

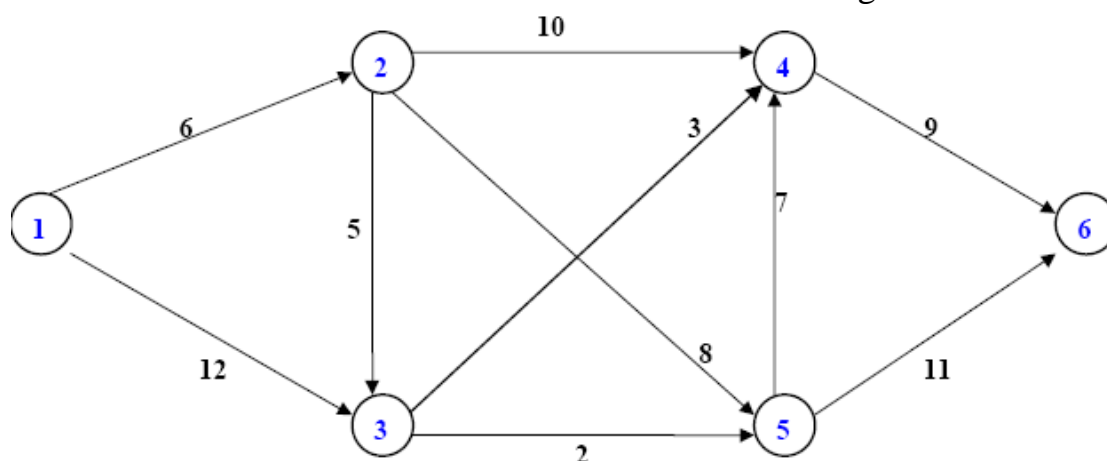
**First Question****No. of Branches (1)****(10/60)**

Consider the following set of activities. Use CPM to come up with the minimum value of the expected projected duration. Also list which activities are critical.

Tasks	Dependency	Duration
A		4
B		3
C	A	8
D	A	7
E	B and C	9
F	B and C	12
G	D and E	2
H	D and E	5
I	F and G	6

**Second Question****No. of Branches (2)****(20/60)**

Consider the following network, and suppose that the number adjacent to an arc represents the distance between the two nodes it connects. Find the following:



A. Use spanning tree in the network.

بكالوريوس

Course No: IGGC2302

Course Title:

Operations Research

Date: 17 / 01 / 2019

No. of Questions: 4 Questions

Time: 2 hours

Using Calculator (Yes)

بسم الله الرحمن الرحيم

University of Palestine



Final Exam

1st quadmester 2018/2019

Total Grade: 60

Instructor Name: Dr. Ahmed H. Abo
absa

Student No.: _____

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Dep. / Specialist: _____

Using Dictionary (No)

- B. Find the shortest path from node 1 to each of the other nodes in the network along with the associated distances.

**Third Question****No. of Branches (1)****(10/60)**

A book supplier has three salespersons to assign to four regions. The salespersons are to cover the regions in different amounts of time. The amount of time, in days, required by each salesperson to cover each region is shown in the table below. Which salesperson should be assigned to which region in order to minimize total time?

Obtain the optimal assignment by using the Hungarian algorithm and calculate the total time.

	A	B	C	D
1	10	2	8	6
2	9	3	11	3
3	3	1	4	2

**Fourth Question****No. of Branches (3)****(20/60)**

A company that makes and distributes cookies, cakes and crackers has three plants that produce and ship its products out to five regional warehouses for distribution to retail outlets. For distribution purposes, the company uses CWT (1 CWT = 100 lbs.) as the unit of measurement.

The plants which are located at Pittsburgh, Memphis and Omaha have monthly supplies of 180, 250 and 150 CWT respectively, while the monthly demands at the warehouses which are located at Newark, Chicago, Atlanta, Dallas and Los Angeles are 120, 100, 160, 80 and 150 CWT respectively. The unit freight costs between all plant-warehouse pairs (in \$/CWT) are given below:

	Newark	Chicago	Atlanta	Dallas	Los Angeles
Pittsburgh	4	6	5	12	19
Memphis	10	4	8	5	14
Omaha	13	9	3	6	10

The company incurs a penalty at each warehouse that does not have all of its monthly demand satisfied and these are given by \$0.15, \$0.10, \$0.25, \$0.20 and \$0.05 per CWT of unsatisfied demand at Newark, Chicago, Atlanta, Dallas and Los Angeles respectively. On the other hand, any unused supply at Pittsburgh, Memphis and Omaha incur storage costs of \$0.15, \$0.20 and \$0.10 per CWT respectively.

1. Formulate this as a **balanced** transportation problem.

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Using Dictionary (No)

2. Use North West method to find the initial visible solution.

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Using Dictionary (No)

3. Use UV method to check the optimality of solution in part 2. (just two iterations)

End of Questions

Good Luck