Computer Networks
Fall 2025
Assignment#5 (5A & 5C)

Due Date: Thursday, 13th November, 2025
Submission Mode & Time: Handwritten solutions to be submitted during the lecture.

Please note the following:

1. No exceptions to the above date and time will be allowed. Inability to submit the assignment by the required time will result in zero marks.

2. To ensure self-completion of assignments and discourage plagiarism, the instructor or the relevant TA may randomly contact you and ask for an explanation of your answers. Where plagiarism and/or cheating is evident, you will be referred to the departmental disciplinary committee. In extreme cases of plagiarism an F may be awarded immediately with further referral to the university disciplinary committee.

3. All solutions must be **hand-written.**

4. **Assignment Solution Submission**: In case of **in person / physical lectures at the campus**, hard copy of the hand-written assignment's solutions will be submitted by **hand** by each student to the Instructor / TA directly during the lecture on the due date.

PART-1

Use the following text for completion of this part of the assignment:
Computer Networking - A Top-Down Approach 8th Edition by Kurose & Ross.

Solve the following problems from the back of **Chapter 5**. Every Question has equal marks i.e.

Review Questions: **(3*1 = 3 marks)** **[CLO 3]**

R3

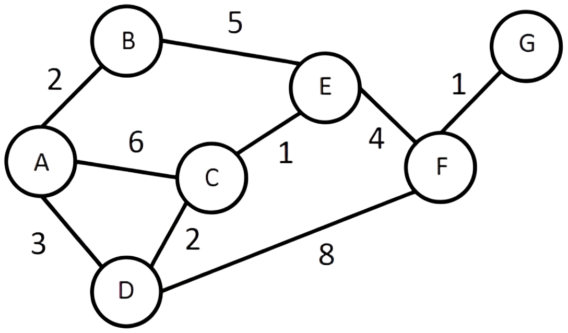
Problems: **(0 marks)** **[CLO 3]**

None (As most that are Important are also given in Part-2 of Assignment)

PART - 2

Question: 01 [10 Marks] [CLO 3]

Consider the network given below. The numbers indicate the link costs. For the indicated link costs, use Dijkstra's algorithm to find the shortest paths from node A to all other nodes (you must use the same order as given in the N' Column and follow the convention used in the book):

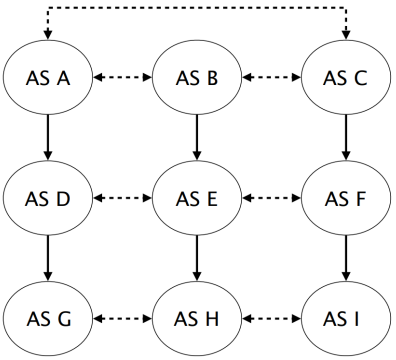


Step	N'	D(B), P(B)	D(C), P(C)	D(D), P(D)	D(E), P(E)	D(F), P(F)	D(G), P(G)
0	A						
1	A, B						
2	A, B, D						
3	A, B, D, C						
4	A, B, D, C, E						
5	A, B, D, C, E, F						

Question: 02 [2 + 3 = 5 Marks] [CLO 3]

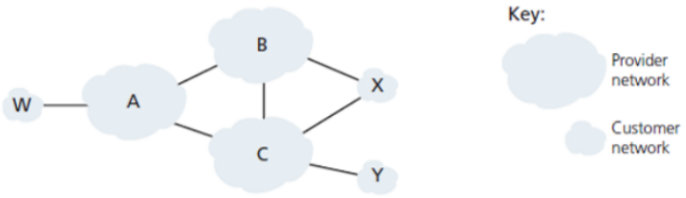
Consider the AS topology (that uses BGP) shown below. Single-headed plain arrows point from providers to their customers (AS-A is the provider of AS-D), while double-headed dashed arrows connect peers (AS-D and AS-E are peers) Recall the policies AS'es adopt when routing packets (also given in hints below). If there is a tie, assume that AS'es prefer paths with fewer hops. A few helpful hints/rules are as below:

- AS'es prefer customer routes since they are revenue-generating.
- Next in preference are peer routes, which are neutral cost.
- Least preferred are provider routes, as they incur cost.
- BGP prohibits AS'es from forwarding traffic between providers or peers if they are not customers.

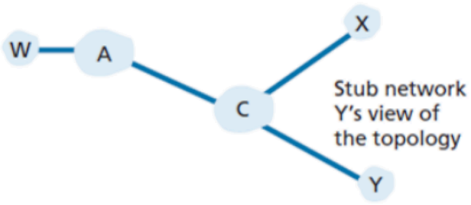


1. What path does a packet take when going from AS-I to AS-E?
2. Imagine that AS-A and AS-C each announce every BGP route they learn for all possible destinations. Using the AS paths from these route advertisements, identify all the inter-AS connections and illustrate what the AS-level network topology would look like. Draw figure?

Question: 03 [10 Marks] [CLO 3]



In the figure above, consider the information that reaches the Stub Networks W, X and Y. Based on Information available at W and X, what are their respective views of Network topology? Justify your answer as well. The topology view of Y is shown below:



Question: 04 [5 Marks] [CLO 3]

Consider a network where the Distance-Vector algorithm is used. There are 4 routers labeled A, B, C and D. Draw a diagram of a possible network consistent with these tables? Suppose their routing tables are as follows:

Forwarding table in A

Destination	Cost	Next Hop
A	0	-
B	3	B
C	4	C
D	5	C

Forwarding table in B

Destination	Cost	Next Hop
A	3	A
B	0	-
C	4	D
D	3	D

Forwarding table in C

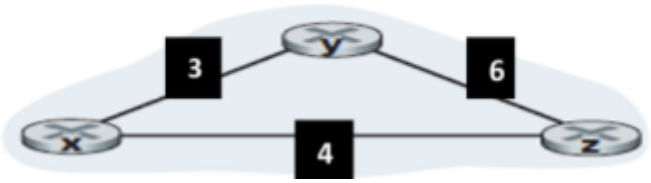
Destination	Cost	Next Hop
A	4	A
B	4	D
C	0	-
D	1	D

Forwarding table in D

Destination	Cost	Next Hop
A	5	C
B	3	B
C	1	C
D	0	-

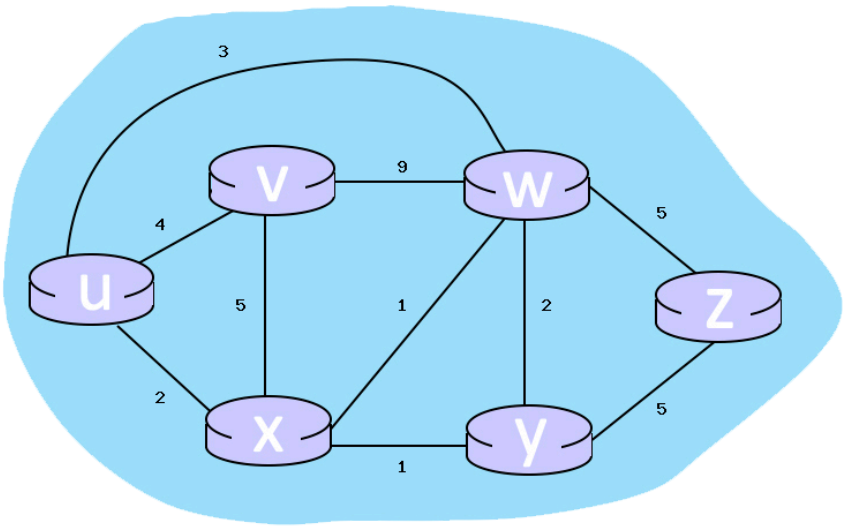
Question: 05 [5 Marks] [CLO 3]

Compute the distance tables of x, y and z using the synchronous version of distance vector algorithm after initialization step and each iteration:



Question: 06 [3 * 2 = 6 Marks] [CLO 3]

Consider the 6-node network shown below, with the given link costs. Using Dijkstra's algorithm, find the least cost path from source node U to all other destinations and answer the following questions (only answer questions, do the calculations elsewhere on a ruf page):



1. What is the shortest distance to node v and what node is its predecessor? Write your answer as n,p
2. What is the shortest distance to node w and what node is its predecessor? Write your answer as n,p
3. What is the shortest distance to node u and what node is its predecessor? Write your answer as n,p