RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [2017 - 20]

B.A./B.Sc. THIRD SEMESTER (July – December) 2018

Mid-Semester Examination, September 2018

Date : 26/09/2018 **MATHEMATICS (General)**

Time : 12 noon - 1 pm Paper: III Full Marks: 25

Answer **any one** from question nos. 1 & 2 : (1 × 6)

1. Calculate the value of y when x = 102 from the following table

x:	93.0	96.2	100.0	104.2	108.7
y:	11.38	12.80	14.70	17.07	19.91

2. a) Find a real root of the equation $x^3 + x^2 + x + 7 = 0$ by Bisection Method , the answer should be correct up to three significant figures.

   b) For the shift operator E and forward difference operator Δ, prove that $\Delta^2 \equiv (E-1)^2$. (4 + 2)

Answer **any one** from question nos. 3 & 4: (1 × 6)

3. Find the shortest distance between the lines $\frac{x-3}{-3} = \frac{y-8}{1} = \frac{z-3}{-1}$ and $\frac{x+3}{3} = \frac{y+7}{-2} = \frac{z-6}{-4}$.

4. Find the values of a and b for which the line $\frac{x-1}{2} = \frac{y-2}{-1} = \frac{z+3}{3}$ lines on the plane $ax + 3y - 5z + d = 0$.

5. Answer **any one** question of the following**:** (1 × 5)

   a) Solve the following L.P.P. graphically.

   Maximize $z = 2x_1 + x_2$

   Subject to $x_1 + x_2 \geq 5$

   $2x_1 + 3x_2 \leq 20$

   $4x_1 + 3x_2 \leq 25$

   $x_1, x_2 \geq 0$

   b) Prove that intersection of two convex sets is also a convex set.

   Find the extreme points if any, of the set $S = \{(x, y) : x + 2y \leq 4,\ x - y \geq 0,\ x \leq 5\}$. (3 + 2)

6. Answer **any one** question of the following**:** (1 × 8)

   a) Find the basic feasible solutions of the following set of equations:

   $2x_1 + 3x_2 - x_3 + 4x_4 = 8$

   $x_1 - 2x_2 + 6x_3 - 7x_4 = -3$

b) Solve the L.P.P. by Charnes Big-M method:

Maximize $z = 2x_1 + 3x_2$

Subject to $x_1 + x_2 \leq 8$

$x_1 + 2x_2 = 5$

$2x_1 + x_2 \leq 8$

$x_1, x_2 \geq 0$

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