Port Gi0
128.96.39.128	255.255.255.128	Port Gi1
192.4.153.128	255.255.255.192	R_B
192.4.153.0	255.255.255.192	R_C
128.96.40.0	255.255.255.128	R_D
128.96.40.128	255.255.255.128	R_E

i) If R_A receives a packet and the destination of the received packet is 128.96.40.12, explain what will next hop of the packet be?
ii) If R_A receives a packet and the destination of the received packet is 12.96.40.11, explain what will next hop of the packet be?
iii) If R_A receives a packet and the destination of the received packet is 192.4.153.63, explain what will next hop of the packet be?
iv) If R_A receives a packet and the destination of the received packet is 192.4.153.65, explain what will next hop of the packet be?
v) If R_A receives a packet and the destination of the received packet is 128.96.39.254, explain what will next hop of the packet be?

(10 marks)

[Turn Over]

B5. A distance vector-based routing protocol is in use by an organization over its internal wide area network.

a) The internal routing tables of one of the routers (X) \in the WAN is shown below.

Destination Network	Distance to Destination	Next Hop
NW1	4	B
NW2	2	C
NW3	3	F
NW5	5	G

If Router (X) receives the following routing update from the router (z)

Destination Network	Distance to Destination
NW1	2
NW2	3
NW3	5
NW4	7

What will the new routing table for Router(X) be? Explain any differences.

(15 marks)

A2. Please see Figure 2 representing a TCP Header.

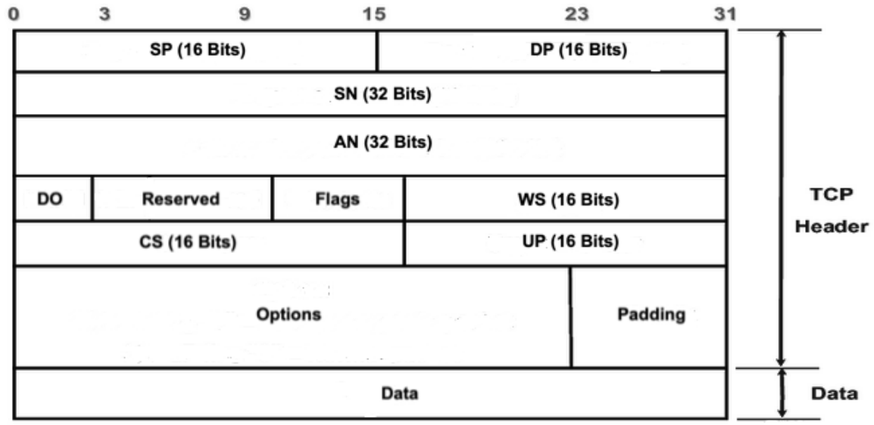

Figure 2. TCP Header

a) Expand and explain the following pairs of acronyms in the TCP Header.

i) SP and DP
ii) SN and AN

(8 marks)

b) Expand and explain the following acronyms in the TCP Header.

i) WS
ii) UP
iii) CS
iv) DO.

(8 marks)

c) Describe the Flag settings that are used in the TCP Header and why they are important for the operation of TCP?

(9 marks)

[Turn Over]

A3. Modern computer networks are often composed of both physical and virtual components made possible by the creation of virtual LAN (VLAN) technology.

a) Which technology and protocols are used for virtual LAN's?

(2 marks)

b) Describe **THREE** different types of virtual LAN's?

(6 marks)

c) Explain with the use of diagrams how VLAN information is carried between both physical and virtual Ethernet switches.

(8 marks)

d) Describe with the use of diagrams how VLAN's can be extended into physical servers with a hypervisor to connect individual virtual machines (VM's) to specific VLAN's and external physical LAN components.

(9 marks)

Section B
Answer Section B questions in Answer Book B

B4. A sequence of data X=100010 is transmitted over a communications link utilizing CRC.

a) If CRC uses a G=111, what will the EBC bits be?

(4 marks)

b) From part (a) if some of the transmitted data is flipped as it goes through the link (the 2nd, 3rd and 4th bits of the X+EDC sequence), will the receiving node be able to detect the error?

(4 marks)

c) If the CRC now uses a G=1111, what will the new EDC bits now be?

(4 marks)

d) From part (c) if the newly transmitted data is flipped as it goes through the link again (the 2nd, 3rd and 4th bits of the X+EDC sequence), will the receiving node be able to detect the error with this new data?

(4 marks)

e) From part (c) if the newly transmitted data is flipped as it goes through the link again (the 2nd, 3rd, 4th and 5th bits of the X+EDC sequence), will the receiving node be able to detect the error with this new data?

(4 marks)

f) When an r-bit G is capable of detecting all burst errors less than r-bits using CRC, what about the situation of using CRC capable of detecting all burst errors r-bits and above? Justify your answer.

(5 marks)

[Turn Over]