1.1	B
1.2	B
1.3	B
1.4	C
1.5	C
1.6	D
1.7	C
1.8	B
1.9	D
1.10	B

1.1.

L/R = 10^6 / (5 x 10^6) = 0.2 sec
0.2 sec * 3 hops = 0.6 sec

10^4 / (5 x 10^6) = 0.002 sec
Time at which 2nd packet is received at the first switch = time at which 1st packet is received at the second switch = 0.002 * 2 = 0.004 sec

Question 3: **[3 +3 = 6] (CLO 2)**

a)

Avg_total_response = avg LAN delay + avg_access_delay + avg_Internet_delay

Avg. LAN delay = 850,000 / (100 * 10^6) = 0.0085 sec

Avg_access_delay = Δ / (1- Δβ)

Δ = 850,000 / (15 * 10^6) = 0.0567 sec; β = 16

Avg_access_delay = (0.0567 / (1 – (0.0567)*(16))) = 0.607 sec

Avg_total_response = 0.0085+ 0.607 sec + 3 sec = 3.6155 sec

b)

total_total_response = # of objects * (avg LAN delay + 0.4* (avg_access_delay + total_Internet_delay))

= 16 *(0.0085 + 0.4 * (0.607 + 3)) =

= 16 *(0.0085 + 0.4 * (0.607 + 3)) =

= 16 * (0.0085 + 0.4 *3.607**)**

= 16 * 1.4513

= 23.2208 sec

Question 4: **[2 + 2 + 2 = 6] (CLO 2)**

Answer: The other field is TTL. It is used to note the time validity of the given resource record (RR). Once the time elapses, we discard this RR since it has become stale (i.e. outdated).

Answer: ***name*** □ alias name for some canonical (real) name (e.g., www.ibm.com)
value □ the canonical name (e.g., servereast.backup2.ibm.com)

Answer: **No**, Do not agree. Recursive DNS inevitably increases the load at the higher levels of the hierarchy, since the root becomes responsible for resolving the query for the relevant IP address of the mentioned URL. We would opt for iterative DNS instead, where the different levels of the hierarchy respond to the local DNS server when requested.

Q5
Answer: DevRTT = (1- β) * DevRTT + β * | SampleRTT - EstimatedRTT |
EstimatedRTT = (1 - α) * EstimatedRTT + α * SampleRTT
TimeoutInterval = EstimatedRTT + 4 * DevRTT

After obtaining first SampleRTT 105ms:
DevRTT = 0.75*4ms + 0.25 * | 105ms - 102ms | = 3.75ms
EstimatedRTT = 0.875 * 102 + 0.125 * 105 = 102.37ms
TimeoutInterval = 102.37ms+4*3.75ms = 117.37 ms

After obtaining 110ms:

DevRTT = 0.75*3.75ms + 0.25 * | 110ms – 102.37ms | = 4.71 ms
EstimatedRTT = 0.875 * 102.37ms + 0.125 * 110ms = 103.33 ms
TimeoutInterval = 103.33ms+4*4.71ms = 122.17 ms

After obtaining 115ms:
DevRTT = 0.75*4.71ms + 0.25 * | 115ms – 103.33ms | = 6.45 ms
EstimatedRTT = 0.875 * 103.33ms + 0.125 * 115ms = 104.78 ms
TimeoutInterval = 104.78ms+4*6.45ms = 130.58 ms

Any four valid IP addresses having subnet address 192.168.1.0/24

IP address of host at interface-1: 192.168.1.1

IP address of host at interface-2: 192.168.1.2

IP address of host at interface-3: 192.168.1.3

IP address of router R1 at interface-4: 192.168.1.4

a)

NAT Translation Table	
WAN Side	**LAN Side**
24.34.112.235, 4121	192.168.1.1 , 3345
24.34.112.235, 4122	192.168.1.1 , 3346
24.34.112.235, 4123	192.168.1.2 , 3355

24.34.112.235, 4124	192.168.1.2 , 3356
24.34.112.235, 4125	192.168.1.3 , 3365
24.34.112.235, 4126	192.168.1.3 , 3366

Question 7:

Step	N'	R2 D(R2), p(R2)	R3 D(R3), p(R3)	R4 D(R4), p(R4)	R5 D(R5), p(R5)	R6 D(R6), p(R6)	R7 D(R7), p(R7)
0	R1	3 , R1	∞	∞	∞	∞	∞
1	R1 R2		4 , R2	∞	∞	9 , R2	∞
2	R1 R2 R3			8 , R3	6 , R3	9 , R2	9 , R3
3	R1 R2 R3 R5			7 , R5		9 , R2	9 , R3
4	R1 R2 R3 R5 R4					9 , R2	9 , R3
5	R1 R2 R3 R5 R4 R6						9 , R3
6	R1 R2 R3 R5 R4 R6 R7						
				OR			
4	R1 R2 R3 R5 R4					9 , R2	9 , R3
5	R1 R2 R3 R5 R4 R7					9 , R2	
6	R1 R2 R3 R5 R4 R7 R6						

Answer: IGP

ii) iBGP, eBGP

iii)

Answer: IGP

iv)

Answer: IGP, iBGP, eBGP (for entries on various routers along the way).

Answer: YES!

Answer: IP address of station C.

Answer: YES!

Answer: IP address of station D.

Answer: NO (Reason: as it has already learnt it and unless ARP cache expires); If YES, reason: last ARP cache expires.

Answer: YES!

Answer: IP address of station B.

II)

A. Header for packet 2

Header Type	Source	Destination
Ethernet	**MAC 1**	**MAC 2**
IP	**10.0.0.2**	**3.0.1.2**

B. Header for packet 3

Header Type	Source	Destination
Ethernet	**MAC 3**	**MAC 4**
IP	**1.2.3.4**	**3.0.1.2**

C. Header for packet 4

Header Type	Source	Destination
Ethernet	**MAC 9**	**MAC 10**
IP	**1.2.3.4**	**3.0.1.2**

Rough Work: