RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

SECOND YEAR B.A./B.SC. THIRD SEMESTER (July – December) 2014 Mid-Semester Examination, September 2014

Date : 17/09/2014 Time : 12 am – 1 pr

MATHEMATICS (General)

: 12 am – 1 pm Paper : III Full Marks : 25

<u>Group – A</u>

(Answer <u>any one</u> question)

1. a) Find the signed distance of the point (2,3,4) from the plane x - y + 2z - 3 = 0. [4]

- b) If the sum of the reciprocals of intercepts of a variable plane on the coordinate axes be a constant $k(\neq 0)$ then show that all such planes always pass through a fixed point in space. [3]
- 2. Find the shortest distance between the lines $\frac{x-3}{-3} = \frac{y-8}{1} = \frac{z-3}{-1}$ and $\frac{x+3}{3} = \frac{y+7}{-2} = \frac{z-6}{-4}$ and the equations of the line of shortest distance. [5+2]

<u>Group – B</u>

 $[2\times4]$

[4]

3. Answer **any two** questions :

a) Solve graphically the given L.P.P $Min Z = 2x_1 + 3x_2$ while states from a first table of the first table of table o

subject to $5x_1 + 9x_2 \le 45$

 $2x_1 + 3x_2 \ge 6$ $x_2 \le 4$

and $x_1, x_2 \ge 0$

- b) Define basic solution of a system of linear equations. Prove that the set of all feasible solutions of an L.P.P is a convex set. [1+3]
- c) Reduce the feasible solution (2,4,1) of the system of equations $2x_1 x_2 + 2x_3 = 2$, $x_1 + 4x_2 = 18$ to a basic feasible solution. [4]

4. Answer **any one** :

a) Obtain an initial basic feasible solution, of the given transportation problem by Vogel's approximation method. [5]

	Warehouses				
	D_1	D_2	D_3	D_4	a ₁
O_1	19	30	50	10	7
O_2	70	30	40	60	9
O ₃	40	8	70	20	18
$\mathbf{b}_{\mathbf{j}}$	5	8	7	14	34
	O_1 O_2 O_3 b_j	$\begin{array}{c c} & D_1 \\ O_1 & 19 \\ O_2 & 70 \\ O_3 & 40 \\ b_j & 5 \end{array}$	D_1 D_2 O_1 19 30 O_2 70 30 O_3 40 8 b_j 5 8	D_1 D_2 D_3 O_1 193050 O_2 703040 O_3 40870 b_j 587	Warehouses D_1 D_2 D_3 D_4 O_1 19305010 O_2 70304060 O_3 4087020 b_j 58714

b) Find an initial basic feasible solution of the following transportation problem using Vogel's approximation method. [5]

		Warehouses				
		А	В	С	a ₁	
Factory	F_1	10	9	8	8	
	F_2	10	7	10	7	
	F_3	11	9	7	9	
	F_4	12	14	10	4	
	$\mathbf{b}_{\mathbf{j}}$	10	10	8	28	

5. Answer <u>any one</u> :

a)	Use	Use the following table to compute $f(0.02)$:						
	Х	:	0.0	0.1	0.2	0.3	0.4	
	f(x)	:	1.0000	1.1052	1.2214	1.3499	1.4918	
b)	From the data in the following table find f(102):							
	Х	:	93.0	96.2	100.0	104.2	108.7	
	f(x)	:	11.38	12.80	14.70	17.07	19.91	

[5]