# MATHS

## BOOKS - CENGAGE

## EQUATION OF PLANE AND ITS APPLICATIONS -I

Dpp 3 3

**1.** Equation of the passing through the origin and perpendicular to the planes $x + 2y + z = 1, 3x - 4y + z = 5$ is

A. $x + 2y - 5z = 0$

B. $x - 2y - 3z = 0$

C. $x - 2y + 5z = 0$

D. $3x + y - 5z = 0$

**Answer: D**

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**2.** A vector $\vec{n}$ is inclined to $x$-axis at $45^\circ$, to y-axis at $60^\circ$ and at an angle to z-axis. If $\vec{n}$ is a normal to the plane passing through the point $(\sqrt{2}, -1, 1)$, then the equation of plane is

A. $3\sqrt{2}x - 4y - 3z = 7$

B. $4\sqrt{2}x + 7y + z = 2$

C. $\sqrt{2}x + y + z = 2$

D. $\sqrt{2}x - y - z = 2$

**Answer: C**

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**3.** If the perpendicular distance of a point $A$, other than the origin from the plane $x + y + z = p$ is equal to the distance of the plane from the

origin, then the coordinates of $A$ are (A) $(p, 2p, 0)$ (B) $(0, 2p, -p)$ (C) $(2p, p, -p)$ (D) $(2p, -p, 2p)$

A. $(p, 2p, 0)$

B. $(0, 2p, -p)$

C. $(2p, p, -p)$

D. $(2p, -p, 2p)$

**Answer: C**

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**4.** Show that the disease of the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane $(x - y + z = 5)$ from the point $(-1, -5, -10)$ is 13 units.

A. 10

B. 8

C. 21

D. 13

**Answer: D**

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**5.** The value of k for which the planes $kx + 4y + z = 0, 4x + ky + 2z = 0nd2x + 2y + z = 0$ intersect in a straighat line is (A) 1 (B) 2 (C) 3 (D) 4

A. 2

B. 4

C. 6

D. 8

**Answer: C**

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**6.** Let $P = -(1, 7, \sqrt{2})$ be a point and line L is $2\sqrt{2}(x-1) = y-2, z=0$. If PQ is the distance of plane $\sqrt{2}x + y - z = 1$ from point P measured along a line inclined at an angle of $45^\circ$ with the line L and is minimum then the value of PQ is

A. 3

B. 4

C. 6

D. 8

**Answer: A**

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**7.** Angle between the two planes of which one plane is $4x + y + 2z = 0$ and another plane containing the lines $\frac{x-3}{2} = \frac{y-2}{3} = \frac{z-1}{\lambda}, \frac{x-2}{3} = \frac{y-3}{2} = \frac{z-2}{3}$

A. $\frac{\pi}{3}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{6}$

D. $\frac{2\pi}{3}$

**Answer: B**

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**8.** The distance of the point $(1, -2, 3)$ from the plane $x - y + z - 5 = 0$, measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z-1}{-6}$ is equal to

A. 1 unit

B. 2 unit

C. 3 units

D. none of these

**Answer: A**

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**9.** The angle between the pair of planes represented by equation $2x^2 - 2y^2 + 4z^2 + 6xz + 2yz + 3xy = 0$ is

A. $\cos^{-1}\left(\frac{1}{3}\right)$

B. $\cos^{-1}\left(\frac{4}{21}\right)$

C. $\cos^{-1}\left(\frac{4}{9}\right)$

D. $\cos^{-1}\left(7\sqrt{84}\right)$

**Answer: C**

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**10.** The Cartesian equation of the plane $\vec{r} = (1 + \lambda - \mu)\hat{i} + (2 - \lambda)\hat{j} + (3 - 2\lambda + 2\mu)\hat{k}$ is a. $2x + y = 5$ b. $2x - y = 5$ c. $2x + z = 5$ d. $2x - z = 5$

A. $2x + y = 5$

B. $2x - y = 5$

C. $2x + z = 5$

D. $2x - z = 5$

**Answer: C**

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**11.** The locus represented by $xy + yz = 0$ is a pair of

A. perpendicular lines

B. parallel lines

C. parallel lines

D. perpendicular planes

**Answer: D**

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**12.** Equation of line passing through A(1,0,3), intersecting the line $\left(\frac{x}{2}=\frac{y-1}{3}=\frac{z-2}{1}\right)$ and parallel to the plane $x+y+z=2$ is

A. $\frac{3x-1}{2}=\frac{2y-3}{3}=\frac{2z-5}{-1}$

B. $\frac{x-1}{2}=\frac{y-0}{3}=\frac{z-3}{-1}$

C. $\frac{x-(2/3)}{1}=\frac{y-(3/2)}{0}=\frac{z+(1/2)}{3}$

D. $\frac{3x-1}{2}=\frac{2y-3}{-3}=\frac{6z-13}{5}$

**Answer: D**

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**13.** If $P(\alpha, \beta, \gamma)$ is a vertex of an equilateral triangle PQR where vertex Q and R are $(-1, 0, 1)$ and $(1, 0, -1)$ respectively, then P can lie on the plane

A. $x+y+z+6=0$

B. $2x + 4y + 3z + 20 = 0$

C. $x - y + z + 12 = 0$

D. $x + y + z + 3\sqrt{2} = 0$

**Answer: D**

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**14.** The variable plane $(2\lambda + 1)x + (3 - \lambda)y + z = 4$ always passes through the line

A. $\frac{x}{0} = \frac{y}{0} = \frac{z-4}{1}$

B. $\frac{x}{1} = \frac{y}{2} = \frac{z-4}{-3}$

C. $\frac{x}{1} = \frac{y}{1} = \frac{z-4}{-7}$

D. $\frac{x}{1} = \frac{y}{2} = \frac{z-4}{-7}$

**Answer: D**

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**15.** In X-Y plane, the path defined by the equation $\frac{1}{x^m}+\frac{1}{y^m}+\frac{k}{(x+y)^n}=0$, is a parabola if $m=\frac{1}{2}, k=-1, n=0$

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**16.** Consider the equation

$E_1: \vec{r} \times \left(2\hat{i}-\hat{j}+3\hat{k}\right)=3\hat{i}+\hat{k}$ and

$E_2: \vec{r} \times \left(\hat{i}+2\hat{j}-3\hat{k}\right)=2\hat{i}-\hat{j}$, then

A. a) $E_1$ represents a line

B. b) $E_1$ represents two parallel planes

C. c) $E_2$ represents a line

D. d) $E_2$ represents two parallel planes

**Answer: B::C::D**

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**17.** the equationof a plane is $2x - y - 3z = 5$ and $A(1, 1, 1), B(2, 1, -3), C(1, -2, -2)$ and $D($ are four points. Which of the following line segments are intersects by the plane? (A) AD (B) AB (C) AC (D) BC

A. AD

B. AB

C. AC

D. BC

**Answer: B::C::D**

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**18.** Let P denotes the plane consisting of all points that are equidistant from the points $A(-4, 2, 1)$ and $B(2, -4, 3)$ and Q be the plane, $x - y + cz = 1$ where $c \in R$.

The planar P is parallel to plane Q

A. for no value of c

B. if c=3

C. if c $= 1/3$

D. if c=1

**Answer: C**

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**19.** Let P denotes the plane consisting of all points that are equidistant from the points $A(-4, 2, 1)$ and $B(2, -4, 3)$ and Q be the plane, $x - y + cz = 1$ where $c \in R$.

If the angle between the planes P and Q is $45^\circ$ then the product of all possible values of c is

A. $-17$

B. $-2$

C. 17

D. $24/27$

**Answer: B**

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**20.** A line $L_1$ with direction ratios $-3, 2, 4$ passes through the point A(7,6,2) and a line $L_2$ with directions ratios 2,1,3 passes through the point B(5,3,4). A line $L_3$ with direction ratios $2, -2, -1$ intersects $L_1$ and $L_3$ at C and D, resectively.

The lenth CD is equal to

A. 4

B. 6

C. 9

D. 11

**Answer: C**

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**21.** A line $L_1$ with direction ratios $-3, 2, 4$ passes through the point A(7,6,2) and a line $L_2$ with directions ratios 2,1,3 passes through the point B(5,3,4). A line $L_3$ with direction ratios $2, -2, -1$ intersects $L_1$ and $L_3$ at C and D, resectively. The equation of the plane parallel to line $L_1$ and containing line $L_2$ is equal to

A. $x + 3y + 4z = 30$

B. $x + 2y + z = 15$

C. $2x - y + z = 11$

D. $2x + 17y - 7z = 33$

**Answer: D**

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**22.** A line $L_1$ with direction ratios $-3, 2, 4$ passes through the point A(7,6,2) and a line $L_2$ with directions ratios 2,1,3 passes through the point

B(5,3,4). A line $L_3$ with direction ratios $2, -2, -1$ intersects $L_1$ and $L_3$ at C and D, resectively.

The volume of parallelopiped formed by $\overrightarrow{AB}, \overrightarrow{AC}$ and $\overrightarrow{AD}$ is equal to

A. 140

B. 138

C. 134

D. 130

**Answer: B**

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## Dpp 3 4

**1.** Let $A(0, 6, 6)$, B(6,6,0) and C(6,0,6) are three points and point D is moving on the line $x + z - 3 = 0 = y$. If G is centroid of $\Delta ABC$, then minimum value of GD is

A. $\sqrt{\frac{47}{2}}$

B. $\sqrt{\frac{37}{2}}$

C. $\sqrt{\frac{57}{2}}$

D. $\sqrt{\frac{23}{2}}$

**Answer: C**

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**2.** Equation of line of projection of the line $3x - y + 2z - 1 = 0 = x + 2y - z = 2$ on the plane $3x + 2y + z = 0$ is

A. $\frac{x+1}{11} = \frac{y-1}{-9} = \frac{z-1}{-15}$

B. $3x - 8y + 7z + 4 = 0 = 3x + 2y + z$

C. $\frac{x+12}{11} = \frac{y+8}{-9} = \frac{z+14}{15}$

D. $\frac{x+12}{11} = \frac{y+8}{-9} = \frac{z+14}{-15}$

**Answer: B**

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**3.** The orthocenter of triangle whose vertices are $A(a, 0, 0), B(0, b, 0)$ and $C(0, 0, c)$ is $\left(\frac{k}{a}, \frac{k}{b}, \frac{k}{c}\right)$ then k is equal to

A. $\left(\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}\right)^{-1}$

B. $\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)^{-1}$

C. $\left(\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}\right)$

D. $\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$

**Answer: A**

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**4.** The shortest distance between the lines $2x + y + z - 1 = 0 = 3x + y + 2z - 2$ and $x = y = z$, is

A. $\frac{1}{\sqrt{2}}$ units

B. $\sqrt{2}$ units

C. $\frac{3}{\sqrt{2}}$ units

D. $\frac{\sqrt{3}}{2}$ units

**Answer: A**

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**5.** If plane $2x + 3y + 6z + k = 0$ is tangent to the sphere $x^2 + y^2 + z^2 + 2x - 2y + 2z - 6 = 0$, then a value of k is

A. 26

B. 16

C. $-26$

D. none of these

**Answer: A**

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**6.** The shortest distance from (1,1,1) to the line of intersection of the pair of planes $xy + yz + zx + y^2 = 0$ is

A. $\sqrt{\frac{8}{3}}$

B. $\frac{2}{\sqrt{3}}$

C. $\frac{1}{\sqrt{3}}$

D. $\frac{2}{3}$

**Answer: A**

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**7.** A variable plane makes intercepts on $x$, y and z axes and it makes a tetrahedron of volume 64 cu. Units. The locus of foot of perpendicular from origin on the plane is

A. $\left(x^2+y^2+z^2\right)^2=384xyz$

B. $xyz=681$

C. $(x+y+z)\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)^2=16$

D. $xyz(x+y+z)=81$

**Answer: A**

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**8.** If the projection of the line $\frac{x}{2}=\frac{y-1}{2}=\frac{z-1}{1}$ on a plane P is $\frac{x}{1}=\frac{y-1}{1}=\frac{z-1}{-1}$. Then the distance of plane P from origin is

A. $\sqrt{3}$

B. $\sqrt{\frac{3}{2}}$

C. $\sqrt{6}$

D. $\frac{2}{\sqrt{3}}$

**Answer: B**

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**9.** Image of sphere $x^2 + y^2 + z^2 = 9$ in plane $2x + 3y + 4z - 29 = 0$ is

A. $x^2 + y^2 + z^2 - 8x - 12y - 16z + 107 = 0$

B. $x^2 + y^2 + z^2 + 8x - 12y - 16z + 107 = 0$

C. $x^2 + y^2 + z^2 - 8x + 12y - 16z + 107 = 0$

D. $x^2 + y^2 + z^2 - 8x - 12y + 16z + 107 = 0$

**Answer: A**

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**10.** The locus of point which moves in such a way that its distance from the line (x)/(1)=(y)/(1)=(z)/(-1) is twice the distance from the plane x+y+z=0 is

A. $x^2 + y^2 + z^2 - \ - 5x - 3y - 3z = 0$

B. $x^2 + y^2 + z^2 - 5x + 3y + 3z = 0$

C. $x^2 + y^2 + z^2 + 5xy + 3yz + zx = 0$

D. $x^2 + y^2 + z^2 + 5xy + 3yz + 3zx = 0$

**Answer: C**

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**11.** A plane cutting the axes in P,Q,R passes through $(\alpha, \beta, \beta - \lambda, \lambda - \alpha)$.

If O is origin, then locus of center of sphere OPQR is

A. $\alpha x + \beta y + \lambda z = 4$

B. $(\alpha - \beta)x + (\beta - \lambda)y + (y - \alpha)z = 0$

C. $(\alpha - \beta)yz + (\beta - y)zx + (\lambda - \alpha)xy = 2xyz$

D. $\left(\frac{1}{\alpha^2} + \frac{1}{\beta^2} + \frac{1}{\lambda^2}\right)\left(x^{2+y^2+z^2}\right) = xyz$

**Answer: C**

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**12.** Let a plane pass through origin and be parallel to the line $\frac{x-1}{2} = \frac{y_3}{-1} = \frac{z+1}{-2}$ is such that distance between the plane and the line is $\frac{5}{3}$. Then equation of the plane is/are

A. $x - 2y + 2z = 0$

B. $x - 2y - 2z = 0$

C. $2x + 2y + z = 0$

D. $x + y + z = 0$

**Answer: A::C**

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**13.** The planes $ax + 4y + z = 0, 2y + 3z - 1 = 0$ and $3x - bz + 2 = 0$ will

A. a) meet at a point if $ab \neq 15$.

B. b) meet on a line if ab =15, a=3

C. c) have no common point if ab=15, $a \neq 3$.

D. d) have no common point if ab=15, $a \neq 5$

**Answer: A::B::C**

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**14.** If the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ intersects the the line $3\beta^2 + 3(1-2\alpha)y + z = 3 - \frac{1}{2}\{6\alpha^2 x + 3(1-2\beta)y + 2z\}$ then point $(\alpha, \beta, 1)$ lies on the plane

A. $2x - y + z = 4$

B. $x + y - z = 0$

C. $x - 2y = 0$

D. $2x - y = 0$

**Answer: A::B::C**

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**15.** Let $A = (1, 1, -1), B = (0, 2, 1)$ be two given points. Also, let P: $x + y + z = 0$ be a plane.

If $A'$ and $B'$ are the feet of perpendicular from A and B, respectively, on the plane 'P' then $A'B'$ equals

A. $\frac{\sqrt{14}}{3}$

B. $\sqrt{\frac{5}{3}}$

C. $\sqrt{3}$

D. $\sqrt{\frac{2}{3}}$

**Answer: A**

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**16.** Let A = (1,1,-1) and B = (0, 2,1) be two given points .Also, let P:x+y+z=0 be a plane. The equation of the line perpendicular to $\overrightarrow{AB}$ and lying

completely in the plane 'P' is

A. (a) $\frac{x-\frac{2}{3}}{1}=\frac{y-\frac{1}{2}}{-3}=\frac{z+2}{2}$

B. (b) $\frac{x-3}{2}=\frac{y-1}{-6}=\frac{z+2}{2}$

C. (c) $x=y=z$

D. (d) $x-3=y-1=z=2$

**Answer: A**

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**17.** Let $P_1: x+y+2z-3=0$ and $P_2=x-2y+z=4$ be two planes. Also, let $A(1,3,4)$ and $B(3,2,7)$ be two points in space.

The equation of plane which passes through line of intersection of $P_1$ and $P_2$ and upon which length of projection of the line segment AB is the greatest, is

A. (a) $2x+3y+z+4=0$

B. (b) $3x-3y+4z-11=0$

C. (c) $x + 3y + z + 2 = 0$

D. (d) $3y + z + 1 = 0$

**Answer: D**

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**18.** Let $P_1 : x + y + 2z - 3 = 0$ and $P_2 = x - 2y + z = 4$ be two planes. Also, let $A(1, 3, 4)$ and $B(3, 2, 7)$ be two points in space.

The equation of plane which passes through line of intersection of $P_1$ and $P_2$ upon which length of projection of the line segment AB is the least, is

A. a) $x + 3y + z + 2 = 0$

B. b) $3y + z + 1 = 0$

C. c) $2x - y + 3z - 7 = 0$

D. d) $3x - 3y + 4z - 11 = 0$

**Answer: C**

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