EASTERN UNIVERSITY, SRI LANKA
FACULTY OF SCIENCE
Second Year First Semester Examination in Science - 2021/2022
(Mar./Apr., 2024)
MT 2222 - Optimization

Answer all questions **Time : Two hours**

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1. Define the following:

   - Linear Programming;
   - feasible solution of a Linear Programming Problem. [10 marks]

   Timber Ltd has two products Sofa and Chair. To produce one unit of Sofa, 2 units of material X and 4 units of material Y are required. To produce one unit of Chair, 3 units of material X and 2 units of material Y are required. As the raw material is in short supply, not more than 16 units of each material can be used. The cost per unit of product Sofa and Chair are Rs. 6.00 and Rs. 8.00 respectively. Atleast 2 units of sofa must be produced.

   (a) Formulate this problem as a linear programming model;

   (b) Solve it for minimum cost by the *graphical method*. [90 marks]

2. Use the *Simplex method* to solve the following Linear Programming Problem:
   Minimize $Z = 3x_1 + 8x_2$,
   Subject to the constraints:

$$x_1 + x_2 = 200,$$
$$x_1 \leq 80,$$
$$x_2 \geq 60,$$

   where $x_1, x_2 \geq 0$. [100 marks]

3. Briefly explain the *Hungarian method* for solving assignment problems. [40 marks]

There are four jobs to be assigned among the five machines A, B, C, D and E. Only one job could be assigned to one machine. The processing times, in hours, for doing the jobs by the machines are given in the following matrix.

Machines

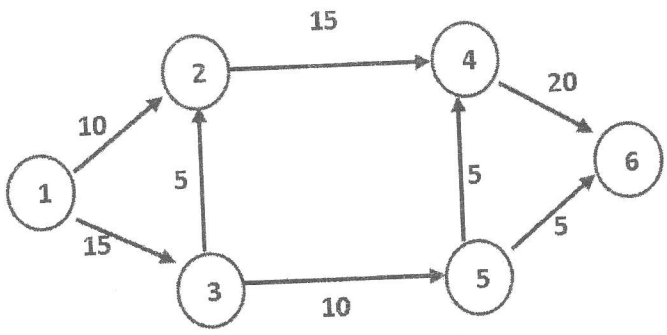
Jobs	A	B	C	D	E
1	4	3	6	2	7
2	10	12	11	14	16
3	4	3	2	1	5
4	8	7	6	9	9

Find an optimum assignment of jobs to the machines to minimize the total processing time. What is the total processing time to complete all the jobs. [60 marks]

4. Find the maximum flow for the following network by

(a) intuitive technique;

(b) labeling technique.



[100 marks]