

# RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [BATCH 2014-17]

B.A./B.Sc. FOURTH SEMESTER (January – June) 2016

Mid-Semester Examination, March 2016

Date : 19/03/2016

MATH FOR ECO (General)

Time : 12 noon – 1 pm

Paper : IV

Full Marks : 25

1. Answer any two questions :

[2×5]

- a) For the linear operator  $T$  on  $P_4$  defined by  $T(f(x)) = xf'(x) + f''(x) - f(2)$ , find the eigen values of  $T$  and investigate if  $T$  is diagonalisable or not.

[5]

- b) Diagonalise the matrix  $A = \begin{pmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{pmatrix}$ .

[5]

- c) Reduce the quadratic form  $5x^2 + y^2 + 10z^2 - 4yz - 10zx$  to the normal form and show that it is positive definite.

[5]

2. Define any two of the following terms :

[2×2]

- a) Spanning set.  
b) Basic feasible solution.  
c) Degenerate basic solution

3. Answer any two questions :

[2×3]

- a) A firm manufactures three products A, B and C. The profits are Rs. 3, Rs. 2 and Rs. 4 respectively for each unit of the products. The firm has two machines and below is the required processing time in minutes for each machine on each product. Machines X and Y have 2000 and 2500 machine minutes respectively.

		Product		
		A	B	C
Machine	X	4	3	5
	Y	2	2	4

The firm manufactures 100A's, 200 B's and 50 C's but not more than 150 A's. Set up a L.P.P to maximize the profit.

- b) Reduce the following linear programming problem to standard form :

Minimize  $z = 2x_1 - 3x_2 + 6x_3$

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

$-6x_1 + 7x_2 + 4x_3 = 15$

$|13x_1 - 4x_2 + 5x_3| \leq 13$

$x_1, x_2 \leq 0$ ,  $x_3$  is unrestricted in sign.

- c) Find the dual of the following primal problem :

Maximize :  $z = 2x_1 + 3x_2 + 4x_3$

Subject to  $x_1 - 5x_2 + 3x_3 = 7$

$2x_1 - 5x_2 \leq 3$

$3x_2 - x_3 \geq 5$

$x_1, x_2, x_3 \geq 0$

4. Answer any one question :

[1×5]

- a) Discuss the process of attaining Nash Equilibrium in a Bertrand type model of duopoly.
- b) Solve the two person zero sum game with the matrix—

$$\begin{pmatrix} -1 & -3 \\ -2 & 2 \end{pmatrix}$$

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