MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

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°, to y-axis at 60° 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 p are

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

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

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

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

Answer: C

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4. find that the distance 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

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. -2

B. 4

C. 6

D. -8

Answer: b

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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° 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. Find the distance of the point $(1, -2, 3)$ from the plane $x - y + z = 5$ measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$.

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. $2x - z = 5$

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 $P(\alpha, \beta, \lambda)$ 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 $x + 3y + z - 4 + \lambda(2x - y) = 0$ 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. Let $\vec{a} = \hat{i} + \hat{j} + \hat{k}, \vec{b} = -\hat{i} + \hat{j} + \hat{k}, \vec{c} = \hat{i} - \hat{j} + \hat{k}$ and $\vec{d} = \hat{i} + \hat{j} - \hat{k}$. Then, the line of intersection of planes one determined by $\vec{a}, \vec{b}$ and other determined by $\vec{c}, \vec{d}$ is perpendicular to

A. x-axis

B. y-axis

C. z-axis

D. none of these

Answer: D

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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. E_1 represents a line

B. E_1 represents two parallel lines

C. E_2 represents a line

D. E_2 represents two parallel planes

Answer: B::C::D

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17. The equation of a plane is $2x - y - 3z = 5$ and $A(1, 1, 1), B(2, 1, -3), C(1, -2, -2)$ and $D(-3, 1, 2)$ are four points, which of the following line segment are interesect by the plane?

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 $c \in R$.

If the angle between the planes P and Q is 45° then the product of all possible values of c is

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° 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_2 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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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 ΔABC, 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 $3xy + 2z - 1 = 0 = x + 2y - z = 2$ 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. Find the angle between the planes $2x + y + z - 1 = 0$ and $3x + y + 2z - 2 = 0$,

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

A. 26

B. 16

C. -26

D. none of these

Answer: A

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6. The shorteast 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 64cu. Units. The locus of foot of perpendicular from origin on this 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. The locus of point which moves in such a way that its distance from the line $\frac{x}{1} = \frac{y}{1} = \frac{z}{-1}$ 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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10. A line is drawn from the point P(1,1,1)and perpendicular to a line with direction ratios, (1,1,1) to intersect the plane $x + 2y + 3z = 4$ at Q. The locus of point Q is

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

B. $\frac{x}{-2} = \frac{y-5}{1} = \frac{z+2}{1}$

C. $x = y = z$

D. none of these

Answer: A

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

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

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

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

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

Answer: A::B::C

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13. 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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14. 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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