

## SOUTH EASTERN UNIVERSITY OF SRI LANKA

THIRD YEAR (REPEAT) EXAMINATION IN BACHELOR OF BUSINESS  
ADMINISTRATION & COMMERCE – 2006/2007

SEMESTER – I, DECEMBER 2007

## MIS 3105R - MATHEMATICAL PROGRAMMING

Answer **all** questions.

Time: 03 hours

## Q-1

I. Explain the methodology of Management Science. List out the uses and advantages of Management Science model.

(10 marks)

II. A farmer has 100 hectares of land in which he can plant with either wheat or potatoes. Taking into account of expected yield, crop prices, planting and harvesting cost (including labor etc) he calculates the net profit of Rs 9000 per hectare for wheat and Rs 6000 for potatoes.

On average it takes 6 man hours per hectare for wheat and 3 man hours per hectare to harvest potatoes. During the critical autumn harvesting period he will have only 480 man hours of helping available.

The maximum quota for potatoes is 65 hectares.

Assuming that the farmer wants to maximize his profit, formulate the LP model for the above problem.

(5 marks)

III. LINDO solver gives you the following report. You are requested to do the sensitivity analysis.

LP OPTIMUM FOUND AT STEP 2

OBJECTIVE FUNCTION VALUE

1) 780000.0

VARIABLE	VALUE	REDUCED COST
W	60.000000	0.000000
P	40.000000	0.000000

ROW	SLACK OR SURPLUS	DUAL PRICES
LAND)	0.000000	3000.000000
MANHOURS)	0.000000	1000.000000
QUOTA)	25.000000	0.000000

NO. ITERATIONS= 2

RANGES IN WHICH THE BASIS IS UNCHANGED:

OBJ COEFFICIENT RANGES

VARIABLE	CURRENT COEF	ALLOWABLE INCREASE	ALLOWABLE DECREASE
W	9000.000000	3000.000000	3000.000000
P	6000.000000	3000.000000	1500.000000

RIGHTHAND SIDE RANGES

ROW	CURRENT RHS	ALLOWABLE INCREASE	ALLOWABLE DECREASE
LAND	100.000000	12.500000	20.000000
MANHOURS	480.000000	120.000000	75.000000
QUOTA	65.000000	INFINITY	25.000000

(10 marks)  
(Total 25 marks)

## Q-2

I. Define the following terms in relation to Dynamic Programming.

- i) Stage                      ii) State    iii) Policy  
iv) Return                    v) Recursive relationship.

(5 marks)

II. The distances (d) between cities are given below.

$$\begin{aligned}d(A-B) &= 7, d(A-C) = 3, d(A-D) = 5 \\d(B-E) &= 12 \\d(C-E) &= 8, d(C-F) = 9 \\d(D-E) &= 7, d(D-F) = 13 \\d(E-G) &= 9, d(F-G) = 6\end{aligned}$$

Use the Dynamic Programming approach (Backward recursive equation) to select the shortest route between two cities (A and G).

(15 marks)

(Total 20 marks)

## Q-3

I. Distinguish **Cutting and Plan** method from **Branch and Bound** method of solving Integer Programming problem with an example.

(10 marks)

II. Find out the optimal integer solution to the following Linear programming problem using Branch and Bound method.

$$\text{Maximize } Z = 5X_1 + 3X_2$$

$$\text{Subject To } 4X_1 + 2X_2 \leq 25$$

$$X_1 \leq 5$$

$$X_2 \leq 8$$

$$X_1, X_2 \geq 0 \text{ and integer}$$

(15 marks)

(Total 25 marks)

## Q-4

I. Explain 10 rules that give the basic syntax of the LINDO modeling language with example for each.

(20 marks)

II. Write short description to the following.

- Linear Programming
- Iteration
- Stochastic Problem
- Constraint
- Integer Programming

(10 marks)

(Total 30 marks)