Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
200 Level 2nd Semester Examination – Dec./Jan. 2018/19
SCT 212-1 Operational Research

Instructions to candidates
Duration: One (01) hour
Number of questions: Two (02) Essay Questions
Mark allocation: 100 mark
Use standard symbols without definition.
Scientific calculators are allowed.
Answer all questions

1. A factory makes tennis rackets and cricket bats. The profit on a racket and a bat is Rs. 2,000 and Rs. 1,000 respectively. A tennis racket takes 1.5 hours of machine time and 3 hours of craftsman's time in its making while a cricket bat takes 3 hours of machine time and 1 hour of craftsman's time. In a day, the factory has the availability not more than 42 hours of machine time and 24 hours of craftsman's time. The production manager must choose the optimal product mix in order to maximize the factory's profit.

   a. Formulate the above scenario as a linear programming problem. (15 mark)

   b. Use the **graphical method** or **simplex method** to solve the model formulated in part (a). (20 mark)

   c. What is the maximum profit of the factory when it works at full capacity? (05 mark)

2. A manufacturing company produces diesel engines in three production plants P_1, P_2, and P_3. They are purchased by three trucking companies, T_1, T_2, and T_3. The following table shows the number of engines available at P_1, P_2, and P_3 and number of engines required by the T_1, T_2, and T_3. It also shows the transportation cost per engine (in Rs. 1,000s) from each source to each destination. The company wishes to keep the total transportation cost to a minimum.

Source \ Destination	T_1	T_2	T_3	Supply
P_1	10	4	11	14
P_2	12	5	8	10
P_3	10	3	12	6
Demand	8	10	12	

   a. Formulate a mathematical model for the above description. (10 mark)

   b. Use the **north-west corner rule** to obtain an initial basic feasible solution for the model formulated in part (a). (15 mark)

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c. Discuss the degeneracy of the solution in part (b). (05 mark)

d. Starting with the initial basic feasible solution from part (b), find the optimal transportation pattern and minimum transportation cost. (30 mark)

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