

BCS Level 4 Certificate in Network Principles  
Answer Key and Rationale – QAN 603/0548/4

Question	Answer	Explanation / Rationale	Syllabus Sections
1	B	A binary conversion – $128+32+8+2 = 170$ .	3.2
2	D	A Local Area Network (LAN) is a network over a small geographical area, typically one building or site.	1.4
3	C	ARP is used to MAP IP addresses to MAC address. A is not correct - CSMA/CD is used manage access to a shared medium typically copper cable. B is not correct - telnet is used as an insecure remote login to Linux and network devices. D is not correct - UDP is a Transport layer protocol used to manage data transmission.	2.1
4	C	ARP maps IP Addresses to MAC Addresses. Addresses are cached locally as they are discovered in an ARP Cache. Clients will only broadcast the LAN to find the MAC address of a system with a specific IP address they need. A is not correct because a broadcast is only used for clients not in the Cache B is not correct because the only way to find a client not in the cache is to send a broadcast packet to the LAN. D is not correct because ARP is never transmitted over WAN links.	1.2
5	A	Bellmann-Ford is an algorithm used by distance vector routing protocols to calculate the best route between networks.	3.6
6	C	By definition, a byte is 8 bits.	3.1
7	C	Class B default subnet mask is 255.255.0.0, also written as /16, so to divide the Class B network into 16 subnets it needs to move the network portion of the mask 4 bits to the right and make it /20 or 255.255.240.0.	3.4
8	D	Dijkstra's algorithm is used to calculate the shortest path between two networks using several metrics.	3.6
9	C	A Metropolitan Area Network (MAN) is a size between LAN and WAN. It is used to connect local networks within a geographic region, e.g. city or county. It is not a connection for global communications this is a WAN. It is not network of Bluetooth devices at very close range, this is a Personal Area Network (PAN). It is not a network of wireless devices, this is a WLAN.	1.4

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10	D	Dynamic Host Configuration Protocol's (DHCP) main purpose is to automatically assign IP addresses. Telnet is an application that allows insecure command line connection, such as Linux systems or network devices. PING is used to check a remote IP address is accessible and Netstat displays the current network connections and network statistics.	2.1																		
11	A	Encapsulation is the process of taking an entire protocol data unit from a higher layer in the ISO model and embedding this as data in the next layer down. For example, Layer 3 IP packets are passed to Layer 2 Ethernet frames and embedded as the data. This helps provide layer independence.	1.2																		
12	C	<p>If eight bits all set to 1 would be the maximum number:</p> <table border="1" data-bbox="411 846 1295 945"> <tr> <td>128</td> <td>64</td> <td>32</td> <td>16</td> <td>8</td> <td>4</td> <td>2</td> <td>1</td> <td>(Decimal)</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>(Binary)</td> </tr> </table> <p>Therefore, the largest number that can be represented is</p> $128+64+32+16+8+4+2+1 = 255$	128	64	32	16	8	4	2	1	(Decimal)	1	1	1	1	1	1	1	1	(Binary)	3.1
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1	1	1	1	1	1	1	1	(Binary)													
13	A	If part of a network between a source and destination goes down the destination may become unreachable. Dynamic routing allows routers to automatically adapt as the available possible routes change, therefore increasing network resilience without manual intervention.	1.3																		
14	D	OSPF, RIP are two well-known routing protocols. TCP and UDP by contrast are Transport layer protocols.	1.3																		
15	C	Port 80 is the default port for HTTP.	1.5																		
16	A	Quality of service is fundamental to VoIP functionality.	3.7																		
17	B	Radio waves are the media over which wireless communications are transmitted. Infrared is used for very short-range communication but is line of sight only. Visible light is not used for wireless communication but can be used in fibre optic networks. Copper cabling is wired communication.	1.1																		

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18	B	<p>The netmask is 255.255.248.0 The 1s represent the network part of the address so:</p> <p>255 is the following in binary:</p> <table border="1" data-bbox="411 548 1295 645"> <tr> <td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td><td>(Decimal)</td> </tr> <tr> <td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>(Binary)</td> </tr> </table> <p>248 is the following in binary:</p> <table border="1" data-bbox="411 792 1295 889"> <tr> <td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td><td>(Decimal)</td> </tr> <tr> <td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>(Binary)</td> </tr> </table> <p>The first two octets in binary are all 1's and therefore are all part of the network address 172.16.</p> <p>The third octet of the IP address must be AND'ed with the third octet of the netmask to find the network address:</p> <table border="1" data-bbox="411 1149 1295 1395"> <tr> <td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td><td>(Decimal)</td> </tr> <tr> <td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>(Netmask) - 248</td> </tr> <tr> <td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>(3 Octet of IP) - 150</td> </tr> <tr> <td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>(Logical AND) - 144</td> </tr> </table> <p>Therefore, the entire network address is 172.16.144.0</p>	128	64	32	16	8	4	2	1	(Decimal)	1	1	1	1	1	1	1	1	(Binary)	128	64	32	16	8	4	2	1	(Decimal)	1	1	1	1	1	0	0	0	(Binary)	128	64	32	16	8	4	2	1	(Decimal)	1	1	1	1	1	0	0	0	(Netmask) - 248	1	0	0	1	0	1	1	0	(3 Octet of IP) - 150	1	0	0	1	0	0	0	0	(Logical AND) - 144	3.4
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19	D	<p>The number of bits in an IP address are 32 therefore: Number of host bits = 32-Network Bits (22) 10 network bits available for hosts Number of hosts= <math>(2^{\text{host bits}}) - 2 = (2^{10}) - 2 = 1022</math></p>	3.3																																																																								
20	B	<p>VLSM is considered to provide the most efficient use of IP addresses.</p>	3.5																																																																								