OPERATIONAL ANALYSIS FOR ECONOMISTS –EXAM TEST **B**

2012/2013

Name:

Total points: Mark:

1. Yes or No? [10 p.]
   1. When using the CPM method we use an exponential distribution function.
   2. Linear programming is not a special case of a mathematical programming.The north-west method always gives an optimal solution to a transportation problem.
   3. Primal problem of a dual problem is a primal problem.
   4. Not every linear programming problem can be converted into a dual problem
2. Fill in the gaps ……. [10 p.]:
   1. The worst initial solution of a transportation problem is given by ………………………………….
   2. If both the primal and the dual problem has a finite optimal solution, then optimal objective functions are …………………….
   3. In the case of the exceed of supply, the transportation problem can be balanced using …………………...
   4. ………………………. contains parallel edges or loops
   5. If one activity on the critical path delays, the total time of the project …………………………………
3. Draw [10 p.]:
   1. Minimal spanning tree containing 3 nodes with total value of the tree 5 units
   2. Complete graph containing 4 nodes
   3. Multigraph containing 3 nodes
   4. Plane graph with 4 nodes
   5. Graph with 3 nodes with the maximal flaw of 5 units
4. Producer of tea mixtures is producing two kinds of tea mixtures from Chinese, Ceylon and Indian teas. In table, there are set capacities of available teas, the ratio of components needed to produce a mixture and profits for 1 ton of mixture.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mixture 1 | Mixture 2 | Capacity (t) |
| Chinese tea | 0,4 | 0,1 | 160 |
| Ceylon tea | --- | 0,5 | 90 |
| Indian tea | 0,6 | 0,4 | 200 |
| Profit (Euro/t) | 12000 | 8000 |  |

1. Write down the mathematical model maximizing the firm’s profit (optimal production program). (5 p.)

2. Write down one impossible solution. (5 p.)

3. Solve the problem using WinQSB program (5 p.)

Solution:

4. Write down the dual problem of the model (5 p.)

1. Is vector (20000,30000,50000) feasible solution to the dual problem? (5 p.)

7. Is vector (50,100) a feasible solution to the primal problem? (5 p.)

Project is composed of 7 activities – in the table there are given activities together with preceding activities and time lengths.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Preceding  activities | Time |  |  |
| A | - | 2 |  |  |
| B | - | 3 |  |  |
| C | - | 5 |  |  |
| D | A | 4 |  |  |
| E | B | 3 |  |  |
| F | A | 6 |  |  |
| G | E,C | 2 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Tasks:

1) Create a project graph (10 p.)

2) Calculate the length of the project using CPM in WinQSB program. (5 p.)

Draw a critical path into the project graph. (5 p.)