Data Networks WS 18/19
INTERNET ARCHITECTURE:

Assignment 7

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Question 1: (0.5 + 0.5 + 0.5 + 0.5 = 2 points) Routing Fundamentals

Give brief answers (2–3 sentences) to the following questions:
(a) What is the difference between static routing and dynamic routing?

Static routing	Dynamic routing
Static routing is a process in which we have to manually add routes in the routing table of the router. Typically done for small networks which aren't expected to grow.	Dynamic routing makes automatic adjustment of the routes according to the current state of the route in the routing table. Dynamic routing uses protocols to discover network destinations and the routes to reach it. Typically used when the network is expected to grow and the state of the links is not known at all points of time.

(b) What are advantages of dynamic routing compared to static routing (describe at least two advantages)?

static routing	dynamic routing
Advantages ● Routers will not share static routes with each other, thus reducing CPU/RAM overhead in the router and saving bandwidth for data exchange instead of using for signalling. ● It adds security because only administrator has control to allow routing to particular networks. **Disadvantages** ● static routing is not fault-tolerant, any change to the routing infrastructure such as a link going down, or a new network being added would require manual intervention from a network administrator.	**Advantages** ● Routing protocols are capable of dynamically choosing a different or better path when there is a change to the routing infrastructure. ● Simpler to configure on larger networks **Disadvantages** ● Routers share dynamic routing information with each other,which increases CPU, RAM, and bandwidth usage. ● Less secure since routers advertise the routing path to neighbors outside a particular network.

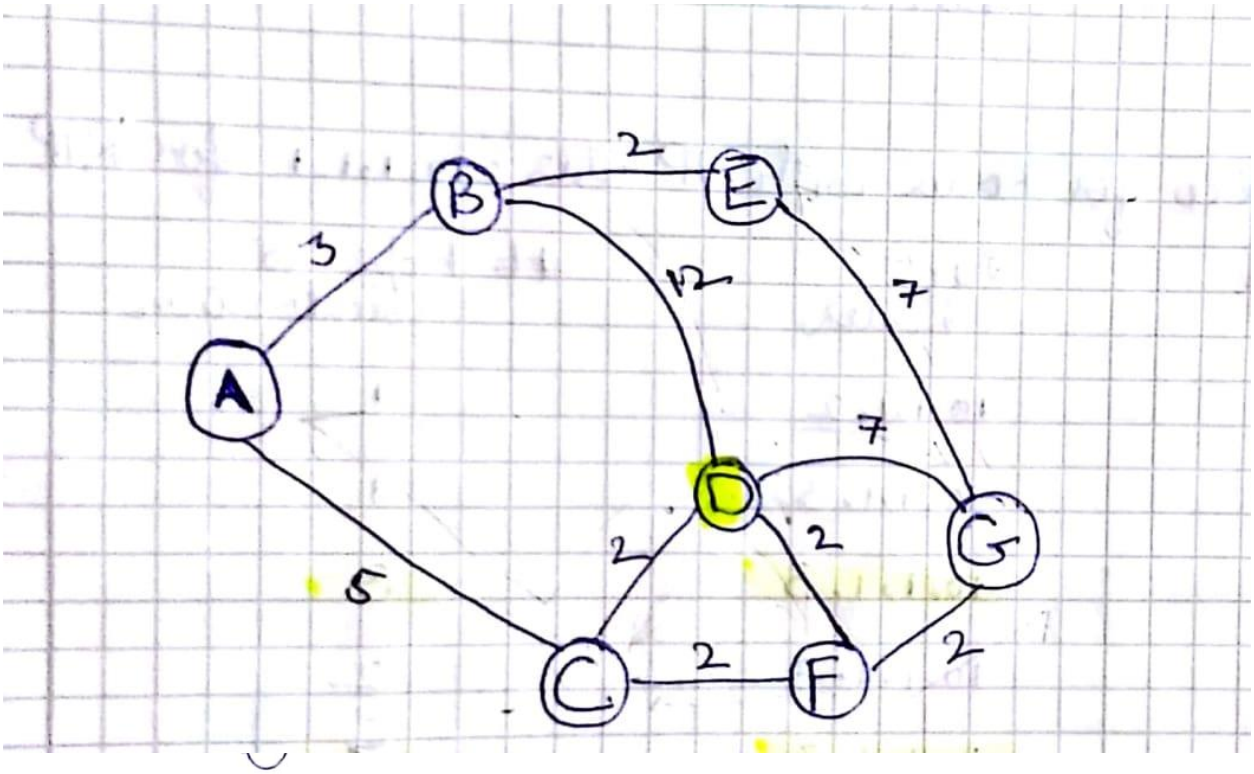
(c) What are the main differences between link state routing and distance vector routing and what algorithms are classically associated with one or the other?

link state routing	distance vector routing
● Include global information, that is all routers have a complete topology and link cost information. ● Algorithm associated - Dijkstra's algorithm	● Include decentralized information, that is routers know only the physically connected neighbours. ● Iterative process of computation and exchange of information with neighbours. ● Algorithm associated - Distance Vector Algorithm.

(d) What are the main advantages and disadvantages of link state routing and distance vector routing?

link state routing	distance vector routing
Advantages ● No count to infinity problem **Disadvantages** ● A router sends its information about its neighbors only to all the routers through flooding therefore induces more traffic in the network.	**Advantages** ● No flooding, therefore less traffic **Disadvantages** ● Count to infinity problem

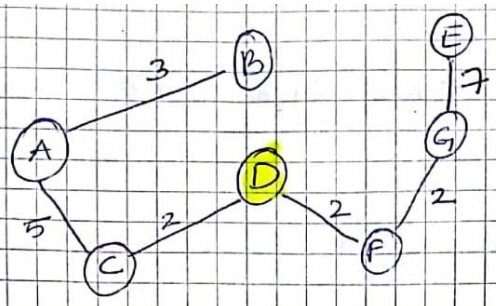
Question 2: (0.5 + 1 + 0.5 + 1 + 1 = 4 points) Link State Routing



(b)

step	start N'	D(A) P(A)	D(B) P(B)	D(C) P(C)	D(E) P(E)	D(F) P(F)	D(G) P(G)
0	D	∞	12, D	2, D	∞	2, D	7, D
1	DC	7, C	12, D	2, D	∞	2, D	7, D
2	DCF	7, C	12, D	2, D	∞	2, D	4, F
3	DCFG	7, C	12, D	2, D	11, G	2, D	4, F
4	DCFGA	7, C	10, A	2, D	11, G	2, D	4, F
5	DCFGAB	7, C	10, A	2, D	11, G	2, D	4, F
6	DCFGABE	7, C	10, A	2, D	11, G	2, D	4, F

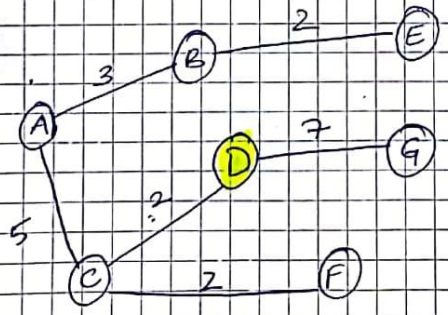
(c)



(d)

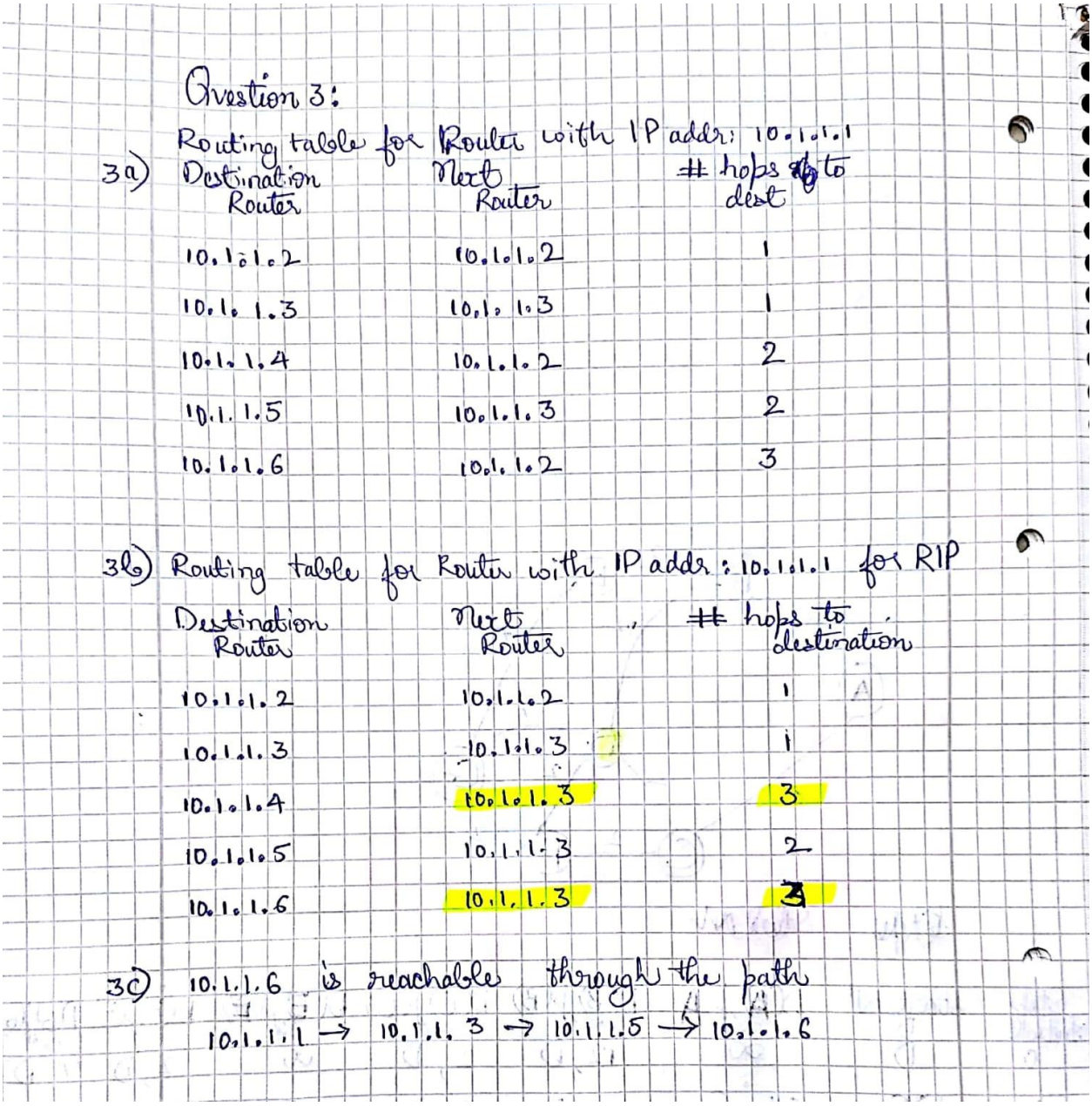
Destination	Next hop
B	C
C	C
G	F
F	F
A	C
E	F
D	self

(e)



Destination	next hop
D	self
B	C
C	C
G	G
F	C
A	C
E	C

Question 3: (1 + 1 + 1 + 0.5 + 0.5 = 4 points) Distance Vector Routing with RIP



Question 3:

3a) Routing table for Router with IP addr: 10.1.1.1

Destination Router	Next Router	# hops to dest
10.1.1.2	10.1.1.2	1
10.1.1.3	10.1.1.3	1
10.1.1.4	10.1.1.2	2
10.1.1.5	10.1.1.3	2
10.1.1.6	10.1.1.2	3

3b) Routing table for Router with IP addr: 10.1.1.1 for RIP

Destination Router	Next Router	# hops to destination
10.1.1.2	10.1.1.2	1
10.1.1.3	10.1.1.3	1
10.1.1.4	10.1.1.3	3
10.1.1.5	10.1.1.3	2
10.1.1.6	10.1.1.3	3

3c) 10.1.1.6 is reachable through the path

10.1.1.1 → 10.1.1.3 → 10.1.1.5 → 10.1.1.6

(d) What mechanisms does RIP use to solve the "Count-to-Infinity" problem? Do the mechanisms RIP provides suffice to eliminate the problem—and if not, in which situations can a count to infinity still occur?

The count- to-infinity problem can be solved using the following mechanisms:

1. Split Horizon - this mechanism makes sure that a route is not advertised for an interface on which it was received.
2. Split Horizon with Poisoned Reverse- this mechanism makes sure to give a infinite metric on routes out the interface on which it was received.

3. Triggered Updates- Once there is a metric change, an update is sent immediately.
4. Hold-down Timer : Once there is invalidation of route ,for few seconds ignore all updates for route

(e) RIP is not in wide use anymore today. Give two reasons why this is the case.

1. Long convergence time.
2. Due to hop limit of 16, it makes it difficult to scale to larger network.