

[This question paper contains 4 printed pages.]

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.

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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.

(c) Show that the lines

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

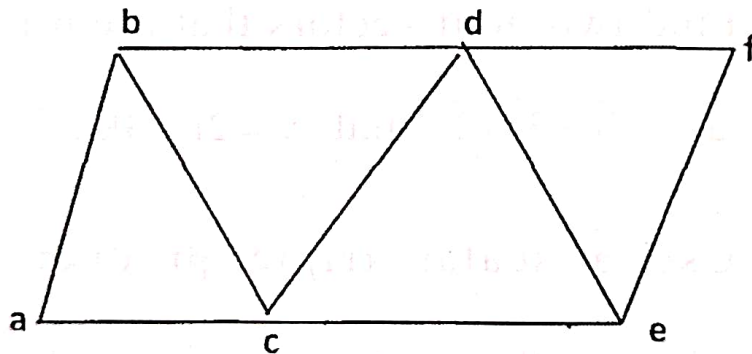
$$L_2: x = 4 - t, \quad y = 6, \quad z = 7 + 2t,$$

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)