

ITS 323 –INTERNETWORKING PRACTICE (ANSWERS)

1 IP Addresses

1.1 Classful Addressing

Answers

Question 1

	140.16.32.21	32.199.201.1	200.254.254.254	128.0.0.1	192.168.1.3
Class	B	A	C	B	C
Network	140.16.0.0	32.0.0.0	200.254.254.0	128.0.0.0	192.168.1.0
Broadcast	140.16.255.255	32.255.255.255	200.254.254.255	128.0.255.255	192.168.1.255
No. Hosts	65534	16777214	254	65534	254
No. Networks	16384	126	2097152	16384	2097152

Question 2

- Class B is needed (more than 254 hosts). Therefore you can choose any Class B network and corresponding host on that network
- Class C is suitable
- Class A is needed.

Question 3

All except b, h and i are valid. 68.x.x.x represents a Class A address (the first bit is a 0). Hence all addresses are valid except:

Network address: b – 68.0.0.0 (all host bits are 0)

Broadcast address: h – 68.255.255.255 (all host bits are 1)

Own address: i – 127.0.0.1 (first 8 bits are 01111111)

1.2 Classless Addressing

Answers

Question 4

	140.16.32.21	32.199.201.1	200.254.254.254	128.0.0.1	192.168.1.3
Subnet mask	/12	/22	/11	/16	/23
Subnet mask	255.240.0.0	255.255.252.0	255.224.0.0	255.255.0.0	255.255.254.0
Network	140.16.0.0	32.199.200.0	200.224.0.0	128.0.0.0	192.168.0.0
Broadcast	140.31.255.255	32.199.203.255	200.255.255.255	128.0.255.255	192.168.1.255
No. Hosts	1048574	1022	2097150	65534	510
	140.16.32.21	32.199.201.1	200.254.254.254	128.0.0.1	192.168.1.3
Subnet mask	/13	/27	/7	/17	/25
Subnet mask	255.248.0.0	255.255.255.224	254.0.0.0	255.255.128.0	255.255.255.128
Network	140.16.0.0	32.199.201.0	200.0.0.0	128.0.0.0	192.168.1.0
Broadcast	140.23.255.255	32.199.201.31	201.255.255.255	128.0.127.255	192.168.1.127
No. Hosts	524286	30	33554430	32766	126

Question 5

You determine the subnet mask by considering the number of hosts needed. You can choose any IP address, and then apply the subnet mask to determine the appropriate network address.

- 261 hosts are needed. Hence there must be at least 9 host bits (510 possible hosts), since with 8 host bits there are only 254 possible hosts. Hence the subnet mask should be /23 or 255.255.254.0. If we chose the IP address 123.45.67.8, the network address would be 123.45.66.0.
- 4 hosts needed. 3 host bits allows for 6 possible hosts, so a subnet mask of /29 is possible.
- 100,000 hosts needed. Subnet mask of /17.

2 Internetworking with IP

<i>Host</i>	<i>IP Address</i>	<i>Subnet Mask</i>
H1	60 . 45 . 12 . 2	/28
H2	70 . 2 . 13 . 1	/22
H3	70 . 2 . 14 . 1	/22
H4	190 . 5 . 5 . 2	/24
H5	200 . 10 . 5 . 6	/24
H6	200 . 10 . 5 . 31	/24

Router IP Addresses

<i>Router</i>	<i>IP Address</i>	<i>Subnet Mask</i>
Router A		
A1	60 . 45 . 12 . 3	/28
A2	130 . 10 . 0 . 1	/16
A3	130 . 20 . 0 . 1	/16
A4	70 . 2 . 12 . 1	/22
Router B		
B1	130 . 10 . 0 . 2	/16
B2	140 . 10 . 1 . 1	/16
B3	140 . 30 . 2 . 3	/16
Router C		
C1	130 . 20 . 0 . 2	/16
C2	150 . 10 . 0 . 1	/16
C3	190 . 5 . 5 . 1	/24
Router D		
D1	140 . 30 . 3 . 1	/16
D2	150 . 20 . 10 . 6	/16
D3	150 . 10 . 0 . 2	/16
Router E		
E1	140 . 10 . 2 . 1	/16
E2	140 . 20 . 7 . 3	/16
Router F		
F1	140 . 20 . 5 . 3	/16
F2	200 . 10 . 5 . 1	/24
F3	150 . 20 . 10 . 13	/16

2.1 Route Discovery

Answers

Least Cost Paths

From/To	A	B	C	D	E	F
A	-	A-B (3)	A-C (2)	A-B-D (5)	A-B-E (7)	A-B-D-F (8)
B	B-A (3)	-	B-A-C (5)	B-D (2)	B-E (4)	B-D-F (5)
C	C-A (2)	C-A-B (5)	-	C-D (6)	C-A-B-E (9)	C-D-F (9)
D	D-B-A (5)	D-B (2)	D-C (6)	-	D-F-E (5)	D-F (3)
E	E-B-A (7)	E-B (4)	E-B-A-C (9)	E-F-D (5)	-	E-F (2)
F	F-D-B-A (7)	F-D-B (5)	F-D-C (9)	F-D (3)	F-E (2)	-

2.2 Routing Tables for Hosts

Answers

Routing Table for Host H1

<i>Destination</i>	<i>Next Router</i>
*	A1: 60.45.12.3/28

Routing Table for Host H2

<i>Destination</i>	<i>Next Router</i>
*	A4: 70.2.12.1/22

Routing Table for Host H3

<i>Destination</i>	<i>Next Router</i>
*	A4: 70.2.12.1/22

Routing Table for Host H4

<i>Destination</i>	<i>Next Router</i>
*	C3: 190.5.5.1/24

Routing Table for Host H5

<i>Destination</i>	<i>Next Router</i>
*	F2: 200.10.5.1/24

Routing Table for Host H6

<i>Destination</i>	<i>Next Router</i>
*	F2: 200.10.5.1/24

2.3 Routing Tables for Routers

Answers

1. Network with H1 (router A is directly connected)
Network Address (Net1): 60.45.12.0/28
2. Network with H2 and H3 (router A is directly connected)
Network Address (Net2): 70.2.12.0/22
3. Network with H4 (router C is directly connected)
Network Address (Net3): 190.5.5.0/24
4. Network with H5 and H6 (router F is directly connected)
Network Address (Net4): 200.10.5.0/24

Routing Table for Router A

<i>Destination</i>	<i>Next Router</i>
Net1: 60.45.12.0/28	Direct
Net2: 70.2.12.0/22	Direct
Net3: 190.5.5.0/24	C1: 130.20.0.2/16
Net4: 200.10.5.0/24	B1: 130.10.0.2/16

Routing Table for Router B

<i>Destination</i>	<i>Next Router</i>
Net1: 60.45.12.0/28	A2: 130.10.0.1/16
Net2: 70.2.12.0/22	A2: 130.10.0.1/16
Net3: 190.5.5.0/24	A2: 130.10.0.1/16
Net4: 200.10.5.0/24	D1: 140.30.3.1/16

Routing Table for Router C

<i>Destination</i>	<i>Next Router</i>
Net1: 60.45.12.0/28	A3: 130.20.0.1/16
Net2: 70.2.12.0/22	A3: 130.20.0.1/16
Net3: 190.5.5.0/24	Direct
Net4: 200.10.5.0/24	D3: 150.10.0.2/16

Routing Table for Router D

<i>Destination</i>	<i>Next Router</i>
Net1: 60.45.12.0/28	B3: 140.30.2.3/16
Net2: 70.2.12.0/22	B3: 140.30.2.3/16

Net3: 190.5.5.0/24	C2: 150.10.0.1/16
Net4: 200.10.5.0/24	F3: 150.20.10.13/16

Routing Table for Router E

<i>Destination</i>	<i>Next Router</i>
Net1: 60.45.12.0/28	B2: 140.10.1.1/16
Net2: 70.2.12.0/22	B2: 140.10.1.1/16
Net3: 190.5.5.0/24	B2: 140.10.1.1/16
Net4: 200.10.5.0/24	F1: 140.20.5.3/16

Routing Table for Router F

<i>Destination</i>	<i>Next Router</i>
Net1: 60.45.12.0/28	D2: 150.20.10.6/16
Net2: 70.2.12.0/22	D2: 150.20.10.6/16
Net3: 190.5.5.0/24	D2: 150.20.10.6/16
Net4: 200.10.5.0/24	Direct