

EE450: Final Solutions (for reference only)

Part 1: True/False

F, T, F, F, F, T, F, T, F, F, T, F, T, F, T, T, F, T, T, F

Part 2: Multiple Choice Questions

(d), (b), (c), (b), (a, e), (b, d, e), (c, f), (a, c), (c), (c)

Part 3: Fill-in-the-Blank

1Mbps, 10Mbps, 100Mbps, 5.24%, 6553600Bytes/sec, 152bits, 2.5×10^{-6} sec, 1×10^{-5} sec, 8695652.2bps, 2, (1156, 380Bytes), 3, (0, 61, 122), 2, (212.56.146.0/23, 212.56.148.0/23), 1, R2, 0, None(drop), R1, (C, F), E, D, (A, F), 10, 5, 5, 1, (10.1.1.3, LAN2), 198.64.1.1

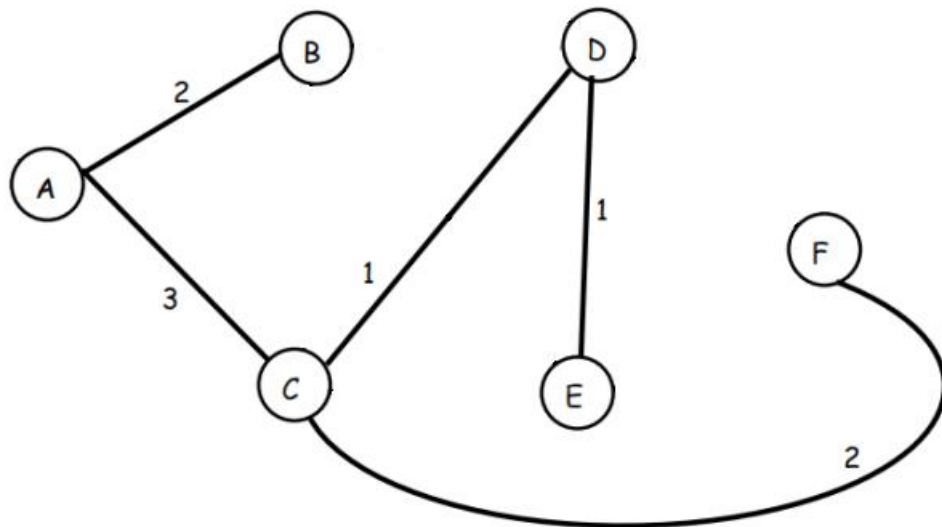
Part 4: Routing Algorithms

a.

Step by step:

STEP	N'	D(B), P(B)	D(B), P(B)	D(B), P(B)	D(B), P(B)	D(B), P(B)
0	A	2, A	3, A	6, A	∞	∞
1	AB		3, A	6, A	6, B	∞
2	ABC			4, C	6, B	5, C
3	ABCD				5, D	5, C
4	ABCDE					5, C
5	ABCDEF					

Spanning Tree:



b.

Time Slot	A	B	C	D	E	F	G	H	I
1	0	1	1	∞	∞	∞	∞	∞	1
2	0	1	1	2	∞	2	∞	2	1
3	0	1	1	2	3	2	3	2	1

Part 5: TCP Congestion Control

a.

The Bandwidth-Delay product = 1MBps \times 20ms = 20Kbytes = 20MSS

At the ending of 22th RTT, the sender reaches a congestion window of

“maximum size” after the loss.

The throughput = $(1 + 2 + 4 + 1 + 2 + 4 + 5 + 6 + \dots + 19)$ Kbytes / $(22 \times 20\text{ms}) =$

0.44MBps

The link utilization = 0.44MBps/1MBps = 44%

b.

The maximum window size of sender A = the receiver window size = 50MSS

The maximum throughput = 50Kbytes/ 20ms = 2.5MBps

The maximum link utilization = 2.5MBps/10MBps = 44%

c.

Point C: (4, 4)

Point D: (10, 10)

Point E: (11, 5)

Point F: (22, 16)

Point G: (25, 1)

Point H: (27, 4)

X-Credit: Addressing/Subnetting

Subnet	Subnet Address	Subnet Mask	Broadcast Address	Max # of hosts
A	192.168.1.0/26	255.255.255.192	192.168.1.63/26	62
B	192.168.1.64/27	255.255.255.224	192.168.1.95/27	30
C	192.168.1.96/28	255.255.255.240	192.168.1.111/28	14
D	192.168.1.112/30	255.255.255.252	192.168.1.115/30	2
E	192.168.1.116/30	255.255.255.252	192.168.1.119/30	2

Used addresses: $62 - 50 + 30 - 30 + 14 - 10 + 136 = 152$

Left addresses: $128 + 2 \times 4 = 136$