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Reg. No. : .....

Name : .....

M.Sc. Final Degree Examination, July 2009
(I.D.E.)
Branch : MATHEMATICS
MM 1211 – Elective – I : Operations Research and Computer Applications – I
(Prior to 2006 admission)

Time : 3 Hours Max. Marks : 85

Instructions: *1) Answer either Part – **A** or Part – **B** of **each** question.*
*2) **All** questions carry **equal** marks.*

I. A) a) Invert the matrix $B = \begin{pmatrix} 2 & 1 & 0 \\ 0 & 2 & 0 \\ 4 & 0 & 1 \end{pmatrix}$ by using product-form. **7**

b) Solve by revised simplex algorithm

Maximize $Z = 6x_1 - 2x_2 + 3x_3$

Subject to $2x_1 - x_2 + 2x_3 \leq 2$

$x_1 + 4x_3 \leq 4,$

$x_1, x_2, x_3 \geq 0.$ **10**

B) a) Use product form of inverse to verify whether the equations $x_1 + 2x_2 = 3$; $x_1 + 4x_2 = 2$ have a unique solution or not. **7**

b) Solve the following problem by the revised dual simplex method :

Minimize $Z = 2x_1 + 3x_2$

Subject to $2x_1 + 3x_2 \leq 30$

$x_1 + 2x_2 \geq 10$

$x_1, x_2 \geq 0.$ **10**

P.T.O.

II. A) a) Write the dual of the given primal

Minimize $Z = 6x_1 + 3x_2$

Subject to $6x_1 - 3x_2 + x_3 \geq 2$

$3x_1 + 4x_2 + x_3 \geq 5,$

$x_1, x_2, x_3 \geq 0.$ **5**

b) Estimate a range for the optimal objective value for the LPP

Maximize $Z = x_1 + 5x_2 + 3x_3$

Subject to $x_1 + 2x_2 + x_3 = 3$

$2x_1 - x_2 = 4,$

$x_1, x_2, x_3 \geq 0.$ **12**

B) Consider the LPP $Z = 2x_1 + 3x_2$

Subject to $2x_1 + 2x_2 \leq 30$

$x_1 + 2x_2 \geq 10,$

$x_1, x_2 \geq 0.$

Solve this primal through its Dual. **17**

III. A) Discuss the effect of changing the requirement vector b form $\begin{pmatrix} 6 \\ 4 \\ 24 \end{pmatrix}$ to $\begin{pmatrix} 6 \\ 2 \\ 12 \end{pmatrix}$

on the optimum solution of the LPP.

Minimize $Z = 3x_1 + 6x_2 + x_3$

Subject to $x_1 + x_2 + x_3 \geq 6$

$x_1 - 5x_2 - x_3 \geq 4$

$x_1 + 5x_2 + x_3 \geq 24,$

$x_1, x_2, x_3 \geq 0.$ **17**

B) a) Explain the terms i) Simplex Optimality Condition, ii) Simplex Feasibility Condition. **7**

b) Show that the set Q of all feasible solutions is convex. **10**

IV. A) Solve by using Branch – and – Bound algorithm

Maximize $Z = 5x_1 + 4x_2$

Subject to $x_1 + x_2 \leq 5$

$10x_1 + 6x_2 \leq 45$

$x_1 \leq 3,$

$x_1, x_2 \geq 0.$ **17**

B) Solve by the fractional algorithm

Maximize $Z = 3x_1 + x_2 + 3x_3$

Subject to $-x_1 + 2x_2 + x_3 \leq 4$

$4x_2 - 3x_3 \leq 2$

$x_1 - 3x_2 + 2x_3 \leq 3,$

x_1, x_2, x_3 non-negative integers. **17**

V. A) Solve by DPP

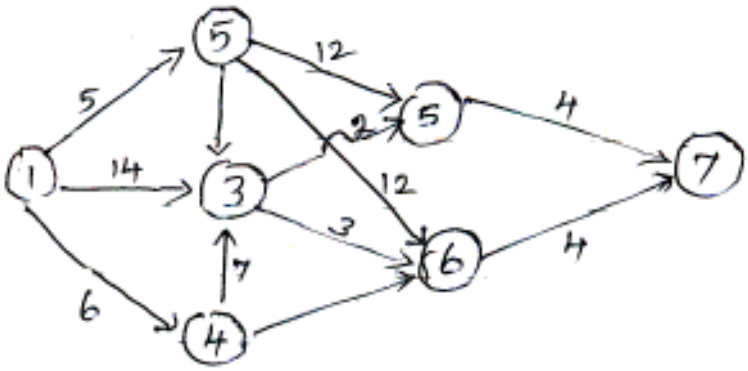
Maximize $Z = 2x_1 + 5x_2$

Subject to $2x_1 + x_2 \leq 430$

$2x_1 \leq 460,$

$x_1, x_2 \geq 0.$ **17**

B) For the network given below, determine the shortest route between cities 1 to 7 and solve the problem using backward recursion. **17**



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