(Use separate answer scripts for each group)

Group - A

1. Answer **any one** question : [1×5 = 5]

   a)   i) Find the direction cosines of a line that makes equal angles with each of the three co-ordinate axes. [2]

   ii) Find the distance of the point (3,2,1) from the line $\dfrac{x-1}{3} = \dfrac{y}{4} = \dfrac{z-2}{1}$. [3]

   b)   A plane cuts the co-ordinate axes at A, B, C and the co-ordinates of the centroid of the triangle ABC are (1,2,3). Find the equation of the plane. [5]

Group – B

2. Answer **any three** questions : [3×5 = 15]

   a)   Define basic feasible solution of a Linear Programming Problem. Express the following L.P.P in matrix form :

   Maximize $Z = 3x_1 - 2x_2 + 3x_3 + x_4$

   Subject to $x_1 - 2x_2 + 3x_3 + 4x_4 \leq 6$

   $x_1 + x_3 \geq 2$

   $-2x_1 + x_2 + x_3 - x_4 \leq 7$

   $x_1, x_2, x_3, x_4 \geq 0$ [2+3]

   b)   Define convex combination for a finite set of points in E^n.

   If x_1, x_2 be reals, show that the set given by $X = \{(x_1, x_2) : x_1 + 2x_2 = 5\}$ is a convex set. [2+3]

   c)   (2,1,3) is a feasible solution of the set of equations $4x_1 + 2x_2 - 3x_3 = 1$; $6x_1 + 4x_2 - 5x_3 = 1$. Reduce it to a basic feasible solution of the set of equations. [5]

   d)   Solve the following L.P.P.

   Maximize $Z = 4x_1 + 3x_2$

   Subject to $3x_1 + 4x_2 \leq 12$

   $2x_1 + 5x_2 \leq 10$

   $x_1 + x_2 \geq 1$

   $x_1, x_2 \geq 0$

   by graphical method. [5]

   e)   Solve the following L.P.P.

   Maximize $Z = x_1 + x_2 + 3x_3$

   Subject to $x_1 + 2x_2 - x_3 \leq 10$

   $4x_1 + 3x_2 + 2x_3 \leq 8$

   $x_2 + 3x_3 \leq 15$

   $x_1, x_2, x_3 \geq 0$

   by using simplex method. [5]

<u>Group – C</u>

3. Answer **<u>any one</u>** question :   [1]

    a) Find the sum correct upto four significant figures of the approximate numbers 211·75, 0·0894, 0·0000467, 380·2 and 0·26.

    b) Evaluate $(E + E^{-1})f(x)$, when $f(x) = ax$.

4. Answer **<u>any one</u>** :   [4]

    a) Using Newton-Raphson method find the real root of the equation $x^3 + 3x - 5 = 0$, correct to six significant figures.

    b) Use the method of bisection to find the root of the equation $x^4 + 2x^3 - x - 1 = 0$ lying in the interval (0,1) correct upto three decimal places.