C-432 Quiz 1 Solutions

Time: 30 Mins

Max Points: 10

Q1-Q3 must be answered. Q4 is optional extra credit worth 1 point.

Q1. (i) Assume 16-bit IP addresses. In the following table, fill up the matching addresses for each of the interfaces A – D

Use the notation ‘x’ for any hexadecimal digit and ‘b’ for any binary bit.

|  |  |  |
| --- | --- | --- |
| Interface | CIDR Address | Matching IP addresses |
| A | A3.80/9 | A3.(1bbbbbbb) |
| B | A3.F8/13 | A3.F(1bbb) |
| C | A0.00/3 | (101bbbbb).xx |
| D | AC.00/6 | A(11bb).xx |
| E | All others |  |

(ii) Now fill up the last two columns for the given incoming IP addresses:

|  |  |  |
| --- | --- | --- |
| Incoming IP address | Matching Interfaces | Longest Match |
| A3.E6 | A,C | A |
| AE.12 | C,D | D |
| B3.4F | C | C |
| A4.33 | C | C |

(2+2)

Q2

Out of the block of IP addresses A8.30.70.00/20 form 4 subnets with the given number of hosts. Work out the subnet number for each

Subnet No of Hosts

A 2000

B 750

C 400

D 200

(3)

A needs 2 ^11 addresses, B needs 2^10, C needs 2 ^9 and D needs 2^8

Available addresses are A8.30.7x.xx or A8.30.7(bbbb).(bbbbbbbb)

Assign A8.30.7(0bbb).(bbbbbbbb) to subnet A with subnet no A8.30.70.00 / 21

Assign A8.30.7(10bb).(bbbbbbbb) to subnet B with subnet no A8.30.78.00/ 22

Assign A8.30.7(110b).(bbbbbbbb) to subnet C with subnet no A8.30.7C.00/23

Assign A8.30.7(1110).(bbbbbbbb) to subnet D with subnet no A8.30.7E.00/24

Q3 An IP datagram with 1700 bytes of data (excluding IP header) and identifier 333 has to pass through a network with MTU of 576 bytes

1. How many fragments are produced and how many bytes of data will be carried in each?
2. What is the identifier, offset and M-bit for the 2nd fragment?
3. Give the byte numbers in the third fragment (3 X 1)
4. Out of the MTU of 576 bytes 20 bytes go to the IP header, leaving 556 bytes for data

But 556 is not a multiple of 8; hence reduce it to 552 = 8\*79

3 fragments will hold 3\*552 = 1656 bytes

A 4th fragment will hold the remaining 44 bytes

Answer: 4 fragments with 552,552,552 and 44 bytes

1. Identifier = 333, Offset =79, M=1

Bytes 1104 to 1655

Q4 When a IP datagram is fragmented, state whether the following fields are changed or remain unchanged

Place an X in the correct column

Data X

|  |  |  |
| --- | --- | --- |
| Field | Changed | Unchanged |
| Version |  | X |
| Datagram Length | X |  |
| Identifier |  | X |
| Fragmentation Offset | X |  |
| Time to Live | X |  |
| Upper Layer Protocol |  | X |
| Header Checksum | X |  |
| Source IP Address |  | X |
| Destination IP Address |  | X |
| Data |  | X |

(10 X 0.1)