

(c) Show that the lines

$$L_1: x = 1 + 7t, \quad y = 3 + t, \quad z = 5 - 3t;$$

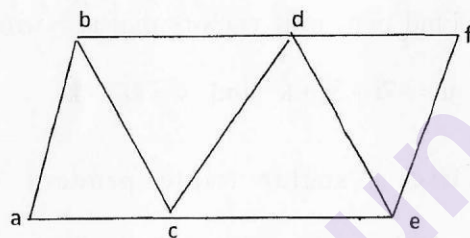
$$L_2: x = 4 - t, \quad y = 6, \quad z = 7 + 2t,$$

are skew. Also find the distance between them.

(6.5)

6. (a) Define a Latin square. Give an example of a Latin square of order 6. (6)

(b) Find a minimal edge cover for the following graph. Give a detailed logical analysis. (6)

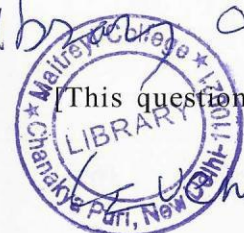


(c) Three pitchers of sizes 10 litres, 4 litres and 7 litres are given. If initially 10 litres pitcher is full and the other two empty, find a minimal sequence of pouring so as to have exactly 2 litres of water in either the 7 litres or the 4 litres pitcher.

(6)

(1000)

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[This question paper contains 4 printed pages.]

04.01.24(E)  
Your Roll No.....

Sr. No. of Question Paper : 6339

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Unique Paper Code : 62354343

Name of the Paper : Analytic Geometry and Applied Algebra

Name of the Course : B.A. (Prog.) Mathematics (CBCS)

Semester : III

Duration : 3 Hours

Maximum Marks : 75

### Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. This question paper has **six** questions in all.
3. Attempt any **two** parts from each question.
4. **All** questions are compulsory.

P.T.O.

1. (a) Identify and sketch the curve (6.5)

$$x = y^2 - 4y + 2.$$

- (b) Sketch the curve represented by the equation

$$4x^2 + 9y^2 = 36,$$

and also label the foci, vertices and the ends of minor axis. (6.5)

- (b) Describe the graph of the equation (6.5)

$$x^2 - 4y^2 + 2x + 8y - 7 = 0.$$

2. (a) Find an equation for the parabola whose vertex is at (1, 1) and directrix  $y = -2$ . Also sketch the graph. (6)

- (b) Find an equation for the ellipse with foci (0,  $\pm 2$ ) and major axis with end points (0,  $\pm 4$ ). Also state the reflection property of the ellipse. (6)

- (c) Find an equation of the hyperbola with vertices ( $\pm 2$ , 0) and foci ( $\pm 3$ , 0). (6)

3. (a) Rotate the coordinate axis to remove the  $xy$ -term of the curve

$$x^2 + 2\sqrt{3}xy + 3y^2 + 2\sqrt{3}x - 2y = 0.$$

Then name the conic. (6.5)

- (b) Find the distance from the point (-5, 2, -3) to the  $yz$ -plane. (6.5)

- (c) Describe the surface whose equation is given by (6.5)

$$x^2 + y^2 + z^2 + 2x - 2y + 2z + 3 = 0.$$

4. (a) Express the vector  $\vec{v}$  as the sum of a vector parallel to  $\vec{b}$  and a vector orthogonal to  $\vec{b}$  where  $\vec{v} = -2\hat{i} + \hat{j} + 6\hat{k}$ ,  $\vec{b} = -2\hat{j} + \hat{k}$ . (6)

- (b) Find two, unit vectors that are orthogonal to both  $\vec{u} = -7\hat{i} + 3\hat{j} + \hat{k}$  and  $\vec{v} = 2\hat{i} + 4\hat{k}$ . (6)

- (c) Use a scalar triple product to determine whether the vectors  $\vec{u} = \hat{i} - 2\hat{j} + \hat{k}$ ,  $\vec{v} = 3\hat{i} - 2\hat{k}$  and  $\vec{w} = 5\hat{i} - 4\hat{j}$  lie in the same plane. (6)

5. (a) Find the parametric equation of the line  $L$  passing through the points (2, 4, -1), and (5, 0, 7). Where does the line intersect the  $xy$ -plane? (6.5)

- (b) Find the distance between the point (2, 3, 6) and the plane  $2x + y + z = 1$ . (6.5)

P.T.O.