MATHS

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

THE PLANE

Problems

1. Find the equation of the plane if the foor of the perpendicular from origin to the plane is

$(2, 3, -5)$.

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2. Find the equation to the plane through the points $(0, -1, -1), (4, 5, 1)$ and $(3, 9, 4)$.

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3. Find the equation to the plane parallel to the ZX-plane and passing through (0,4,4).

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4. Find the equation of the plane through the point (α, β, γ) and parallel to the plane $ax + by + cz = 0$

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5. Find the angle between the planes 2x - y + z = 6 and x + y + 2 z = 7 .

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6. Find the equation of the plane passing through (2, 0, 1) and (3, -3, 4) and perpendicular to $x - 2y + z = 6$.

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7. Reduce the equation of the plane x + 2y - 2z - 9 = 0 to the normal form and hence find the direction cosines of the normal to the plane and the length of the perpendicular drawn from the origin to the given plane.

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8. Suppose a plane makes intercepts 2,3,4 on the X, Y, Z - axes respectively. Then find its equation.

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9. Consider the plane whose equation is , x - 3y 4- 2z = 9.

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Textual Exercises Exercise 7 A I

1. Find the equation of the plane If the foot of the perpendicular from origin of the plane is A(1,3,-5)

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2. Reduce the equation $x + 2y - 3z - 6 = 0$ of the plane to the normal form.

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3. Find the equation of the plane whose intercepts on x, y, z axes are 1, 2, 4 respectively.

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4. Find the intercepts of the plane $4x + 3y - 2z + 2 = 0$ on the coordinate axes.

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5. The d.c.'s of the normal to the plane 2x + 3y – 6z + 5 = 0 are

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6. Find the equation of the plane passing through the point $(-2, 1, 3)$ and having `(3, -5, 4) as d.r's of its normal.

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7. Write the equation of the plane $4x - 4y + 2z + 5 = 0$ in the intercept form.

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8. Find the angle between the planes $x + 2y + 2z - 5 = 0$ and $3x + 3y + 2z - 8 = 0$.

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Textual Exercises Exercise 7 A Ii

1. Find the equation of the plane passing through the point (1,1,1) and parallel to the plane $x + 2y + 3z - 7 = 0$

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2. Find the equation of the plane passing through $(2, 3, 4)$ and perpendicular to x-axis.

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3. Show that $2x + 3y + 7 = 0$ represents a plane perpendicular to xy-plane.

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4. Find the angle between the planes $2x - y + z = 6$ and $x + y + 2z = 7$.

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5. Find the equation of the plane through (-1,6,2) are perpendicular to the join of (1,2,3) and (-2,3,4).

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6. Find the equation of the plane bisecting the line segment joining (2, 0, 6) and (-6, 2, 4) and perpendicular to it.

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7. Find the equation of the plane passing through $(0, 0, -4)$ and perpendicular to the line joining the points $(1, -2, 2)$ and $(-3, 1, -2)$.

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8. The equation of the plane through (4, 4, 0) and perpendicular to the planes

$2x + y + 2z + 3 = 0$ and $3x + 3y + 2z - 8 = 0$

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Textual Exercises Exercise 7 A Iii

1. Find the equation of the plane through the points $(2, 2, -1), (3, 4, 2), (7, 0, 6)$.

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2. Show that the points $(0, -1, 0), (2, 1, -1), (1, 1, 1), (3, 3, 0)$ are coplanar.

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3. Find the equation of the planes through $(6, -4, 3), (0, 4, -3)$ and cutting of intercepts whose sum is zero.

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4. A plane meets the coordinate axes A, B, C so that the centroid of the triangle ABC is $(1, 2, 4)$. Then the equation of the plane is

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5. Show that the plane through (1,1,1),(1,-1,1) and (-7,-3,-5) is parallel to the Y-axis.

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6. Show that the equations $ax + by + r = 0by + cz + p = 0, cz + ax + q = 0$ represents the planes perpendicular to xy, yz, zx - planes respectively.

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Important Points

1. The position vectors of the three non-collinear points A, B, C, are $\bar{a}, \bar{b}, \bar{c}$ respectively. The

distance of the origin from the plane through A, B, C is

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2. Consider a variable line L which passes through the point of intersection P of the line $3x + 4y - 12 = 0$ and $x + 2y - 5 = 0$ meetingt the coordinate axes at point A and B. Locus of the feet of the perpendicular from the origin on the variable line L has the equation

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3. Equation of the plane π which contains the point A(x_0, y_0, z_0) and perpendicular to the line L with direction ratios (a, b, c) is a $(x - x_0) + b(y - y_0) + c(z - z_0) = 0.$

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4. The perpendicular distance of the plance ax + b y + c z + d = 0 from the point $P(x_0, y_0, z_0)$ is $\frac{ax_0 + by_0 + cz_0 + d}{\sqrt{a^2 + b^2 + c^2}}$

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