

SOLUTION ASSIGNMENT-04 (BCS 5A & 5C)

PART-01

REVIEW QUESTIONS

R18.

The Data Plane handles packet forwarding at high speed using routing tables created by the control plane. The Control Plane makes routing decisions and updates forwarding tables dynamically based on network conditions.

R19.

The checksums in the transport-layer segment (UDP/TCP) and network-layer datagram (IP) are computed over different parts of the packet, but they share some common bytes. The IP checksum is calculated only over the IP header, ensuring its integrity, while the UDP/TCP checksum is computed over the entire transport segment (header + data) and includes a pseudo-header that contains the source and destination IP addresses from the IP header. This means that although the IP checksum does not cover the transport-layer data, the source and destination IP addresses are included in both checksums—once as part of the IP header for the IP checksum and again in the pseudo-header for the transport-layer checksum. This ensures that errors affecting IP addressing can be detected at both the network and transport layers, but the actual transport-layer data is only verified by the transport-layer checksum.

PROBLEMS

Problem 8.

a)

Prefix Match	Link Interface
11100000 00	0
11100000 01000000	1
1110000	2
11100001 1	3
otherwise	3

b)

Prefix match for first address is 5th entry: link interface 3
Prefix match for second address is 3rd entry: link interface 2
Prefix match for third address is 4th entry: link interface 3

Problem 9.

Destination Address Range	Link Interface
00000000 – 00111111	0
01000000 – 01011111	1
01100000 – 01111111	2
10000000 – 10111111	2
11000000 – 11111111	3

number of addresses for interface 0 = $2^6 = 64$

number of addresses for interface 1 = $2^5 = 32$

number of addresses for interface 2 = $2^5 + 2^6 = 32 + 64 = 96$

number of addresses for interface 3 = $2^6 = 64$

Ac
Go

Problem 11.

223.1.17.0/26

223.1.17.128/25

223.1.17.192/28

Problem 21.

S2 Flow Table	
Match	Action
Ingress Port = 1; IP Src = 10.3.*.*; IP Dst = 10.1.*.*	Forward (2)
Ingress Port = 2; IP Src = 10.1.*.*; IP Dst = 10.3.*.*	Forward (1)
Ingress Port = 1; IP Dst = 10.2.0.3	Forward (3)
Ingress Port = 2; IP Dst = 10.2.0.3	Forward (3)
Ingress Port = 1; IP Dst = 10.2.0.4	Forward (4)
Ingress Port = 2; IP Dst = 10.2.0.4	Forward (4)
Ingress Port = 4	Forward (3)
Ingress Port = 3	Forward (4)

PART-02

Question 1

- (1) Does not Work
- (2) Works
- (3) Works
- (4) Works

(5) Does not Work

Question 2

(a) 11111111.11111111.11111110 → 255.255.254.0

(b) 128.100.112.0/23
128.100.114.0/23
128.100.116.0/23
128.100.118.0/23

(c) 128.100.113.255
128.100.115.255
128.100.117.255
128.100.119.255

Question 3

One needs to select n such that $2^n - 2 \geq 16,000$. There must be enough host bits h remaining so that $2^h - 2 \geq 700$. A subnet mask of 255.255.252.0 provides 16,382 subnets of the class A address and 1022 host addresses on each subnet. (Note this is the only subnetmask which will work).

Question 4

Network	Network Address	Subnet mask	First available host address	Last available host address	# of available host addresses
Network 1	201.180.128.0	/24	201.180.128.1	201.180.128.254	254
Network 2	201.180.129.0	/26	201.180.129.1	201.180.129.62	62
Network 3	201.180.129.64	/27	201.180.129.65	201.180.129.94	30
Network 4	201.180.129.96	/27	201.180.129.97	201.180.129.126	30
Network 5	201.1180.129.128	/27	201.180.129.129	201.180.129.158	30