MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

THE DIMENSIONAL GEOMETRY

ILLUSTRATION

1. Find the direction cosines of the line whose direction ratios are $12, 4, -8$.

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2. Direction ratios of a line L_1, ae $1, -1, 1$ and of L_2 re $1, 0, \lambda$. Find the value of λ so that L_1 and L_2 are perpendicular to each other.

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3. Find the direction cosines of the normal to the plane $4x - 3y + 5z = 25$ and the length of the perpendicular from the origin on this plane

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4. Find the angle between the planes $x + y + z + 1 = 0$ and $x - y + z - 1 = 0$.

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5. Find the direction ratios of the line $x + 2y - z = 3, 2x - y + z = 1$ and its equation in a symmetrical form.

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6. Find the value of λ, so that the lines

$\frac{x-1}{1}=\frac{y-2}{2}=\frac{z+\lambda}{3}$ and

$\frac{x+1}{2}=\frac{y-1}{3}=\frac{z-3}{1}$ are coplanar

Also find the equation of the plane containing them.

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7. Find the perpendicular distance of the point (2, 1, 3) from the line

$\frac{x-1}{3}=\frac{y-3}{1}=\frac{z-4}{-5}$

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8. Find an equation of the line of shortest distance between the lines

$r=\lambda(i-j+k)$ and $r=(i-j)+\mu(-2j+k)$

In the vectorial notation and Cartesian notation. Also find the shortest distance between them.

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SOLVED EXAMPLES (CONCEPT-BASED (SINGLE CORRECT ANSWER TYPE QUESTIONS))

1. the acute angle between two lines such that the direction cosines l, m, n of each of them satisfy the equations $l+m+n=0$ and $l^2+m^2-n^2=0$ is

A. 15°

B. 30°

C. 60°

D. 45°

Answer: C

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2. if the projections of a line segment on the x, y and z-axes in 3-dimensional space $2, 3$ and 6 respectively, then the length of the line segment is:

A. 12

B. 7

C. 9

D. 6

Answer: B

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3. the equation of a plane through the line of intersection the planes $x + 2y = 3, y - 2z + 1 = 0$ and perpendicular to the first plane is:

A. $2x - y - 10z = 9$

B. $2x - y + 7z = 11$

C. $2x - y + 10z = 11$

D. $2x - y - 9z = 10$

Answer: C

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4. The image of the line $\frac{x-1}{3}=\frac{y-3}{1}=\frac{z-4}{-5}$ in the plane $2x-y+z+3=0$ is the line (1) $\frac{x+3}{3}=\frac{y-5}{1}=\frac{z-2}{-5}$ (2) $\frac{x+3}{-3}=\frac{y-5}{-1}=\frac{z+2}{5}$ (3) $\frac{x-3}{3}=\frac{y+5}{1}=\frac{z-2}{-5}$ (3) $\frac{x-3}{-3}=\frac{y+5}{-1}=\frac{z-2}{5}$

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

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

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

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

Answer: A

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5. The equation of the plane which passes through the point of intersection of

$\frac{x-1}{3}=\frac{y-2}{1}=\frac{z-3}{2}$ and $\frac{x-3}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ and perpendicular to $4\hat{i}+3\hat{j}+5\hat{k}$, is

A. $7x+2y+4z=54$

B. $3x+4y+5z=49$

C. $4x+3y+5z=50$

D. $5x+4y+3z=57$

Answer: C

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6. ABC is a triangle and $A=(235)\dot{B}=(-1,3,2)andC=(\lambda,5,\mu)\cdot$ If the median through A is equally inclined to the axes, then find the value of $\lambda and\mu\cdot$

A. (10, 7)

B. (7, 5)

C. (7, 10)

D. (5, 7)

Answer: C

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7. The plane containing the line $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$ and parallel to the line $\frac{x}{1} = \frac{y}{1} = \frac{z}{4}$ passes through the point

A. $(1, -2, 5)$

B. $(1, 0, 5)$

C. $(0, 3, -5)$

D. $(-1, -3, 0)$

Answer: B

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8. Find the distance of the point $(-1, -5, -10)$ from the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and plane $x - y + z = 5$.

A. 13

B. 15

C. 16

D. 12

Answer: A

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9. Let α, β, γ be the angles made by a line with the positive directions of the axes of reference in three dimensions. If θ is the acute angle given by $\cos\theta = \frac{\cos^2\alpha + \cos^2\beta + \cos^2\gamma}{\sin^2\alpha + \sin^2\beta + \sin^2\gamma}$, then θ equal.

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

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

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

D. $\frac{\pi}{4}$

Answer: B

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10. The reflection point of the point $(0, 3-2)$ in the line $\frac{1-x}{2} = 2-y = z+1$ is

A. $(1, 2, -1)$

B. $(2, 1, 4)$

C. $(2, 1, 0)$

D. $(0, 0, 1)$

Answer: C

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11. A variable plane passes through a fixed point $(1, -2, 3)$ and meets the coordinate axes at point A, B, C then the point of intersection of the planes through A, B, C parallel to the coordinate planes lies on

A. $xy - \frac{1}{2}yz + \frac{1}{3}zx = 6$

B. $yz - 2zx + 3xy = xyz$

C. $xy - 2yz + 3zx = 3xyz$

D. $xy - \frac{1}{2}yz - \frac{1}{3}zx = 6$

Answer: B

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12. If L_1 is the line of intersection of the planes $2x - 2y + 3x - 2 = 0$ $x - y + z + 1 = 0$ and L_2 is the line of the intersection of the planes $x + 2y - z - 3 = 0\, 3x - y + 2z - 1 = 0$then the distance of the origin from the plane containing the lines L_1 and L_2 is

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

B. $\frac{1}{2\sqrt{2}}$

C. $\frac{1}{3\sqrt{2}}$

D. $\frac{1}{\sqrt{15}}$

Answer: C

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13. Foot of the perpendicular drawn from the origin to the plane passing through $(1, 0, 0), (0, 1, 0)$ and $(0, 0, 1)$ is

A. $(3, 3, 3)$

B. $\left(\frac{1}{2}, \frac{1}{2}, \frac{1}{2}\right)$

C. $\left(\frac{1}{3}, \frac{1}{3}, \frac{1}{3}\right)$

D. $(2, 2, 2)$

Answer: C

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14. Find the equation of the plane which contains the line of intersection of the planes $\rightarrow r\hat{i} + 2\hat{j} + 3\hat{k} - 4 = 0, \rightarrow r2\hat{i} + \hat{j} - \hat{k} + 5 = 0$and which is perpendicular to the plane

A. $r.(33i + 45j + 50k) - 41 = 0$

B. $r.(13i + 15j + 25k) - 14 = 0$

C. $r.(24i + 45j + 30k) - 17 = 0$

D. $r.(45i + 33j + 50k) - 41 = 0$

Answer: A

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15. The points A, B and C with position vectors $a = 3i - 4j - 4k, b = 2i - j + k$ and $c = i - 3j - 5k$, respectively are

A. Collinear

B. Vertices of an equilateral triangle

C. Vertices of a right angled triangle

D. none of these

Answer: C

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SOLVED EXAMPLES (LEVEL 1(SINGLE CORRECT ANSWER TYPE QUESTIONS))

1. The coordinates of a point which divide the line joining the points $P(2, 3, 1)$ and $Q(5, 0, 4)$ in the ratio $1:2$ are

A. $(7/3, 1, 5/3)$

B. $(4, 1, 3)$

C. $(3, 2, 2)$

D. $(1, -1, 1)$

Answer: C

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2. If a line OP through the origin O makes angles $\alpha, 45^\circ \text{ and } 60^\circ$ with x, y and z axis respectively then the direction cosines of OP are.

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

B. $\frac{1}{2}, \frac{1}{2}, \frac{1}{\sqrt{2}}$

C. $\frac{1}{2}, \frac{1}{\sqrt{2}}, \frac{1}{2}$

D. none of these

Answer: C

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3. The direction cosines of the line joining the points (1,2,-3) and (-2,3,1) are

A. $-3, 1, 4$

B. $-1, 5, -2$

C. $\frac{-3}{\sqrt{26}}, \frac{1}{\sqrt{26}}, \frac{4}{\sqrt{26}}$

D. $\frac{-1}{\sqrt{30}}, \frac{5}{\sqrt{30}}, \frac{-2}{\sqrt{30}}$

Answer: C

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4. The equation of Z - axis , are.....

A. $z = 0, x = 0$

B. $z = 0, y = 0$

C. $x = 0, y = 0$

D. $x = k, y = -k, (k \neq 0)$

Answer: C

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5. Find the ratio in which the $y-z$ plane divides the join of the points $(-2,4,7) and (3,-5,8)$.

A. $2:3$

B. $3:2$

C. $4:5$

D. $-7:8$

Answer: A

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6. What are corrdinates of the point equidistant from the points $(a,0,0),(0,a,0),(0,0,a)$ and $(0,0,0)$?

A. $(a/3,a/3,a/3)$

B. $(a/2,a/2,a/2)$

C. (a, a, a)

D. $(2a, 2a, 2a)$

Answer: B

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7. If O be the origin and OP=r and OP makes an angle theta with the positive direction of x-axis and lies in the XY plane find the coordinates of P.

A. $(r\cos\alpha, 0, r\sin\alpha)$

B. $(0, 0, r\sin\alpha)$

C. $(0, 0, r\cos\alpha)$

D. $(r\cos\alpha, 0, 0)$

Answer: A

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8. If a straight line in space is equally inclined to the co-rodinate axes, then the cosine of its angle of inclination to any one of the axes is

A. $\cos^{-1}(1/2)$

B. $\cos^{-1}(1/\sqrt{2})$

C. $\cos^{-1}(1/\sqrt{3})$

D. $\cos^{-1}(\sqrt{3}/2)$

Answer: C

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9. A line makes an angle of 60° with each of x and y axis, the angle which it makes with z axis is

A. 30°

B. 45°

C. 60°

D. none of these

Answer: B

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10. The projections of a line segment on x, y and z axes are respectively 3, 4 and 12. The length of the line segment is

A. 5

B. $4\sqrt{10}$

C. $3\sqrt{17}$

D. 13

Answer: D

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11. If $P(x, y, z)$ is a point in space at a distance r from the origin O, then the direction cosines of the line OP are

A. $\frac{r}{x}, \frac{r}{y}, \frac{r}{z}$

B. rx, ry, rz

C. $\frac{x}{r}, \frac{y}{r}, \frac{z}{r}$

D. none of these

Answer: C

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12. Let N be the foot of the perpendicular of length p from the origin to a plane and l, m, n be the direction cosines of ON, the equation of the plane is

A. $px + my + nz = 1$

B. $lx + py + nz = m$

C. $lx + my + pz = n$

D. $lx + my + nz = p$

Answer: D

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13. The equation of plane passing throught the point (1 ,2 ,3) and the direction cosines of the normal to which are l, m, n is

A. $lx + my + nz = l + 2m + 3n$

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

C. $lx + my + nz = 1$

D. $\frac{lx}{1} + \frac{my}{2} + \frac{nz}{3} = 0$

Answer: A

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14. If a plane meets the co-ordinate axes in A, B, C such that the centroid of the triangle ABC is the point $(1, r, r^2)$, then equation of the plane is

A. $x + ry + r^2z = 3r^2$

B. $r^2x + ry + z = 3r^2$

C. $x + ry + r^2z = 3$

D. $r^2x + ry + z = 3$

Answer: B

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15. Algebraic sum of the intercepts made by the plane $x + 3y - 4z + 6 = 0$ on the axes is

A. $-13/2$

B. $19/2$

C. $-22/3$

D. $26/3$

Answer: A

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16. An equation of the plane passing through the origin and containing the lines whose direction cosinesare proportional to $1, -2, 2$ and $2, 3, -1$ is

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

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

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

D. $4x - 5y - 7z = 0$

Answer: D

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17. An equation of the plane passing through the point $(1, -1, 2)$ and parallel to the plane $3x + 4y - 5z = 0$ is

A. $3x + 4y - 5z + 11 = 0$

B. $3x + 4y - 5z = 11$

C. $6x + 8y - 10z = 11$

D. $3x + 4y - 5z = 2$

Answer: A

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18. The vector form of the equation of the line 6x - 2 = 3y + 1 = 2z - 2 is

A. $r = i - j + 3k + \lambda(i + 2j + 3k)$

B. $r = i + 2j + 3k + \lambda\left(\frac{1}{3}i - \frac{1}{3}j + k\right)$

C. $r = \frac{1}{3}i - \frac{1}{3}j + k + \lambda(i + 2j + 3k)$

D. $r = -2i + j - 2k + \lambda(6i + 3j + 2k)$, λ, being a parameter

Answer: C

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19. Find the vector of a line passing through $(2, -1, 1)$ and parallel to the line whose equations are $\frac{x-3}{2} = \frac{y+1}{7} = \frac{z-2}{-3}$.

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

B. $\frac{x-2}{2} = \frac{y+1}{7} = \frac{z-1}{-3}$

C. $\frac{x-2}{2} = \frac{y-7}{-1} = \frac{z+3}{1}$

D. $\frac{x-3}{2} = \frac{y+1}{-1} = \frac{z-2}{1}$

Answer: B

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20. If M denotes the md point of the line segment joining $A\left(4\hat{i} + 6\hat{j} - 10\hat{k}\right)$ and $B\left(-\hat{i} + 2\hat{j} + \hat{k}\right)$, then the equation, of the

plane through M and perpendicular to AB is

A. $r.(-5i-3j+11k)+135/2=0$

B. $r.\left(\frac{3}{2}i+\frac{7}{2}j-\frac{9}{2}k\right)+\frac{135}{2}=0$

C. $r.(4i+5j-10k)+4=0$

D. $r.(-i+2j+k)+4=0$

Answer: A

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21. Find the equation of the plane through (3,4,-1) which is parallel to the plane $\vec{r}.\left(2\hat{i}-3\hat{j}+5\hat{k}\right)+7=0$

A. $r.(2i-3j+5k)+11=0$

B. $r.(3i+4j-k)+11=0$

C. $r.(3i+4j-k)+7=0$

D. $r.(2i-3j+5z)-7=0$

Answer: A

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22. The ratio in which the plane $2x - 1 = 0$ divides the line joining $(-2, 4, 7)$ and $(3, -5, 80)$ is

A. $2:3$

B. $4:5$

C. $7:8$

D. $1:1$

Answer: D

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23. A line passes through the point $(6, -7, -1)$ and $(2, -3, 1)$. The direction cosines of the line so directed that the angle made by it with

the positive direction of x-axis is acute, are

A. $2/3, \ -2/3, \ -1/3$

B. $2/3, 2/3, \ -1/3$

C. $2/3, \ -2/3, 1/3$

D. $2/3, 2/3, 1/3$

Answer: A

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24. The dr. of normal to the plane through $(1, 0, 0), (0, 1, 0)$ which makes an angle $\frac{\pi}{4}$ with plane , $x + y = 3$ are

A. $1, \sqrt{2}, 1$

B. $1, 1, \sqrt{2}$

C. $1, 1, 2$

D. $\sqrt{2}, 1, 1$

Answer: B

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25. A plane which passes through the point (3,2,0) nd the line $\frac{x-4}{1}=\frac{y-7}{5}=\frac{z-4}{4}$ is (A) $x-y+z=1$ (B) x+y+z=5(C)x+2y-z=1 (D)2x-y+z=5`

A. $x-y+z=1$

B. $x+y+z=5$

C. $x+2y-z=1$

D. $2x-y+z=5$

Answer: A

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26. The lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-k}$ and $\frac{x-1}{k}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar, if

A. $k=1$ or -1

B. $k=0$ or -3

C. $k=3$ or -3

D. $k=0$ or -1

Answer: B

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27. Two system of rectangular axes have the same origin. If a plane cuts them at distance a, b, c and a', b', c' from the origin, then:

A. $\frac{1}{a^2}+\frac{1}{b^2}-\frac{1}{c^2}+\frac{1}{a'^2}+\frac{1}{b'^2}-\frac{1}{c'^2}=0$

B. $\frac{1}{a^2}-\frac{1}{b^2}-\frac{1}{c^2}+\frac{1}{a'^2}-\frac{1}{b'^2}-\frac{1}{c'^2}=0$

C. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}+\frac{1}{a'^2}-\frac{1}{b'^2}-\frac{1}{c'^2}=0$

D. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}+\frac{1}{a'^2}+\frac{1}{b'^2}+\frac{1}{c'^2}=0$

Answer: C

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28. The two lines $x=ay+b, z=cy+d$ and $x=a'y+b', z=c'y+d'$ will be perpendicularm if and only if

A. $aa'+bb'+cc'=0$

B. $(a+a')(b+b')(c+c')=0$

C. $aa'+cc'+1=0$

D. $aa'+bb'+cc'+1=0$

Answer: C

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29. Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is

A. $7/2$

B. $5/2$

C. $3/2$

D. $9/2$

Answer: A

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30. A tetrahedron has vertices $P(1, 2, 1), Q(2, 1, 3), R(-1, 1, 2)$ and $O(0, 0, 0)$. The angle beween the faces OPQ and PQR is :

A. $\cos^{-1}(17/31)$

B. 30°

C. 90°

D. $\cos^{-1}(19/35)$

Answer: D

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31. A line line makes the same angle θ with each of the x and z-axes. If the angle β, which it makes with y-axis, is such that $\sin^2\beta = 3\sin^2\theta$ then $\cos^2\theta$ equals

A. $3/5$

B. $1/5$

C. $2/3$

D. $2/5$

Answer: A

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32. A line with direction cosines proportional to 2,1,2 meet each of the lines $x = y + a = zndx + a = 2y = 2z$. The coordinastes of each of the points of intersection are given by (A) $(3a, 2a, 3a), (a, a, 2a)$ (B) $(3a, 2a, 3a), (a, a, a0$ (C) $(3a, 3a, 3a), (a, a, a)$ (D) $92a, 3a, 3a), (2a, a, a0$

A. $(3a, 2a, 3a), (a, a, 2a)$

B. $(3a, 2a, 3a), (a, a, a)$

C. $(3a, 3a, 3a), (a, a, a)$

D. $(2a, 3a, 3a), (2a, a, a)$

Answer: B

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33. If the straighat lines $x = 1 + s, y = -3 - \lambda s, z = 1 + \lambda s$ and $x = \frac{t}{2}, y = 1 + t, z = 2 - t$

with parameters s and t respectively, are coplanar, then λ equals (A) $-\frac{1}{2}$ (B) -1 (C) -2 (D) 0

A. $-1/2$

B. -1

C. -2

D. 0

Answer: C

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34. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is (A) 0^0 (B) 90^0 (C) 45^0 (D) 30^0

A. 45°

B. 30°

C. 0°

D. 90°

Answer: D

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35. If the angle θ between the line $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$ and the plane $2x - y + \sqrt{\lambda}z + 4 = 0$ is such that $\sin\theta = \frac{1}{3}$. The value of λ is

A. $3/4$

B. $-4/3$

C. $5/3$

D. $-3/5$

Answer: C

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36. The distance between the line $\vec{r} = 2i - 2j + 3k + \lambda(i - j + 4k)$ and the plane $\vec{r}.(i + 5j + k) = 5$ is

A. $3/10$

B. $10/3$

C. $10/9$

D. $10/3\sqrt{3}$

Answer: D

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37. then image of the point $(-1, 3, 4)$ in the plane $x - 2y = 0$

A. $(8, 4, 4)$

B. $(-17/3, -19/3, 4)$

C. $(15, 11, 4)$

D. none of these

Answer: D

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38. Let L be the line of intersection of the planes $2x + 3y + z = 1$ and $x + 3y + 2z = 2$. If L makes an angle α with the positive X=axis, then $\cos\alpha$ equals

A. $1/\sqrt{3}$

B. $1/2$

C. 1

D. $1/\sqrt{2}$

Answer: A

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39. If a line makes an angle of $\frac{\pi}{4}$ with the positive directions of each of x-axis and y-axis, then the angle that the line makes with the positive direction of the z-axis is (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$

A. $x - y = 0 = z$

B. $x - z = 0 = y$

C. $y - z = 0 = x$

D. $x = y = z$

Answer: A

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40. Let $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} - \hat{j} + 2\hat{k}$ and $\vec{c} = x\hat{i} + (x-2)\hat{j} - \hat{k}$. If the vector $\vec{c}$ lies in the plane of $\vec{a}$ and $\vec{b}$ then x equals

A. 0

B. 1

C. -4

D. -2

Answer: D

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41. If the angle between the line $x = \frac{y-1}{2} = (z-3)(\lambda)$ and the plane $x + 2y + 3z = 4is\cos^{-1}\left(\sqrt{\frac{5}{14}}\right)$, then λ equals

A. $5/3$

B. $2/3$

C. $3/2$

D. $2/5$

Answer: B

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42. The distance of the point $(1, -5, 9)$ from the plane $x - y + z = 5$ measured along a straighat line $x = y = z$ is (A) $5\sqrt{3}$ (B) $3\sqrt{10}$ (C) $3\sqrt{5}$ (D) $10\sqrt{3}$

A. $10\sqrt{3}$

B. $5\sqrt{3}$

C. $3\sqrt{10}$

D. $3\sqrt{5}$

Answer: A

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43. The length of the perpendicular drawn from the point $(3, -1, 11)$ to the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ is

A. $\sqrt{29}$

B. $\sqrt{33}$

C. $\sqrt{53}$

D. $\sqrt{66}$

Answer: C

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44. An equation of a plane parallel to the plane $x - 2y + 2z - 5 = 0$ and at a unit distance from the origin is

A. $x - 2y - 2z - 1 = 0$

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

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

D. $x - 2y + 2z + 1 = 0$

Answer: C

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45. If the line $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-k}{2}=\frac{z}{1}$ intersect, then k is equal to

A. $9/2$

B. 0

C. -1

D. $2/9$

Answer: A

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46. Let the line $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+2}{2}$ lies in the plane $x+3y-\alpha z+\beta=0$. Then, (α, β) equals

A. $(5, -15)$

B. $(-5, 5)$

C. $(6, -17)$

D. $(-6, 7)$

Answer: D

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47. The projections of a vector on the three coordinate axis are 6, 3 , 2 respectively. The direction cosines of the vector are (1) $6, -3, 2$ (2) $\frac{6}{5}, \frac{-3}{5}, \frac{2}{5}$ (3) $\frac{6}{7}, \frac{-3}{7}, \frac{2}{7}$ (4) $\frac{-6}{7}, \frac{-3}{7}, \frac{2}{7}$

A. $6/7, -3/7, 2/7$

B. $-6/7, -3/7, 2/7$

C. $6, -3, 2$

D. $6/5, -3/5, 2/5$

Answer: A

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48. A line AB in three-dimensional space makes angles 45° and 120° with the positive X-axis and The positive Y-axis, respectively. If AB makes an acute angleθ with the positive Z-axis, then θ equals

A. 60°

B. 75°

C. 30°

D. 45°

Answer: A

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49. $\frac{x+1}{3} = \frac{y+2}{1} = \frac{z+1}{2}$ and $\frac{x-2}{1} = \frac{y+2}{2} = \frac{z-3}{3}$

A. $2/\sqrt{75}$

B. $7/\sqrt{75}$

C. $13/\sqrt{75}$

D. $23/\sqrt{75}$

Answer: C

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50. A line with positive direction cosines passes through the point P(2, – 1, 2) and makes equal angles with the coordinate axes. The line meets the plane 2x + y + z = 9 at point Q. The length of the line segment PQ equals

A. 1

B. $\sqrt{2}$

C. $\sqrt{3}$

D. 2

Answer: C

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51. The vertices of a triangle are $A(1, 0, 0), B(0, 2, 0), C(0, 0, 3)$. If the direction ratios of the line joining the orthoceutre and circumcentre of the triangle are $a, b, -111$, the $a + b$ is equal to

A. 5

B. 10

C. 15

D. 25

Answer: C

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52. Find the equation of the plane which contains the two parallel lines $\frac{x+1}{2} = \frac{y-2}{2} = \frac{z}{1}$ and $\frac{x-3}{3} = \frac{y+4}{2} = \frac{z-1}{2}$.

A. $3x + 2y + z = 14$

B. $8x + y - 26z + 6 = 0$

C. $4x - 6y + z = 53$

D. none of these

Answer: B

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53. The length of projection, of the line segment joining the points (1,-1,0) and (-1,0,1) to the plane 2x+y+6z=1 is equal to

A. $\sqrt{255/41}$

B. $\sqrt{237/41}$

C. $\sqrt{137/41}$

D. $\sqrt{155/41}$

Answer: B

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54. The point P is the intersection of the straight line joining the points $Q(2, 3, 5)$ and $R(1, -1, 4)$ with the plane $5x - 4y - z = 1$. If S is the foot of the perpendicular drawn from the point $T(2, 1, 4)$ to QR, then the length of the line segment PS is (A) $\frac{1}{\sqrt{2}}$ (B) $\sqrt{2}$ (C) 2 (D) $2\sqrt{2}$

A. $1/\sqrt{2}$

B. $\sqrt{2}$

C. 2

D. $2\sqrt{2}$

Answer: A

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55. The equation of a plane passing through the line of intersection of the planes x+2y+3z = 2 and x y + z = 3 and at a distance 2 3 from the point (3, 1, 1) is (A) 5x 11y + z = 17 (B) 2x y 3 2 1 (C) x + y + z = 3 (D) x 2y 1 2

A. $5x - 11y + z = 17$

B. $\sqrt{2}x + y = 3\sqrt{2} - 1$

C. $x = y + z = \sqrt{3}$

D. $x + \sqrt{2}y = 1 - \sqrt{2}$

Answer: A

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SOLVED EXAMPLES (LEVEL 2(SINGLE CORRECT ANSWER TYPE QUESTIONS))

1. The image of the point A (1,0,0) in the line $\frac{x-1}{2} = \frac{x+1}{-3} = \frac{z+10}{8}$ is :

A. $(3, -4, -2)$

B. $(5, -8, -4)$

C. $(1, -1, -10)$

D. $(2, -3, 8)$

Answer: B

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2. Find the equation of a plane containing the line of intersection of the planes $x+y+z-6=0 and 2x+3y+4z+5=0$ passing through $(1,1,1)$.

A. $2x+3y+4z=9$

B. $x+y+z=3$

C. $x+2y+3z=6$

D. $20x+23y+26z=69$

Answer: D

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3. Equation of the plane through three points A, B and C with position vectors $-6i+3j+2k, 3i-2j+4k$ and $5i+7j+3k$ is equal to

A. $r.(i-j+7k)+23=0$

B. $r.(i+j+7k)=23$

C. $r.(i+j-7k)+23=0$

D. $r.(i-j-7k)=23$

Answer: A

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4. The lines whose vector equations are $r=a+tb, r=c+t'd$ are coplanar if

A. $(a-b).c\times d=0$

B. $(a-c).b\times d=0$

C. $(b-c).a\times d=0$

D. $(b-d).\ a \times c = 0$

Answer: B

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5. The shortest distance between the skew lines $\bar{r} = \overline{a_1} + \lambda\overline{b_1} \text{and} \bar{r} = \overline{a_2} + \mu\overline{b_2}$ is

A. $\frac{|(a_2 - a_1).\ b_1 \times b_2|}{|b_1 \times b_2|}$

B. $\frac{|(a_1 - a_1).\ a_2 \times b_2|}{|b_1 \times b_2|}$

C. $\frac{|(a_2 - b_2).\ a_1 \times b_1|}{|b_1 \times b_2|}$

D. $\frac{|(a_1 - b_2).\ b_1 \times a_2|}{|b_1 \times a_2|}$

Answer: A

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6. The length of the shortest distance between the lins $r = 3i + 5j + 7k + \lambda(i - 2j + k)$ and $r = -i - j - k + \mu(7i - 6j + k)$ is

A. 83

B. $\sqrt{6}$

C. $\sqrt{3}$

D. $2\sqrt{29}$

Answer: D

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7. The angle between the lines whose direction cosines are given by the equatios $l^2 + m^2 - n^2 = 0, m + n + l = 0$ is

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. $\pi/2$

Answer: C

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8. The volume of the tetrahedron included betweenthe plane $3x + 4y - 5z - 60 = 0$ and the coordinate planes, is

A. 60

B. 600

C. 720

D. none of these

Answer: B

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9. A line segment has length 63 and direction ratios are 3, -26. The components of the line vectors are

A. $27, \ -18, 54$

B. $-27, 18, \ -54$

C. $-27, 18, \ -54$

D. $27, \ -18, \ -54$

Answer: B

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10. Find the equations of the bisectors of the angles between the planes $2x - y + 2z + 3 = 0 and 3x - 2y + 6z + 8 = 0$ and specify the plane which bisects the acute angle and the plane which bisects the obtuse angle.

A. $5x - y - 4z - 45 = 0$

B. $5x - y - 4z - 3 = 0$

C. $23x + 13y + 32z - 45 = 0$

D. $23x - 13y + 32z + 5 = 0$

Answer: B

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11. Find the vector equation of a line passing through $3\hat{i} - 5\hat{j} + 7\hat{k}$ and perpendicular to theplane $3x - 4y + 5z = 8$.

A. $\frac{x-3}{3} = \frac{y+5}{-4} = \frac{z-7}{5}$

B. $\frac{x-3}{3} = \frac{y+4}{-5} = \frac{z-5}{7}$

C. $r = 3i + 5j - 7k + \lambda(3i - 4j - 5k)$

D. $r = 3i - 4j - 5k + \mu(3i + 5j + 7k)$

Answer: A

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12. 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) $(2p, -p, 2p)$

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

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

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

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

Answer: C

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13. If d_1, d_2, d_3 denote the distances of the plane $2x - 3y + 4z = 0$ from the planes $2x - 3y + 4z + 6 = 0$

$4x - 6y + 7z + 3 = 0$ and $2x - 3y + 4z - 6 = 0$ respectively, then

A. $p_1 + 8p_2 - p_3 = 0$

B. $p_3^2 = 16p_2^2$

C. $8p_2^2 = p_1^2$

D. $p_1 + 2p_20 + 3p_3 = \sqrt{29}$

Answer: A

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14. Equation of the plane containing the lines.

$r = i + 2j - k + \lambda(i + 2j - k)$

and $r = i + 2j - k + \mu(i + j - 3k)$ is

A. $r.\,(7i - 4j - k) = 0$

B. $7(x - 1) - 4(y - 1) - (z + 3) = 0$

C. $r.\,(1 + 2j - k) = 0$

D. $r.\,(i + j + 3k) = 0$

Answer: A

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15. Show that the foot of the perpendicular from the origin to the join of $A(-9, 4, 5)$ and $B(11, 0, -1)$ is the mid point of AB. Also find distance of point $(2, 4, 4)$ from the line AB

A. $2:3$

B. $3:2$

C. $1:1$

D. none of these

Answer: C

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16. Cosine of the angle between the lines whose vector equations are $r = 3i + 2j - 4k + \lambda(i + 2j + 2k)$ and $r = 5i - 2k + \mu(3i + 2j + 6k)$, λ, being parameters, is

A. $-1/3\sqrt{29}$

B. $3/7\sqrt{29}$

C. $23/29$

D. $19/21$

Answer: D

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17. Find the equation of the plane through the line of intersection of $\vec{r}\,2\hat{i} - 3\hat{j} + 4\hat{k} = 1 and \vec{r}\,\hat{i} - \hat{j} + 4 = 0$ and perpendicular to $\vec{r}\,2\hat{i} - \hat{j} + \hat{k} + 8 = 0.$

A. $3x - 4y + 4z = 5$

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

C. $5x - 2y - 12z + 47 = 0$

D. $2x + 3y + 4 = 0$

Answer: C

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18. If 1,m ,n are the direction cosines of the line of shortest distance between the lines $\frac{x-3}{2} = \frac{y+15}{-7} = \frac{z-9}{5}$ and $\frac{x+1}{2} = \frac{y-1}{1} = \frac{z-9}{-3}$ then :

A. $4\sqrt{5}$

B. $4\sqrt{17}$

C. $4\sqrt{3}$

D. $8\sqrt{2}$

Answer: C

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19. Equation of the line through the point $(2, -1, 1)$ and the intersection of the lines

$2x - y - 4 = 0 = y + 2z, x + 3z - 4 = 0 = 2x + 5z - 8$ is

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

B. $x + y + z = 2, x + 2z = 4$

C. $x + 2y + z = 1, x + 2z = 4$

D. $x + 2y + z = 1, x + 2y = 0$

Answer: B

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20. Under what condition do the planes $bx - ay = n, cy - bz = l, az - cx = m$ intersect in a line?

A. $al - bm + cn = 1$

B. $al + bm + cn = 0$

C. $al - bm - cn + 1 = 0$

D. $al + bm + cn = 1$

Answer: B

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21. The value of k such that $\frac{x-4}{1} = \frac{y-2}{1} = \frac{z-k}{2}$ lies in the plane $2x - 4y = z = 7$ is a. 7 b. -7 c. no real value d. 4

A. 7

B. 6

C. no real value

D. -7

Answer: A

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22. A variable plane at distance of 1 unit from the origin cuts the coordinte axes at A,B and C. If the centroid $D(x, y, z)$ of triangle ABC satisfies the relation $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=k$ then the value of k is (A) 3 (B) 1 (C) $\frac{1}{3}$ (D) 9

A. 9

B. 3

C. 1

D. $1/3$

Answer: A

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23. A plane passes through (1,-2,1) and is perpendicualr to two planes $2x-2y+z=0$ and $x-y+2z=4$, then the distance of the plane

from the point (1,2,2) is

A. 0

B. 1

C. $\sqrt{2}$

D. $2\sqrt{2}$

Answer: D

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24. A line with positive direction cosines passes through the point P(2, – 1, 2) and makes equal angles with the coordinate axes. The line meets the plane 2x + y + z = 9 at point Q. The length of the line segment PQ equals

A. 1

B. $\sqrt{2}$

C. $\sqrt{3}$

D. 2

Answer: C

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25. Let $P(3, 2, 6)$ be a point in space and Q be a point on line $\vec{r} = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + \mu\left(-3\hat{i} + \hat{j} + 5\hat{k}\right)$. Then the value of μ for which the vector $\vec{PQ}$ is parallel to the plane $x - 4y + 3z = 1$ is a. 1/4 b. -1/4 c. 1/8 d. -1/8

A. $1/4$

B. $-1/4$

C. $1/8$

D. $-1/8$

Answer: A

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26. Equation of the plane containing the straight line $\frac{x}{2} = \frac{y}{3} = \frac{z}{4}$ and perpendicular to the plane containing the straight lines $\frac{x}{2} = \frac{y}{4} = \frac{z}{2}$ and $\frac{x}{4} = \frac{y}{2} = \frac{z}{3}$ is

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

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

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

D. $5x + 2y - 4z = 0$

Answer: C

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27. If the distance of the point $P(1, -2, 1)$ from the plane $x + 2y - 2z = \alpha, where \alpha > 0, is 5,$ then the foot of the perpendicular from P to the place is a. $\left(\frac{8}{3}, \frac{4}{3}, -\frac{7}{3}\right)$ b. $\left(\frac{4}{3}, -\frac{4}{3}, \frac{1}{3}\right)$ c. $\left(\frac{1}{3}, \frac{2}{3}, \frac{10}{3}\right)$ d. $\left(\frac{2}{3}, -\frac{1}{3}, -\frac{5}{3}\right)$

A. $\left(\frac{8}{3}, \frac{4}{3}, \frac{-7}{3}\right)$

B. $\left(\frac{4}{3}, \frac{-4}{3}, \frac{1}{3}\right)$

C. $\left(\frac{1}{3}, \frac{2}{3}, \frac{10}{3}\right)$

D. $\left(\frac{2}{3}, \frac{-1}{3}, \frac{5}{2}\right)$

Answer: A

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28. Read the following passage and answer the questions. Consider the lines

$$L_1: \frac{x+1}{3} = \frac{y+2}{1} = \frac{z+1}{2}$$

$$L_2: \frac{x-2}{1} = \frac{y+2}{2} = \frac{z-3}{3}$$

Q. The distance of the point $(1, 1, 1)$ from the plane passing through the point $(-1, -2, -1)$ and whose normal is perpendicular to both the lines L_1 and L_2, is

A. $2/\sqrt{75}$

B. $7/\sqrt{75}$

C. $13/\sqrt{75}$

D. $23/\sqrt{75}$

Answer: C

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29. (i) Find the equation of the plane passing through the points $(2, 1, 0), (5, 0, 1) and (4, 11).$ (ii) If P s the point $(2, 1, 6),$ then the find the point Q such that PQ is perpendicular to the plane in (i) and the midpoint of PQ lies on it.

A. $(-2, -1, -6)$

B. $(6, 5, -2)$

C. $(1, 1, 4)$

D. $(2, 5, 4)$

Answer: B

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30. If the distance between the plane $Ax - 2y + z = d$ and the plane containing the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ is $\sqrt{6}$, then |d| is equal to....

A. 3

B. 4

C. 5

D. 6

Answer: D

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SOLVED EXAMPLES (NUMERICAL ANSWER TYPE QUESTIONS)

1. A plane P_1 is making intercepts 2, 3, 4 on X, Y and Z-axes respectively. Another plane P_2 is passing through $(-1, 6, 2)$ and is perpendicular to the line joining the points $(1, 2, 3)$ and $(-2, 3, 4)$. Let θ be an angle between P_1 and P_2, then $61\cos^2\theta$=_____

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2. If equation of the plane passing through $i + 2j - k$ and perpendicular to the line of intersection of the planes $r.(3i - j + k) = 4$ and $r.(i + 4j + 2k) = 12$, is $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$, then $91(a + b + c)$=_____

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3. Let P be the point of intersection of the lines represented by

$r = (i + 2j - k) + \lambda(2i + 3j + 4k)$ (1)

and $r = (-i - 3j + 7k) + \mu(i + 2j - k)$ (2)

If the position vector of P is $ai + bj + ck$, then $\left|a^2 - b^2 + c^2\right|$=_____

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4. Suppose $A(2, 3, 5), B(b, 3, 5)$ and $C(7, 5, c)$ are vertices of a triangle. If the median through A is equally inclined to the axes, then $b^2 + c^2$ =_____

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5. The plane $3x + 4y + 6z + 7 = 0$ is rotated about the line

$r = (i + 2j - 3k) + t(2i - 3j + k)$ (1)

until the plane passes through the origin. If the equation of this plane is $x + y + \lambda z = 0$, then λ=_____

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6. Let L be a line through $B(3i + j - k)$ and parallel $21 - j + 2k$. Suppose A is a point on L such that $|BA| = 18$ If position vector of A is $ai + bj + ck$ where $c < 0$, then $|a| + |b|$=_____

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7. Suppose $a = a_1 i + a_2 j + a_3 k$ is a vector which lies in the plane containing $i + j$ and $j + k$ and is parllel to $2i - 2j - 4k$. If $|a| = \sqrt{6}$ and $a_3 < 0$, then $|a_1| + |a_2| + |a_3|$=_____

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8. Suppose position vectors of A, B, C are respectively $i + 2j + k, 2i - j + 2k$ and $i + j + 2k$. If p is the perpendicular distance of the point C from the line joining A and B, then $11p^2$=_____

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9. Suppose $H(3, 2, -1)$ and $C(3, 2, 5)$ are respectively the orthocentre and circumcentre of a triangle PQR. If G is centroid of triangle PQR, then OG^2=_____ where O is the origin.

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10. The direction cosines of two lines satisfy $2l + 2m - n = 0$ and $lm + mn + nl = 0$. The angle between these lines is

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11. If equation of plane passing through $(2, 1, 3), (3, 2, 1)$ and $(1, 3, 2)$ is $ax + by + cz = 1$ then $a + b + c$ is equal to _____

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12. The distance of the point $(-1, -5, -10)$ from the point of intersection of the line $\frac{x-2}{2} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane

$x - y + z = 5$ is

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13. If Q is foot of the perpendicular from the point $P(4, -5, 3)$ on the line $\frac{x-5}{3} = \frac{y-2}{-4} = \frac{z-6}{5}$ then, find the value of $100(PQ)^2$.

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14. If the lines $\frac{x-4}{15} = \frac{y-17}{9} = \frac{z-11}{8}$ and $\frac{x-15}{4} = \frac{y-9}{17} = \frac{z-8}{11}$ are intersecting at point A, then $OP^2 =$

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15. If the root of perpendicular from $A(3, 1, 0)$ on a line passing through $B(1, \alpha, 7)$ is $C(17/3, 5/3, 7/3)$, then α= _____

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16. Find the angle between the lines $x-3y-4=0, 4y-z+5=0 and x+3y-11=0, 2y=z+6=0.$

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17. P,Q,R,S are the points $(1, 2, -2), (8, 10, 11), (1, 2, 3)$ and $(3, 5, 7)$ respectively. If s denotes the projection of PQ on RS then $29s^2+29$ is equal to :

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18. The area of the triangle whose vertices are $A(1, -1, 2), B(2, 1-1)C(3, -1, 2)$ is .....

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19. A plane passing through a point (1, 2, 2) and is perpendicular to two planes $2x - 2y + z = 0$ and $x - y + 2z = 4$. Square of the distance of the plane from the point (2, 5, 18) is_____

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20. A variable plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ at a unit distance from origin cuts the coordinate axes at A, B and C. Centroid (x, y, z) satisfies the equation $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = K$. The value of K is (A) 9 (B) 3 (C) $\frac{1}{9}$ (D) $\frac{1}{3}$

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21. A variable plane is at a constant distance p from the origin and meets the coordinate axes in A, B, C . Show that the locus of the centroid of the tehrahedron $OABCisx^{-2} + y^{-2} + z^{-2} = 16p^{-2}$.

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22. Find the point where the line $\frac{x-1}{2}=\frac{y-2}{-3}=\frac{z+3}{4}$ meets the plane $2x+4y-z=1$.

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23. Let s be the distance between the lines:

$r=2i-j+k+t(2i+j+2k)$ (1)

and $r=i+2j+5k+\lambda(2i+j+2k)$ (2) then $9s^2$ =_____

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EXERCISE (CONCEPT-BASED (SINGLE CORRECT ANSWER TYPE QUESTIONS))

1. let Q be the foot of perpendicular from the origin to the plane $4x-3y+z+13=0$ and R be a point $(-1,1,-6)$ on the plane then length QR is

A. $\sqrt{14}$

B. $\sqrt{19/2}$

C. $3\sqrt{7/2}$

D. $3/\sqrt{2}$

Answer: C

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2. If the lines $\frac{x+1}{2} = \frac{y-1}{1} = \frac{z+1}{3}$ and $\frac{x+2}{2} = \frac{y-k}{3} = \frac{z}{4}$ are coplanar, then the value of k is

A. $11/2$

B. $-11/2$

C. $9/2$

D. $-9/2$

Answer: A

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3. A line in 3-dimensional space makes an angle $\theta(0 < \theta \leq \pi/2)$ with both x and y-axis. Then the set of all values of θ is the interval:

A. $\left(0, \frac{\pi}{4}\right]$

B. $\left[\frac{\pi}{6}, \frac{\pi}{3}\right]$

C. $\left[\frac{\pi}{4}, \frac{\pi}{3}\right]$

D. $\left(\frac{\pi}{6}, \frac{\pi}{2}\right]$

Answer: C

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4. A symmetrical form of the line of intersection of the planes $x = ay + b$ and $z = cy + d$ is

A. $\frac{x-b}{a} = \frac{y-1}{1} = \frac{z-d}{c}$

B. $\frac{x-b-a}{a} = \frac{y-1}{1} = \frac{z-d-c}{c}$

C. $\frac{x-a}{b}=\frac{y-0}{1}=\frac{z-c}{d}$

D. $\frac{x-b-a}{b}=\frac{y-1}{0}=\frac{z-d-c}{d}$

Answer: B

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5. If the angle between the line $(2x+1)=y=z+4$ and the plane $2x-y+\sqrt{\lambda}z+4$ is $\pi/6$, then the value of λ is

A. $135/7$

B. $45/11$

C. $45/7$

D. $135/7$

Answer: C

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6. If the centroid of the triangle with vertices $(3c+2, 2, 0), (2c, -1, -1)$ and $(c+2, 3c+1, c+3)$ lies in the plane $z = c$, then the coordinates of the centroid are:

A. $\left(-\frac{2}{3}, -\frac{1}{3}, \frac{1}{3}\right)$

B. $\left(\frac{10}{3}, \frac{5}{3}, 1\right)$

C. $\left(\frac{4}{3}, \frac{2}{3}, \frac{2}{3}\right)$

D. $\left(\frac{2}{3}, \frac{1}{3}, -\frac{1}{3}\right)$

Answer: B

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7. A plane passes through a fixed point (α, β, γ). The locus of the foot of the perpendiculars to the plane from the origin is

A. a plane inclined at a angle $\frac{\pi}{3}$ with the given plane

B. a straight line

C. a plane perpendicular to the given plane

D. none of these

Answer: D

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8. Let $(a, b, c) \neq (0, 0, 0)$. The pair of equations which does not represent a straight line is

A. $ax - by + cz + d = 0, ax + b'y + cz + d = 0 (b \neq b')$

B. $ax - by + cz + d = 0, ax + by + c'z + d = 0 (c \neq c')$

C. $ax + by + cz + d = 0, ax + by + cz - d' = 0 (d \neq d')$

D. $ax + by + cz + d = 0, a'x + by + cz + d = 0 (a \neq a')$

Answer: C

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9. Shortest distance between z-axis and the line $\frac{x-2}{3}=\frac{y-5}{2}=\frac{z+1}{-5}$ is

A. $1/\sqrt{13}$

B. $11/\sqrt{13}$

C. $\sqrt{11}/13$

D. $11/\sqrt{13}$

Answer: D

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10. If the lines $\frac{x-4}{1}=\frac{y-2}{1}=\frac{z-\lambda}{3}$ and $\frac{x}{1}=\frac{y+2}{2}=\frac{z}{4}$ intersect each other, then λ lies in the interval

A. $(-5, -3)$

B. $(13, 15)$

C. $(11, 13)$

D. $(9, 11)$

Answer: D

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11. Find the distance between the point $P(6, 5, 9)$and the plane determined by the points $A(3, 1, 2)$, $B(5, 2, 4)$and $C(1, 1, 6)$.

A. $3/\sqrt{34}$

B. $6/\sqrt{34}$

C. $2/\sqrt{17}$

D. $3/\sqrt{17}$

Answer: B

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12. Let $L: x - 2y + 4z = 9$ be a plane, $P(2, 1, -1)$ be a point and O, be the Origin. Q is the foot of the perpendicular from P on the plane L, then $(OP)^2 + (PQ)^2$ is equal to

A. $\frac{190}{21}$

B. $\frac{43}{21}$

C. $\frac{295}{21}$

D. $\frac{211}{21}$

Answer: C

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13. The algebraic sum of the intercepts made by the plane $x - 2y + 3z = 24$ on the coordinate axes is

A. 28

B. 20

C. 4

D. 44

Answer: B

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14. $L_1 : 2(x-1) + 3(y+2) + (z-7) = 0$ and $L_1 : 2(x+1) - 3(y+2) + (z+7) = 0$ are two planes.

A. L_1 and L_2 are parallel

B. L_1 and L_2 are perpendicular

C. L_1 and L_2 are equidistant from the origin

D. Equation of a plane through the intersection of L_1 and L_2 is $y = 0$

Answer: C

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15. If the points $(1, 1, p)$ and $(-3, 0, 1)$ be equidistant from the plane $\vec{r} \cdot \left(3\hat{i} + 4\hat{j} - 12\hat{k}\right) + 13$, find the values of p.

A. -1

B. 0

C. $7/3$

D. $3/7$

Answer: C

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EXERCISE (LEVEL 1 (SINGLE CORRECT ANSWER TYPE QUESTIONS))

1. The coordinate of the middle point of the line joining the points $(-1, -1, 1)$ and $(-1, 1, -1)$ are

A. $(0, 0, 0)$

B. $(-1, 0, 0)$

C. $(0, -1, 1)$

D. $(0, 1, -1)$

Answer: B

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2. If l, m, n and l', m', n' be the direction cosines of two lines which include an angle θ, then

A. $\cos\theta = ll' + mm' + nn'$

B. $\sin\theta = ll' + mm' + nn'$

C. $\cos\theta = mn' + m'n + nl' + n'l + lm' + l'm$

D. $\sin\theta = mn' + m'n + nl' + n'l + lm' + l'm$

Answer: A

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3. An equation of the XOY plane is

A. $x = 0$

B. $y = 0$

C. $z = 0$

D. $z = c, c \neq 0$

Answer: C

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4. The coordinate of the foot of the perpendicular from the point (a, b, c) on z-axis is

A. $(a, 0, 0)$

B. $(0, b, 0)$

C. $(0, 0, c)$

D. $(a, b, 0)$

Answer: C

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5. l = m = n = 1 are the direction Cosines of

A. x-axis

B. y-axis

C. z-axis

D. none of these

Answer: D

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6. If l_1, m_1, n_1 and l_2, m_2, n_2 are the direction cosines of two mutually perpendicular lines, show that the direction cosines of the line perpendicular to both of these are $m_1n_2 - m_2n_1, n_1l_2 - n_2l_1, l_1m_2 - l_2m_1$.

A. $l_1l_2 + m_1m_2 + n_1n_2 = 0$

B. $l_1l_2 + m_1m_2 + n_1n_2 = 1$

C. $\frac{l_1}{l_2} + \frac{m_1}{m_2} + \frac{n_1}{n_2} = 1$

D. $\frac{l_1}{l_2} + \frac{m_1}{m_2} + \frac{n_1}{n_2} = 0$

Answer: A

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7. $A(0, 5, 6), B(1, 4, 7), C(2, 3, 7)dnD(3, 4, 6)$ are four points in space. The point nearest to the origin $O(0, 0, 0)$ is (A) A (B) B (C) C (D) D

A. P

B. Q

C. R

D. S

Answer: B

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8. $P(1, 1, 1)$ and $Q(\lambda, \lambda, \lambda)$ are two points in space such that $PQ = \sqrt{27}thevaeofl$amda` can be (A) -2 (B) -4 (C) 4 (D) 2

A. -4

B. -3

C. 2

D. 4

Answer: D

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9. Show that the points (0,7,10), (-1,6,6) and(-4,9,6) are the vertices of an isosceles right angled triangle.

A. a right angled isosceles triangle

B. equilateral triangle

C. an isosceles triangle

D. an obtuse angled triangle

Answer: A

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10. If α, β, γ are the angles which a line makes with the coordinate axes ,then (A) $\sin^2\alpha = \cos^2\beta + \cos^2\gamma$ (B) $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 2$ (C) $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$ (D) $\sin^2\alpha + \sin^2\beta = 1 + \cos^2\gamma$

A. $\sin^2\alpha + \cos^2\beta + \cos^2\gamma = 0$

B. $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 0$

C. $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

D. $\sin^2\alpha + \sin^2\beta = 1 - \cos^2\gamma$

Answer: C

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11. If a line makes angles α, β, γ with the positive direction of coordinate axes, then write the value of $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$.

A. $3\cos\alpha = 2/\sqrt{62}$

B. $2\cos\beta = -3/\sqrt{62}$

C. $\cos\gamma = 7/\sqrt{62}$

D. $2\cos\alpha = -3\cos\beta = 7\cos\gamma$

Answer: C

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12. Find the vector equation of the line through $A(3, 4, -7) and B(1, -1, 6)$. Find also, its Cartesian equations.

A. $r = 3i - 4j + 7k + \lambda(2i - 5j - 13k)$

B. $r = i - j + 6k - \lambda(2i - 5j - 13k)$

C. $\frac{x-3}{2} = \frac{y-4}{-4} = \frac{z+7}{-13}$

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

Answer: D

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13. The lines $\frac{x-1}{3} = \frac{y-1}{-1} = \frac{z+1}{0}$ and $\frac{x-4}{2} = \frac{y+0}{0} = \frac{z+1}{3}$ (A) intersect at (4,0,-1) (B) intersect at (1,1,-1) (C) do not intersect (D) intersect

A. do not intersect

B. intersect

C. intersect at (4, 0, 4)

D. intersect at $(1, 1, -1)$

Answer: B

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14. The sine of the angle between the lines $r = 2i + 2j - k + (i + j + k)t$ and the plane $r.(3i - 4j + 5k) = q$ is

A. $2\sqrt{6}/15$

B. $2\sqrt{3}/15$

C. $\sqrt{201}/15$

D. none of these

Answer: A

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15. Equation of a plane passing through (1, 1, 1) and containing x-axis is

A. $x - y = 0$

B. $x - z = 0$

C. $y - z = 0$

D. $x + y + z = 3$

Answer: C

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16. The co-ordinates of the foot of the perpendicular from the point $(3, -1, 11)$ on the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ are

A. $(2, 5, 7)$

B. $(-2, -1, -1)$

C. $(0, 2, 3)$

D. $(2, 3, 4)$

Answer: A

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17. The length of the line segment whose projection on the coordinate axes are of magnitudes 12,4,3 is (1) 13 (2) 17 (3) 19 (4) 21

A. 19

B. 13

C. 11

D. none of these

Answer: B

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18. The number of lines which are equally inclined to the axes is :

A. 3

B. 4

C. 6

D. 8

Answer: B

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19. Find the equation of a line which passes through a given point of position vector $\vec{c}$ and is parallel to a given vector $\vec{b}$.

A. [r b c] = [a b c]

B. [r c a] = [b c a]

C. [r a b] = [c a b]

D. none of these

Answer: A

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20. If the line $r = (i + j - k) + \lambda(3i - j)$ and $r = (4i - k) + \mu(2i + 3k)$ intersect at the point $(p, 0, p - 5)$ then

A. $p = 0$

B. $p = -1$

C. $p = 4$

D. $p = 5$

Answer: C

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21. Line of intersection of the two planes $\bar{r}.(3i-j+k)=1$ and $\bar{r}.(i+4j-2k)=2$ is parallel to the vector

A. $-2i+7j+13k$

B. $2i+7j-13k$

C. $-2i+7j-13k$

D. $2i+7j+13k$

Answer: A

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22. The plane $x-2y+7z+21=0$ (A) contains the line $\frac{x+1}{-3}=\frac{y-3}{2}=\frac{z+2}{1}$ (B) contains the point (-,7,-1)

$(C) isperpendicar \rightarrow thel \in$ ex/1=y/(-2)=z/7

$(D) isparal \leq l \rightarrow thepla \neq$ x-2y+7z=0`

A. $x+y+z=0$

B. $x + 2y - 3z = 35$

C. $3x - 2y + 3z + 35 = 0$

D. $3x - 2y - z = 21$

Answer: A

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23. A line passes through two points $A(2, -3, -1)$ and $B(8, -1, 2)$. The coordinates of a point on this lie at distance of 14 units from a are

A. $(14, 1, 5)$

B. $(-10, -7, -7)$

C. $(10, 7, 7)$

D. $(-14, -1, -5)$

Answer: B

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24. The plane $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$ meets the coordinaste axces in points A,B,C respectively. Find the area of $\triangle ABC$.

A. $(a, b/4, c/4)$

B. $(a/4, b, c/4)$

C. $(a/4, b/4, c)$

D. $(a/2, b/4, c/4)$

Answer: D

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25. The lines $r=a+\lambda(b\times c)$ and $r=b+\mu(c\times a)$ will intersect if

A. $a\times c=b\times c$

B. $a.\ c=b.\ c$

C. $b\times a=c\times a$

D. none of these

Answer: B

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26. The shortest distance between the lines

$r = (4i - j) + \lambda(i + 2j - 3k)$ and

$r = (i - j + 2k) + \mu(2i + 4j - 5k)$ is

A. 6

B. $\sqrt{5}$

C. $6/\sqrt{5}$

D. $6\sqrt{5}$

Answer: C

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27. The co-ordinates of a point on the line $x = 4y + 5, z = 3y - 6$ at a distance $3\sqrt{26}$ from the point (5,0,-6) are

A. $(17, 3, 3)$

B. $(-7, 3, -15)$

C. $(-17, -3, -3)$

D. $(7, -3, 15)$

Answer: A

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28. If θ denotes the acute angle between the line $r = (i + 2j - k) + \lambda(i - j + k)$ and the plane $r.(2i - j + k) = 4$, then $\sin\theta + \sqrt{2}\cos\theta =$

A. $1/\sqrt{2}$

B. 1

C. $\sqrt{2}$

D. $1+\sqrt{2}$

Answer: C

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29. Prove that the lines $\frac{x+1}{3}=\frac{y+3}{5}=\frac{z+5}{7} and \frac{x-2}{1}=\frac{y-4}{4}=\frac{z-6}{7}$ are coplanar . Aslo, find the plane containing these two lines.

A. $(0, 0, 0)$

B. $(1, 0, 1)$

C. $(1, -1, 1)$

D. $(-1, 1, 0)$

Answer: A

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30. Equation of a plane bisecting an angle between the plane $r.(i+2j+2k)=19$ and $r.(4i-3j+12k)+3=0$, passing through the point with position vector $i+7j-k$ is

A. $r.(i+35j-10k)-256=0$

B. $r.(25i+17j+62k)-238=0$

C. $r.(i+2j+2k)-13=0$

D. $r.(4i-3j+12k)+29=0$

Answer: A

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31. If the line $\frac{x-1}{2}=\frac{y-3}{a}=\frac{z+1}{3}$ lies in the plane $bx+2y+3z-4=0$, then find a and b.

A. $a=11/2, b=1$

B. $a = -5/2, b = -7$

C. $a = -11/2, b = 1$

D. $a = 1, b = -11/2$

Answer: C

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32. Equation of the plane passing through the points $i + j - 2k, 2i - j + k$ and $i + 2j + k$ is

A. $r.(4i + 2j) = 20$

B. $r.(9i + 3j - k) = 14$

C. $r.(9i + 3j - k) = 6$

D. none of these

Answer: B

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33. The line of shortest distance between the lines $\frac{x-1}{2}=\frac{y+8}{-7}=\frac{z-4}{5}$ and $\frac{x-1}{2}=\frac{y-2}{1}=\frac{z-6}{-3}$ intersects the first line at the point

A. $(1, 1, 1)$

B. $(-1, -1, -1)$

C. $(3, 3, 3)$

D. $(-3, -3, -3)$

Answer: B

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34. If $r.n=q$ is the equation of a plane normal to the vector n, the length of the perpendicular from the origin on the plane is

A. q

B. $|n|$

C. $q|n|$

D. $\frac{q}{|n|}$

Answer: D

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35. If the foot of the perpendicular from the origin to plane is $P(a, b, c)$, the equation of the plane is a. $\frac{x}{a} = \frac{y}{b} = \frac{z}{c} = 3$ b. $ax + by + cz = 3$ c. $ax + by + cz = a^{I2} + b^2 + c^2$ d. $ax + by + cz = a + b + c$

A. $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$

B. $ax + by + cz = 1$

C. $ax + by + cz = a^2 + b^2 + c^2$

D. $ax + by + cz = 0$

Answer: C

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36. The plane passing through the point $(-2, -2, 2)$ and containing the line joining the points $(1, 1, 1)$ and $(1, -1, 2)$ makes intercepts on the co-ordinates axes, the sum of whose length is

A. 3

B. 4

C. 6

D. 12

Answer: D

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37. Equation of a line passing through the point whose position vector is $2i - 3j + 4k$ and in the direction of the vector $3i + 4j - 5k$ is

A. $4x + 3y = 17, 5y - 4z = 1$

B. $4x - 3y = 17, 5y + 4z = 1$

C. $4x + 5y = 12, 3y + 4z = 1$

D. $5y + 4z = 1, 4x + 3z = 1$

Answer: B

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38. The lines $r = i - j + \lambda(2i + k)$ and $r = 2i - j + \mu(i + j - k)$

A. intersect each others

B. do not intersect

C. intersect at $r = 3i - j + k$

D. are parallel

Answer: B

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39. The points $(-2, 5), (3, -4)$ and $(7, 10)$ are the vertices of the triangle then triangle is:

A. a right angled triangles

B. isosceles triangle

C. equilateral triangle

D. none of these

Answer: B

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40. The foot of the perpendicular from (a, b, c) on the line $x = y = z$ is the point (r, r, r) where

A. $r = a + b + c$

B. $r = 3(a + b + c)$

C. $3r = a + b + c$

D. none of these

Answer: C

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41. Equation of a plane which passes through the line $x + py + q = 0 = rz + s$ and makes equal intercepts on y and z axes is $x + py + q + \lambda(rz + s) = 0$ where λ is equal to

A. q/s

B. p/r

C. r/s

D. p/q

Answer: B

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42. Parametric form of the equation of the line $3x - 6y - 2z - 15 = 2x + y - 2z - 5 = 0$ is

A. $\frac{x-5}{14} = \frac{y}{2} = \frac{z}{15}$

B. $\frac{x-1}{14} = \frac{y-5}{2} = \frac{z-1}{15}$

C. $\frac{x-3}{14} = \frac{y+1}{2} = \frac{z}{15}$

D. none of these

Answer: C

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43. A line with cosines proportional to $2, 7 - 5$ drawn to intersect the lines $\frac{x-5}{3} = \frac{y-7}{-1} = \frac{z+2}{1}; \frac{x+3}{-3} = \frac{y-3}{2} = \frac{z-6}{4}$ .Find the co-ordinates of the points of intersection and the length intercepted on it.

A. $\sqrt{78}$

B. $\sqrt{77}$

C. $\sqrt{54}$

D. $\sqrt{74}$

Answer: A

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44. The YZ-plane divides the line joining the points $(3, 5, -7)$ and $(-2, 1, 8)$ in the ratio :

A. $1:2$

B. $2:3$

C. $3:2$

D. $2:1$

Answer: C

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45. Find the angle between the lines $\frac{x-2}{3}=\frac{y+1}{-2}=z=2and\frac{x-1}{1}=\frac{2y+3}{3}=\frac{z+5}{2}$.

A. $\pi/3$

B. $\pi/6$

C. $\pi/4$

D. $\pi/2$

Answer: D

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46. If the plane $\frac{x}{a}+\frac{y}{b}+\frac{y}{c}=3$ meets the coordinate axes in A, B, C, and the centroid of the triangle ABC is at $P(2, 4, 8)$, then a, b, c are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: B

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

A. $\frac{x}{2}=\frac{y}{1}=\frac{z+4}{1}$

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

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

D. none of these

Answer: C

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48. Algebraic sum of the intercepts by the plane $3x - 4y + 7z = 84$ on the axes is

A. 6

B. 14

C. 19

D. 61

Answer: C

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EXERCISE (LEVEL 2 (SINGLE CORRECT ANSWER TYPE QUESTIONS))

1. The line $\frac{x-a}{a'} = \frac{y-b}{b'} = \frac{z-c}{c'}$ and $\frac{x-a'}{a} = \frac{y-b'}{b} = \frac{z-c'}{c}$ intersect at the point

A. $(a-a', b-b', c-c')$

B. $(a + a', b + b', c + c')$

C. (a, b, c)

D. (a', b', c')

Answer: B

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2. Find the image of point (3,-2,1) in the plane 3x- y + 4z = 2.

A. $(0, 1, -3)$

B. $(-1, 0, -3)$

C. $(0, -1, -3)$

D. $(0, -1, 3)$

Answer: C

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3. The shortest distance between the lines $x + a = 2y = -12z$ and $x = y + 2a = 6z - 6a$ is

A. a

B. 2a

C. 4a

D. 6a

Answer: B

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4. The $P(u, v, q)$ is a point whose distance from the line $x = y = z$ is twice its distance from the plane $x + y + z = 1$ and $uv + vw + wu = 0$ then $u^2 + v^2 + w^2 - 4(u + v + w)$ is equal to

A. -2

B. 0

C. 2

D. 4

Answer: A

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5. Find the angel between any two diagonals of a cube.

A. 30°

B. 45°

C. $\cos^{-1}(1/\sqrt{3})$

D. $\cos^{-1}(1/3)$

Answer: D

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6. The mid-points of the sides of a triangle are $(2, 3, -1), (0, 8, 5)$ and $(5, 7, 11)$. The distance of the origin from the vertex of the triangle which is farthest from it is

A. $\sqrt{74}$

B. $2\sqrt{19}$

C. $\sqrt{78}$

D. $\sqrt{442}$

Answer: D

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7. A line makes angles $\alpha, \beta, \gamma and \delta$ with the diagonals of a cube. Show that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = 4/3$.

A. 1

B. $1/3$

C. $2/3$

D. $4/3$

Answer: D

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8. The volume of the tetrahedron included between the plane $3x + 4y - 5z - 60 = 0$ and the co-odinate planes is

A. 60

B. 600

C. 720

D. none of these

Answer: B

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9. A triangle ABC is placed so that the mid-points of the sides are on the x, y, z axes. Lengths of the intercept made by the plane containing the triangle on these axes are respectively α, β, γ. Coordinates of the centroid of the trianlge ABC are

A. $(-\alpha/3, \beta/3, \gamma/3)$

B. $(\alpha/3, -\beta/3, \gamma/3)$

C. $(\alpha/3, \beta/3, -\gamma/3)$

D. $(\alpha/3, \beta/3, \gamma/3)$

Answer: D

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10. A point moves so that the sum of the square of itsdistances from the six faces of a cube given by $x = \pm 1, y = \pm 1, z = \pm 1$ is 10 units. The locus of the point is:

A. $x^2 + y^2 + z^2 = 1$

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

C. $x + y + z = 1$

D. $x + y + z = 2$

Answer: B

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11. The plane $2x - y + 3z + 5 = 0$ is rotated through 90° about its line of intersection with the plane $5x - 4y - 2z + 1 = 0$. The equation of the plane in the new position is

A. $6x - 9y - 29z - 31 = 0$

B. $27x - 24y - 26z - 13 = 0$

C. $43x - 32y - 2z + 27 = 0$

D. $26x - 43y - 151z - 165 = 0$

Answer: B

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12. A plane passes through (1,-2,1) and is perpendicualr to two planes $2x - 2y + z = 0$ and $x - y + 2z = 4$, then the distance of the plane from the point (1,2,2) is

A. 0

B. 1

C. $\sqrt{2}$

D. $2\sqrt{2}$

Answer: D

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13. A variable plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ at a unit distance from origin cuts the coordinate axes at A, B and C. Centroid (x, y, z) satisfies the equation $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = K$. The value of K is (A) 9 (B) 3 (C) $\frac{1}{9}$ (D) $\frac{1}{3}$

A. 9

B. 3

C. 1

D. $1/3$

Answer: A

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14. If t is a parameter, then the line of intersection of the planes $3x - 6y - 2z = 15$ and $2x + y - 2z = 5$ is

A. $x = 3 + 14t, y = 1 + 2t, z = 15t$

B. $x = 3 + 14t, y = -1 + 2t, z = 15t$

C. $x = -3 + 14t, y = 1 + 2t, z = 15t$

D. none of these

Answer: B

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15. Projection of the line $8x - y - 7z = 8, x + y + z = 1$ on the plane $5x - 4y - z = 5$ is

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

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

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

D. $x = y = t$

Answer: A

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16. Distance between parallel lines

$r = 2i + \lambda(i + j + k)$

and $r = -3j + \mu(i + j + k)$ is

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

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

C. $\sqrt{3}$

D. $2\sqrt{3}$

Answer: A

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EXERCISE (NUMERICAL ANSWER TYPE QUESTIONS)

1. Show that the lines $\frac{x-a+d}{\alpha-\delta}=\frac{y-a}{\alpha}=\frac{z-a-d}{\alpha+\delta}$ and $\frac{x-b+c}{\beta-\gamma}=\frac{y-b}{\beta}=\frac{z-b-c}{\beta+\gamma}$ are coplanar.

A. 0

B. 1

C. $\sqrt{a^2+c^2}$

D. $\sqrt{d^2+f^2}$

Answer: A

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2. For a non-zero real number x, u, v, w if the points with position vectors $A((x-u)i+xj+xk), B(xi+(x-v)j+xk), C(xi+xj+(x-w)k)$ are coplanar, then $\frac{1}{u}+\frac{1}{v}+\frac{1}{w}$ is equal to_____

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3. If four points with position vectors $A(-i+2j+3k), B(-i-12j-3k), C(2i-j-4k)$ and $D(2i+\lambda j-$ are coplanar, then λ = _____

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4. A non zero vector $\vec{a}$ is parallel to the line of intersection of the plane determined by the vectors $\hat{i}, \hat{i}+\hat{j}$and the plane determined by the

vectors $\hat{i}-\hat{j}, \hat{i}+\hat{k}$. The angle between $\vec{a}$ and $\hat{i}-2\hat{j}+2\hat{k}$ can be

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5. Suppose direction cosines of two lines L_1 and L_2 are related by $l+m+n=0$ and $l^2+m^2-n^2=0$. If acute angle between L_1 and L_2 is θ, then π/θ = _____

View Text Solution

6. If $Q\left(\frac{5}{3}, \frac{7}{3}, 17, 3\right)$ is foot of perpendicular drawn from $P(1, 0, 3)$ on a line L and if line L is passing through $(\alpha, 7, 1)$, then value of α is

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7. A line passing through $A(2, -1, 5)$ and $B(4, 3, -10)$ meets the xy-plane at (x, y, z), then $\frac{x}{y}$ = _____

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8. A variable plane in space moves in such a way that the sum of its reciprocal of intercepts on the x and y-axes exceed the reciprocal of its intercept on the z-axis by 2. If all these planes passing through a fixed point $F(\alpha, \beta, \gamma)$, then $\alpha^2 + \beta^2 + \gamma^2$ = _____

View Text Solution

9. If plane $x + 4y - 2z = 1, x + 7y - 5z = \beta, x + 5y + \alpha z = 5$ intersects in a line $(R \times R \times R)$ then $\alpha + \beta$ is equal to

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10. Suppose a and b lie on a plane normal to the plane containing c and d. If angle between $a \times b$ and $c \times d$ is π / k, then k = _____

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11. A tetrahedron has vertices $P(1, 2, 1), Q(2, 1, 3), R(-1, 1, 2)$ and $O(0, 0, 0)$. The angle beween the faces OPQ and PQR is :

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12. The length of the perpendicular from the point (2, -1, 4) on the straight line, $\frac{x+3}{10} = \frac{y-2}{-7} = \frac{z}{1}$ is

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13. If a point $R(4, y, z)$ lies on the line segment joining the points $P(2, -3, 4)$ and $Q(8, 0, 10)$, then $(OR)^2$ = _____??

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14. The vertices B and C of a ΔABC lie on the line, $\frac{x+2}{3} = \frac{y-1}{0} = \frac{z}{4}$ such that BC=5 units. Then, the area (in sq units)

of this triangle, given that the point A(1, -1, 2) is

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15. If the plane $2x - y + 2x + 3 = 0$ has the distances $\frac{1}{3}$ and $\frac{2}{3}$ units from the planes $4x - 2y + 4z + \lambda = 0$ and $2x - y + 2z + \mu = 0$, respectively, then the maximum value of $\lambda + \mu$ is equal to

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16. The distance of the point having position vector $-\hat{i} + 2\hat{j} + 6\hat{k}$ from the straight line passing through the point $(2, 3, -4)$ and parallel to the vector, $6\hat{i} + 3\hat{j} - 4\hat{k}$ is :

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17. Let V = Volume of the tetrahedron whose vertices are $A(1, 0, 0), B(0, 0, 1), C(0, 0, 2)$ and $D(1, 2, 3)$ then 3V = _____

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18. If the symmetrical form of line of intersection of planes $4x - 3y = 1, 2y - 4z = 3$ is $\frac{x-a}{3} = \frac{y}{4} = \frac{z+3/4}{2}$ then a = _____

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19. Let d = the distance of point $A(4, 1, 1)$ from the line of intersection of the planes $x + y + z = 4$ and $x - 2y - z = 4$, then $14d^2/3$ = _____

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20. If equation of the plane through the parallel lines $\frac{x+1}{3} = \frac{y-2}{2} = \frac{z}{1}$ and $\frac{x-3}{3} = \frac{y+4}{2} = \frac{z-1}{1}$ is $ax + by - 26z + 6 = 0$, then $a + b$ = _____

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QUESTIONS FROM PREVIOUS YEARS. AIEEE/JEE MAIN PAPERS

1. The dr. of normal to the plane through $(1, 0, 0), (0, 1, 0)$ which makes an angle $\frac{\pi}{4}$ with plane , $x + y = 3$ are

A. $1, \sqrt{2}, 1$

B. $1, 1, \sqrt{2}$

C. $1, 1, 2$

D. $\sqrt{2}, 1, 1$

Answer: A

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2. A plane which passes through the point (3,2,0) nd the line $\frac{x-4}{1} = \frac{y-7}{5} = \frac{z-4}{4}$ is (A) $x - y + z = 1$ (B) x+y+z=5(C)x+2y-z=1

(D)2x-y+z=5`

A. $x - y + z = 2$

B. $x + y + z = 5$

C. $x + 2y - z = 1$

D. none of these

Answer: D

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3. Two system of rectangular axes have the same origin. If a plane cuts them at distance a, b, c and a', b', c' from the origin, then:

A. $\frac{1}{a^2} + \frac{1}{b^2} - \frac{1}{c^2} + \frac{1}{a'^2} + \frac{1}{b'^2} - \frac{1}{c'^2} = 0$

B. $\frac{1}{a^2} - \frac{1}{b^2} - \frac{1}{c^2} + \frac{1}{a'^2} - \frac{1}{b'^2} - \frac{1}{c'^2} = 0$

C. $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} - \frac{1}{a'^2} - \frac{1}{b'^2} - \frac{1}{c'^2} = 0$

D. $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} + \frac{1}{a'^2} + \frac{1}{b'^2} + \frac{1}{c'^2} = 0$

Answer: C

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4. The two lines $x = ay + b, z = cy + d$ and $x = a'y + b', z = c'y + d'$ will be perpendicularm if and only if

A. $aa' + bb' + cc' = 0$

B. $(a \mid a')(b \mid b')(c \mid c') = 0$

C. $aa' + cc' + 1 = 0$

D. $aa' + bb' + c' + 1 = 0$

Answer: C

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5. The lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{-k}$ and $\frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{1}$ are coplanar, if

A. $k = 1 \text{ or } -1$

B. $k = 0 \text{ or } -3$

C. $k = 3 \text{ or } -3$

D. $k = 0 \text{ or } -1$

Answer: B

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6. A tetrahedron has vertices $P(1, 2, 1), Q(2, 1, 3), R(-1, 1, 2)$ and $O(0, 0, 0)$. The angle beween the faces OPQ and PQR is :

A. $\cos^{-1}(17/31)$

B. 30°

C. 90°

D. $\cos^{-1}(19/35)$

Answer: D

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7. A line line makes the same angle θ with each of the x and z-axes. If the angle β, which it makes with y-axis, is such that $\sin^2\beta = 3\sin^2\theta$ then $\cos^2\theta$ equals

A. $3/5$

B. $1/5$

C. $2/3$

D. $2/5$

Answer: A

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8. Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is

A. $7/2$

B. $5/2$

C. $3/2$

D. $9/2$

Answer: A

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9. A line with direction cosines proportional to 2,1,2 meet each of the lines $x = y + a = zndx + a = 2y = 2z$. The coordinastes of each of the points of intersection are given by (A) $(3a, 2a, 3a), (a, a, 2a)$ (B) $(3a, 2a, 3a), (a, a, a0$ (C) $(3a, 3a, 3a), (a, a, a)$ (D) $92a, 3a, 3a), (2a, a, a0$

A. $(3a, 2a, 3a), (a, a, 2a)$

B. $(3a, 2a, 3a), (a, a, a)$

C. $(3a, 3a, 3a), (a, a, a)$

D. $(2a, 3a, 3a), (2a, a, a)$

Answer: B

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10. If the straighat lines $x = 1 + s, y = -3 - \lambda s, z = 1 + \lambda s$ and $x = \frac{t}{2}, y = 1 + t, z = 2 - t$ with parameters s and t respectively, are coplanar, then λ equals (A) $-\frac{1}{2}$ (B) -1 (C) -2 (D) 0

A. $-1/2$

B. -1

C. -2

D. 0

Answer: C

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11. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is

A. 45°

B. 30°

C. 0°

D. 90°

Answer: D

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12. If the angle θ between the line $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$ and the plane $2x - y + \sqrt{\lambda}z + 4 = 0$ is such that $\sin\theta = \frac{1}{3}$. The value of λ is

A. $3/4$

B. $-4/3$

C. $5/3$

D. $-3/5$

Answer: C

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13. The distance between the line $\vec{r} = 2i - 2j + 3k + \lambda(i - j + 4k)$ and the plane $\vec{r}.(i + 5j + k) = 5$ is

A. $3/10$

B. $10/3$

C. $10/9$

D. $10/3\sqrt{3}$

Answer: D

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14. The two lines $x = ay + b, z = cy + d$ and $x = a'y + b', z = c'y + d'$ are perpendicular to each other, if

A. $\frac{a}{a'} + \frac{c}{c'} = 1$

B. $aa' + cc' = -1$

C. $aa' + cc' = 1$

D. $\frac{a}{a'} + \frac{c}{c'} = -1$

Answer: B

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15. then image of the point $(-1, 3, 4)$ in the plane $x - 2y = 0$

A. $(-17/3, -19/3, 4)$

B. $(15, 11, 4)$

C. $(-17/3, -19/3, 1)$

D. none

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16. Let L be the line of intersection of the planes $2x + 3y + z = 1$ and $x + 3y + 2z = 2$. If L makes an angles $\alpha$with the positive x-axis, then cos α equals $\frac{1}{\sqrt{3}}$ $\frac{1}{2}$ 1 $\frac{1}{\sqrt{2}}$

A. $1/\sqrt{3}$

B. $1/2$

C. 1

D. $1/\sqrt{2}$

Answer: A

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17. If a line makes an angle of $\frac{\pi}{4}$ with the positive directions of each of x-axis and y-axis, then the angle that the line makes with the positive direction of the z-axis is (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$

A. $\pi/6$

B. $\pi/3$

C. $\pi/4$

D. $\pi/2$

Answer: D

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18. Let $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} - \hat{j} + 2\hat{k}$ and $\vec{c} = x\hat{i} + (x-2)\hat{j} - \hat{k}$. If the vector $\vec{c}$ lies in the plane of $\vec{a}$ and $\vec{b}$ then x equals

A. 0

B. 1

C. -4

D. -2

Answer: D

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19. The line passing through the points $(5, 1, a)$ and $(3, b, 1)$ crosses the yz-plane at the point $\left(0, \frac{17}{2}, \frac{-13}{2}\right)$.Then

A. $a = 8, b = 2$

B. $a = 2, b = 8$

C. $a = 4, b = 6$

D. $a = 6, b = 4$

Answer: D

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20. If the straight lines $\frac{x-1}{k}=\frac{y-2}{2}=\frac{z-3}{3}$ and $\frac{x-2}{3}=\frac{y-3}{k}=\frac{z-1}{2}$ intersect at a point, then the integer k is equal to

A. -2

B. -5

C. 5

D. 2

Answer: B

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21. Let the line $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+2}{2}$ lies in the plane $x+3y-\alpha z+\beta=0$. Then, (α, β) equals

A. $(5, -15)$

B. $(-5, 5)$

C. $(6, -17)$

D. $(-6, 7)$

Answer: D

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22. The projections of a vector on the three coordinate axis are $6, 3, 2$ respectively. The direction cosines of the vector are (1) $6, -3, 2$ (2) $\frac{6}{5}, \frac{-3}{5}, \frac{2}{5}$ (3) $\frac{6}{7}, \frac{-3}{7}, \frac{2}{7}$ (4) $\frac{-6}{7}, \frac{-3}{7}, \frac{2}{7}$

A. $\frac{6}{7}, \frac{-3}{7}, \frac{2}{7}$

B. $\frac{-6}{7}, \frac{-3}{7}, \frac{2}{7}$

C. $6, -3, 2$

D. $\frac{6}{5}, \frac{-3}{5}, \frac{2}{5}$

Answer: A

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23. A line AB in three-dimensional space makes angles 45° and 120° with the positive x-axis and the positive y-axis respectively. If AB makes an acute angle θ with the positive z-axis, then θ equals

A. 60°

B. 75°

C. 30°

D. 45°

Answer: A

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24. If the angle between the line $x = \frac{y-1}{2} = (z-3)(\lambda)$ and the plane $x + 2y + 3z = 4is\cos^{-1}\left(\sqrt{\frac{5}{14}}\right)$, then λ equals

A. $5/3$

B. $2/3$

C. $3/2$

D. $2/5$

Answer: B

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25. The distance of the point $(1, -5, 9)$ from the plane $x - y + z = 5$ measured along a straighat line $x = y = z$ is (A) $5\sqrt{3}$ (B) $3\sqrt{10}$ (C) $3\sqrt{5}$ (D) $10\sqrt{3}$

A. $10\sqrt{3}$

B. $5\sqrt{3}$

C. $3\sqrt{10}$

D. $3\sqrt{5}$

Answer: A

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26. The length of the perpendicular drawn from the point $(3, -1, 11)$ to the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ is

A. $\sqrt{29}$

B. $\sqrt{33}$

C. $\sqrt{53}$

D. $\sqrt{66}$

Answer: C

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27. An equation of a plane parallel to the plane $x - 2y + 2z - 5 = 0$ and at a unit distance from the origin is

A. $x - 2y + 2z - 1 = 0$

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

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

D. $x - 2y + 2z + 1 = 0$

Answer: C

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28. If the line $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-k}{2} = \frac{z}{1}$ intersect, then k is equal to

A. $9/2$

B. 0

C. -1

D. $2/9$

Answer: A

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29. If the lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{x-4}{-k}$ and $\frac{x-1}{k}=\frac{y-4}{2}=\frac{x-5}{1}$ are coplanar, then k can have (1) exactly one value (2) exactly two values (3) exactly three values (4) any value

A. exactly three values

B. any value

C. exactly one value

D. exactly two values

Answer: D

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30. Distance between two parallel planes $2x+y+2z=8$ and $4x+2y+4z+5=0$ is

A. $5/2$

B. $7/2$

C. $9/2$

D. $3/2$

Answer: B

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31. If the lines $\frac{x+1}{2} = \frac{y-1}{1} = \frac{z+1}{3}$ and $\frac{x+2}{2} = \frac{y-k}{3} = \frac{z}{4}$ are coplanar, then the value of k is

A. $11/2$

B. $-11/2$

C. $9/2$

D. $-9/2$

Answer: A

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32. let Q be the foot of perpendicular from the origin to the plane $4x - 3y + z + 13 = 0$ and R be a point $(-1, 1, -6)$ on the plane then length QR is

A. $\sqrt{14}$

B. $\sqrt{19/2}$

C. $3\sqrt{7/2}$

D. $3/\sqrt{2}$

Answer: C

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33. the acute angle between two lines such that the direction cosines l, m, n of each of them satisfy the equations $l + m + n = 0$ and $l^2 + m^2 - n^2 = 0$ is

A. 15°

B. 30°

C. 60°

D. 45°

Answer: C

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34. If two lines L, and L, in space, are definedby $L_1 = \{x = \lambda y + (\sqrt{\lambda} - 1\}, z = (\sqrt{\lambda} - 1)y + \sqrt{\lambda}\}$ and $L_2 = \{x = \sqrt{\mu}y$ then L_1 is perpendicular to L_2 for all non-negative reals λ and μ, such that:

A. $\sqrt{\lambda} + \sqrt{\mu} = 1$

B. $\lambda \neq \mu$

C. $\lambda + \mu = 0$

D. $\lambda = \mu$

Answer: D

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35. if the projections of a line segment on the x, y and z-axes in 3-dimensional space $2, 3$ and 6 respectively, then the length of the line segment is:

A. 12

B. 7

C. 9

D. 6

Answer: B

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36. ABC is a triangle and $A = (235)\dot{B} = (-1, 3, 2) and C = (\lambda, 5, \mu)$. If the median through A is equally inclined to the axes, then find the value of $\lambda and \mu$.

A. $(10, 7)$

B. $(7, 5)$

C. $(7, 10)$

D. $(5, 7)$

Answer: C

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37. the equation of a plane through the line of intersection the planes $x + 2y = 3, y - 2z + 1 = 0$ and perpendicular to the first plane is:

A. $2x - y - 10z = 9$

B. $2x - y + 7z = 11$

C. $2x - y + 10z = 11$

D. $2x - y - 9z = 10$

Answer: C

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38. The image of the line $\frac{x-1}{3} = \frac{y-3}{1} = \frac{z-4}{-5}$ in the plane $2x - y + z + 3 = 0$ is the line (1) $\frac{x+3}{3} = \frac{y-5}{1} = \frac{z-2}{-5}$ (2) $\frac{x+3}{-3} = \frac{y-5}{-1} = \frac{z+2}{5}$ (3) $\frac{x-3}{3} = \frac{y+5}{1} = \frac{z-2}{-5}$ (3) $\frac{x-3}{-3} = \frac{y+5}{-1} = \frac{z-2}{5}$

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

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

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

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

Answer: A

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39. The angle between the lines whose direction cosines satisfy the equations $l+m+n=0$ and $l^2=m^2+n^2$ is (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

A. $\pi/3$

B. $\pi/4$

C. $\pi/6$

D. $\pi/2$

Answer: A

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40. Equation of plane which passes through the intersection point of the lines $L_1: \frac{x-1}{3}=\frac{y-2}{1}=\frac{z-3}{2}$ and $L_2: \frac{x-2}{2}=\frac{y-1}{2}=\frac{z-6}{-1}$ and has the largest distance from origin

A. $7x+2y+4z=54$

B. $3x + 4y + 5z = 49$

C. $4x + 3y + 5z = 50$

D. $5x + 4y + 3z = 57$

Answer: C

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41. A line in 3-dimensional space makes an angle $\theta(0 < \theta \leq \pi/2)$ with both the x and y-axis. Then the set of all values of θ is the interval:

A. $\left(0, \frac{\pi}{4}\right]$

B. $\left[\frac{\pi}{6}, \frac{\pi}{3}\right]$

C. $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$

D. $\left(\frac{\pi}{3}, \frac{\pi}{2}\right]$

Answer: C

View Text Solution

42. Let $A(2, 3, 5), B(-1, 3, 2), C(\lambda, 5, \mu)$ are the vertices of a triangle and its median through A(I.e.,) AD is equally inclined to the coordinates axes.

Q. Projection of AB onBC is

A. $5\lambda - 8\mu = 0$

B. $8\lambda - 5\mu = 0$

C. $10\lambda - 7\mu = 0$

D. $7\lambda - 10\mu = 0$

Answer: C

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43. The plane containing the line $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$ and parallel to the line $\frac{x}{1} = \frac{y}{1} = \frac{z}{4}$ passes through the point:

A. $(1, -2, 5)$

B. $(1, 0, 5)$

C. $(0, 3, -5)$

D. $(-1, -3, 0)$

Answer: B

View Text Solution

44. A symmetrical form of the line of intersection of the planes $x = ay + b$ and $z = cy + d$ is

A. $\frac{x-b}{a} = \frac{y-1}{1} = \frac{z-d}{c}$

B. $\frac{x-b-a}{a} = \frac{y-1}{1} = \frac{z-d-c}{c}$

C. $\frac{x-a}{b} = \frac{y-0}{1} = \frac{z-c}{d}$

D. $\frac{x-b-a}{b} = \frac{y-1}{0} = \frac{z-d-c}{d}$

Answer: B

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45. If the distance between planes $4x - 2y - 4x + 1 = 0$ and $4x - 2y - 4x + d = 0$ is 7, then d is

A. $41 \text{ or } -42$

B. $42 \text{ or } -43$

C. $-41 \text{ or } 43$

D. $-42 \text{ or } 44$

Answer: C

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46. Equation of the line of the shortest distance between the lines $\frac{x}{1} = \frac{y}{-1} = \frac{z}{1}$ and $\frac{x-1}{0} = \frac{y+1}{-2} = \frac{z}{1}$ is:

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

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

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

D. $\frac{1}{8}$

Answer: B

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47. If the angle between the lines $2(x+1)=y=z+4$ and the plane $2x-y+\sqrt{\lambda}z+4$ is $\frac{\pi}{6}$, then the value of λ is

A. $\frac{135}{7}$

B. $\frac{45}{11}$

C. $\frac{45}{7}$

D. $\frac{135}{11}$

Answer: C

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48. The disatance of the point $(1, 0, 2)$ from the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane $x - y + z = 16$, is

A. $2\sqrt{14}$

B. 8

C. $3\sqrt{21}$

D. 13

Answer: D

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49. The equation of the plane containing the line $2x - 5y + z = 3; x + y + 4z = 5$, and parallel to the plane, $x + 3y + 6z = 1$, is : (1) $2x + 6y + 12z = 13$ (2) $x + 3y + 6z = -7$ (3) $x + 3y + 6z = 7$ (4) $2x + 6y + 12z = -13$

A. $2x + 6y + 12z = 13$

B. $x + 3y + 6z = -7$

C. $x + 3y + 6z = 7$

D. $2x + 6y + 12z = -13$

Answer: C

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50. Find the shortest distance between the z-axis and the line, $x + y + 2z - 3 = 0, 2x + 3y + 4z - 4 = 0.$

A. 1

B. 2

C. 3

D. 4

Answer: B

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51. A plane containing the point (3, 2, 0) and the line $\frac{x-1}{1}=\frac{y-2}{5}=\frac{z-3}{4}$ also contains the point:

A. $(0,-3,1)$

B. $(0,7,10)$

C. $(0,7,-10)$

D. $(0,3,1)$

Answer: B

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52. Ifthe points $(1,1,\lambda)$ and $(-3,0,1)$ are equidistant from the plane, $3x+4y-12z+13=0$, then λ satisfiesthe equation

A. $3x^2-10x+7=0$

B. $3x^2 + 10x + 7 = 0$

C. $3x^2 + 10x - 13 = 0$

D. $3x^2 - 10x + 21 = 0$

Answer: A

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53. If the shortest distance between the lines $\frac{x-1}{\alpha} = \frac{y+1}{-1} = \frac{z}{1}$ and $x + y + z + 1 = 0 = 2x - y + z + 3$ is $\frac{1}{\sqrt{3}}$ then value of α

A. $-\frac{16}{19}$

B. $\frac{-19}{16}$

C. $\frac{32}{19}$

D. $\frac{19}{32}$

Answer: C

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54. The distance of the point (1,-5,9) from the plane x-y+z = 5 measured along the line x = y = z is

A. $3\sqrt{10}$

B. $10\sqrt{3}$

C. $\frac{10}{\sqrt{3}}$

D. $\frac{20}{3}$

Answer: A

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55. If the line, $\frac{x-3}{2}=\frac{y+2}{-1}=\frac{z+4}{3}$ lies in the place, $lx+my-z=9$, then l^2+m^2 is equal to: (1) 26 (2) 18 (3) 5 (4) 2

A. 26

B. 18

C. 5

D. 2

Answer: D

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56. The shortest distance between the lines lines $\frac{x}{2}=\frac{y}{2}=\frac{z}{1}$ and $\frac{x+2}{-1}=\frac{y-4}{8}=\frac{z-5}{4}$ in the interval:

A. $(3, 4]$

B. $(2, 3]$

C. $[1, 2)$

D. $[0, 1)$

Answer: C

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57. The distance of the point $(1, -2, 4)$ from the plane passing through the point $(1, 2, 2)$ perpendicular to the planes $x - y + 2z = 3$ and $2x - 2y + z + 12 = 0$ is

A. 2

B. $\sqrt{2}$

C. $2\sqrt{2}$

D. $\frac{1}{\sqrt{2}}$

Answer: C

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58. ABC is a triangle and $A = (235)\dot{B} = (-1, 3, 2) and C = (\lambda, 5, \mu)$. If the median through A is equally inclined to the axes, then find the value of $\lambda and \mu$.

A. 1130

B. 1348

C. 1077

D. 676

Answer: B

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59. The number of distinct real values of λ for which $\frac{x-1}{1}=\frac{y-2}{2}=\frac{z+3}{\lambda^2}$ and $\frac{x-3}{1}=\frac{y-2}{\lambda^2}=\frac{z-1}{2}$ are coplanar, is

A. 2

B. 4

C. 3

D. 1

Answer: C

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60. If the image of the point P(1,-2,3) in the plane, 2x+3y-4z+22=0 mesured parallel to the line, $\frac{x}{1}=\frac{y}{4}=\frac{z}{5}$ is Q, then PQ is equal to

A. $6\sqrt{5}$

B. $3\sqrt{5}$

C. $2\sqrt{42}$

D. $\sqrt{42}$

Answer: D

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61. The distance of the point $(1, 3, -7)$ from the plane passing through the point $(1, -1, -1)$ having normal perpendicular to both the lines $\frac{x-1}{1}=\frac{y+2}{-2}=\frac{z-4}{3}$ and $\frac{x-2}{2}=\frac{y+1}{-1}=\frac{z+7}{-1}$ is

A. $\frac{10}{\sqrt{74}}$

B. $\frac{20}{\sqrt{74}}$

C. $\frac{10}{\sqrt{83}}$

D. $\frac{5}{\sqrt{83}}$

Answer: C

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62. If the lies $\frac{x-3}{1}=\frac{y+2}{-1}=\frac{z+\lambda}{-2}$ lies on the line, $2x-4y+3z=2$, then the shortest distance between this line and the line, $\frac{x-1}{12}=\frac{y}{9}=\frac{z}{4}$ is (A) 0 (B) 2 (C) 1 (D) 3

A. 2

B. 1

C. 0

D. 3

Answer: C

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63. The coordinates of the foot of the perpendicular from the point $(1, -2, 1)$ on the plane containing the lines, $\frac{x+1}{6} = \frac{y-1}{7} = \frac{z-3}{8}$ and $\frac{x-1}{3} = \frac{y-2}{5} = \frac{z-3}{7}$ is

A. $(2, -4, 2)$

B. $(-1, 2, -1)$

C. $(0, 0, 0)$

D. $(1, 1, 1)$

Answer: C

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64. Line of intersection of the two planes $\bar{r}.(3i-j+k)=1$ and $\bar{r}.(i+4j-2k)=2$ is parallel to the vector

A. $\frac{x-4/7}{-2}=\frac{y}{7}=\frac{z-5/7}{13}$

B. $\frac{x-4/7}{-2}=\frac{y}{-7}=\frac{z+5/7}{13}$

C. $\frac{x-6/3}{2}=\frac{y-5/13}{-7}=\frac{z}{-13}$

D. $\frac{x-6/3}{2}=\frac{y-5/13}{7}=\frac{z}{-13}$

Answer: C

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65. If a variable plane, at a distance of 3 units from the origin, intersects the coordinate axes at A,B anc C, then the locus of the centroid of ΔABC is :

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

B. $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=3$

C. $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=\frac{1}{9}$

D. $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=9$

Answer: A

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66. The length of the projection of the line segment joining the points (5,-1,4) and (4,-1,3) on the plane x+y+z=7 is

A. $2/3$

B. $1/3$

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

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

Answer: C

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67. If L_1 is the line of intersection of the planes $2x - 2y + 3x - 2 = 0$ $x - y + z + 1 = 0$ and L_2 is the line of the intersection of the planes $x + 2y - z - 3 = 0\ 3x - y + 2z - 1 = 0$then the distance of the origin from the plane containing the lines L_1 and L_2 is

A. $\frac{1}{3\sqrt{2}}$

B. $\frac{1}{2\sqrt{2}}$

C. $\frac{1}{\sqrt{2}}$

D. $\frac{1}{4\sqrt{2}}$

Answer: A

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68. A variable plane passes through a fixed point(3,2,1) and meets and axes at A,B,C respectively. A plane is drawn parallel to plane through a second plane is drawn parallel to plane through A,B,C . Then the locus of the point of intersection of these three planes, is :

A. $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=\frac{11}{6}$

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

C. $\frac{3}{x}+\frac{2}{y}+\frac{1}{z}=1$

D. $x+y+z=6$

Answer: C

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69. An agle between the plane, $x+y+z=5$ andthe line of intersection of the planes,$3x+4y+z-1=0$ and $5x+8y+2z+14=0,$ is :

A. $\sin^{-1}\left(\sqrt{\frac{3}{17}}\right)$

B. $\cos^{-1}\left(\sqrt{\frac{3}{17}}\right)$

C. $\cos^{-1}\left(\frac{3}{\sqrt{17}}\right)$

D. $\sin^{-1}\left(\frac{3}{\sqrt{17}}\right)$

Answer: A

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70. The sum of the intercepts on the coordinate axes of the plane passing through the point $(-2, -2, 2)$ and containing the line joining the points $(1, -1, 2)$ and $(1, 1, 1)$, is :

A. 4

B. -4

C. -8

D. 12

Answer: B

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71. If the angle between the lines, $\frac{x}{2} = \frac{y}{2} = \frac{z}{1}$ and $\frac{5-x}{-2} = \frac{7y-14}{p} = \frac{z-3}{4}$ $is \cos^{-1}\left(\frac{2}{3}\right)$, then P is equal to

A. $7/2$

B. $2/7$

C. $-7/4$

D. $-4/7$

Answer: A

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72. A plane bisects the line segment joining the points $(1, 2, 3)$ and $(-3, 4, 5)$ at right angles. Then this plane also passes through the point

A. $(1, 2, -3)$

B. $(-1, 2, 3)$

C. $(-3, 2, 1)$

D. $(3, 2, 1)$

Answer: C

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73. An angle between the lines whose direction cosines are given by the equations, $1 + 3m + 5n = 0$ and $5lm - 2mn + 6nl = 0$, is :

A. $\cos^{-1}(1/8)$

B. $\cos^{-1}(1/3)$

C. $\cos^{-1}(1/4)$

D. $\cos^{-1}(1/6)$

Answer: D

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74. If lines $x = ay + b, z = cy + d$ and $x = a'z + b$

$y + c'z + d'$ are perpendicular then

A. $ab' + bc' + 1 = 0$

B. $cc' + a + a' = 0$

C. $bb' + cc' + 1 = 0$

D. $aa' + c + c' = 0$

Answer: D

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75. Two lines $\frac{x-3}{1} = \frac{y+1}{3} = \frac{z-6}{-1}$ and $\frac{x+5}{7} = \frac{y-2}{-6} = \frac{z-3}{4}$ intersect in point R. The reflection of R in the xy-plane has coordinates: (a) $(2, -4, -7)$ (b) $(2, 4, 7)$ (c) $(2, -4, 7)$ (d) $(-2, 4, 7)$

A. $(2, -4, -7)$

B. $(2, 4, 7)$

C. $(2, -4, 7)$

D. $(-2, 4, 7)$

Answer: A

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76. On which of the following lines lies the point of intersection of the line, $\frac{x-4}{2}=\frac{y-5}{2}=\frac{z-3}{1}$ and the plane, $x+y+z=2$?

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

B. $\frac{x-4}{1}=\frac{y-5}{1}=\frac{z-5}{-1}$

C. $\frac{x-1}{1}=\frac{y-3}{2}=\frac{z+4}{5}$

D. $\frac{x-2}{2}=\frac{y-3}{2}=\frac{z+3}{3}$

Answer: C

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77. The plane which bisects the line segment joining the points (-3, -3, 4) and (3, 7, 6) at right angles, passes through which one of the following

points?

A. $(-2, 3, 5)$

B. $(4, -1, 7)$

C. $(2, 1, 3)$

D. $(4, 1, -2)$

Answer: D

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78. If the point $(2, \alpha, \beta)$ lies on the plane which passes through the points $(3, 4, 2)$ and $(7, 0, 6)$ and is perpendicular to the plane $2x - 5y = 15$, then $2\alpha - 3\beta$ is equal to:

A. 12

B. 7

C. 5

D. 17

Answer: B

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79. If the plane containing the line $\frac{x-3}{2}=\frac{y+2}{-1}=\frac{z-1}{3}$ and also containing its projection on the plane $2x+3y-z=5$ contains which one of the following points? (a) $(2,2,0)$ (b) $(2,0,-2)$ (c) $(0,-2,2)$ (d) $(-2,2,2)$

A. $(2,2,0)$

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

C. $(0,-2,2)$

D. $(2,0,-2)$

Answer: D

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80. The driection ratios of normal to the plane through the points (0, -1, 0) and (0, 0, 1) and making an angle $\pi/4$ with the plane $y - z + 5 = 0$ are

A. $2, \ -1, 1$

B. $2, \sqrt{2}, \ -\sqrt{2}$

C. $\sqrt{2}, 1, \ -1$

D. $2\sqrt{3}, 1, \ -1$

Answer: C

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81. The plane through the intersection of the planes $x + y + z = 1$ and $2x + 3y - z + 4 = 0$ and parallel to Y-axis also passes through the point

A. $(-3, 0, \ -1)$

B. $(-3, 1, 1)$

C. $(3, 3, -1)$

D. $(3, 2, 1)$

Answer: D

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82. The plane passing through the point (4, -1, 2) and perallel to the lines $\frac{x+2}{3} = \frac{y-2}{-1} = \frac{z+1}{2}$ and $\frac{x-2}{1} = \frac{y-3}{2} = \frac{z-4}{3}$ also passes through the point

A. $(1, 1, -1)$

B. $(1, 1, 1)$

C. $(-1, -1, -1)$

D. $(-1, -1, 1)$

Answer: B

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83. Equation of the plane containing the straight line $\frac{x}{2}=\frac{y}{3}=\frac{z}{4}$ and perpendicular to the plane containing the straight lines $\frac{x}{2}=\frac{y}{4}=\frac{z}{2}$ and $\frac{x}{4}=\frac{y}{2}=\frac{z}{3}$ is

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

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

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

D. $5x+2y-4z=0$

Answer: A

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84. The equation of the line passing through $(-4,3,1)$, parallel to the plane $x+2y-z-5=0$ and intersecting the line $\frac{x+1}{-3}=\frac{y-3}{2}=\frac{z-2}{-1}$

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

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

C. $\frac{x+4}{3} = \frac{y-3}{-1} = \frac{z-1}{1}$

D. $\frac{x+4}{-1} = \frac{y-3}{1} = \frac{z-1}{1}$

Answer: C

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85. The perpendicular distance from the origin to the plane containing the two lines, $\frac{x+2}{3} = \frac{y-2}{5} = \frac{z+5}{7}$ and $\frac{x-1}{1} = \frac{y-4}{4} = \frac{z+4}{7}$ is: (a) $11\sqrt{6}$ (b) $\frac{11}{\sqrt{6}}$ (c) 11 (d) $6\sqrt{11}$

A. $11\sqrt{6}$

B. $11/\sqrt{6}$

C. 11

D. $6\sqrt{11}$

Answer: B

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86. A tetrahedron has vertices $P(1, 2, 1), Q(2, 1, 3), R(-1, 1, 2)$ and $O(0, 0, 0)$. The angle beween the faces OPQ and PQR is :

A. $\cos^{-1}\left(\frac{17}{31}\right)$

B. $\cos^{-1}\left(\frac{19}{35}\right)$

C. $\cos^{-1}\left(\frac{9}{35}\right)$

D. $\cos^{-1}\left(\frac{7}{31}\right)$

Answer: B

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87. Let S be the set of all real values of λ such that a plane passing through the points $(-\lambda^2, 1, 1), (1, -\lambda^2, 1)$ and $(1, 1, -\lambda^2)$ also passes through the point $(-1, -1, 1)$. Then, S is equal to:

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

B. $\{\sqrt{3}, -\sqrt{3}\}$

C. $\{1, -1\}$

D. $\{3, -3\}$

Answer: B

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88. If an angle between the line,

$\frac{x+1}{2} = \frac{y-2}{1} = \frac{z-3}{-2}$ and the plane $x - 2y + kz = 3$ is $\cos^{-1}\left(\frac{2\sqrt{2}}{3}\right)$, then a value of k is:

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

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

C. $-\frac{3}{5}$

D. $-\frac{5}{3}$

Answer: A

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89. The length of the perpendicular from the point (2, -1, 4) on the straight line, $\frac{x+3}{10} = \frac{y-2}{-7} = \frac{z}{1}$ is

A. less than 2

B. greater than 3 but less than 4

C. greater than 4

D. greater than 2 but less than 3

Answer: B

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90. The equation of a plane containing the line of intersection of the planes $2x - y - 4 = 0$ and $y + 2z - 4 = 0$ and passing through the

point (1, 1, 0) is

A. $x - 3y - 2z = -2$

B. $x - y - z = 0$

C. $2x - z = 2$

D. $x + 3y + z = 4$

Answer: B

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91. Find the equation of the plane through the line of intersection of the planes $x + y + z = 1$ and $2x + 3y + 4z = 5$ which is perpendicular to the plane $x - y + z = 0$.

A. $r.(i - k) + 2 = 0$

B. $r.(i - k) - 2 = 0$

C. $r \times (i - k) + 2 = 0$

D. $r \times (i + k) + 2 = 0$

Answer: A

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92. If a point $R(4, y, z)$ lies on the line segment joining the points $P(2, -3, 4)$ and $Q(8, 0, 10)$ then the distance of R from the origin is:

A. $2\sqrt{14}$

B. 6

C. $2\sqrt{21}$

D. $\sqrt{53}$

Answer: A

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93. If the line $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-2}{4}$ meets the plane, $x+2y+3z=15$ at a point P, then the distance of P from the origin is

A. $\sqrt{5}/2$

B. $2/\sqrt{5}$

C. $9/2$

D. $7/2$

Answer: C

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94. A plane passing through the points $(0,\ -1,0)$ and $(0,0,1)$ and making an angle $\pi/4$ with the plane $y-z=0,$ also passes through the point:

A. $(\sqrt{2},\ -1,4)$

B. $(-\sqrt{5},\ -1,\ -4)$

C. $\left(-\sqrt{2}, 1, -4\right)$

D. $\left(\sqrt{2}, 1, 4\right)$

Answer: D

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95. The vertices B and C of a ΔABC lie on the line, $\frac{x+2}{3} = \frac{y-1}{0} = \frac{z}{4}$ such that BC=5 units. Then, the area (in sq units) of this triangle, given that the point A(1, -1, 2) is

A. $\sqrt{34}$

B. $5\sqrt{17}$

C. $2\sqrt{34}$

D. 6

Answer: A

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96. Let A(3,0,-1) ,B(2,10,6) and C(1,2,1) be the vertices of a triangle and M be the mid- point of AC.

If G divides BM in the ratio $2:1$ then cos $(\angle GOA)$ (O being the origin) is equal to

A. $\frac{1}{2\sqrt{15}}$

B. $\frac{1}{\sqrt{15}}$

C. $\frac{1}{6\sqrt{10}}$

D. $\frac{1}{\sqrt{30}}$

Answer: B

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97. A perpendicular is drawn from a point on the line $\frac{x-1}{2}=\frac{y+1}{-1}=\frac{z}{1}$ to the plane $x+y+z=3$ such that plane $x-y+z=3$. Then, the coordinates of Q are

A. $(4, 0, -1)$

B. $(2, 0, 1)$

C. $(1, 0, 2)$

D. $(-1, 0, 4)$

Answer: B

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98. If the plane $2x - y + 2x + 3 = 0$ has the distances $\frac{1}{3}$ and $\frac{2}{3}$ units from the planes $4x - 2y + 4z + \lambda = 0$ and $2x - y + 2z + \mu = 0$, respectively, then the maximum value of $\lambda + \mu$ is equal to

A. 5

B. 15

C. 9

D. 13

Answer: D

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99. If the line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{-1}$ intersects the plane $2x+3y-z+13=0$ at a point P and the plane $3x+y+4z=16$ at a point Q, then PQ is equla to

A. $\sqrt{14}$

B. $2\sqrt{7}$

C. 14

D. $2\sqrt{14}$

Answer: D

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100. A plane which bisects the angle between the two given planes $2x - y + 2z - 4 = 0$ and $x + 2y + 2z - 2 = 0$, passes through the point

A. $(1, -4, 1)$

B. $(1, 4, -1)$

C. $(2, -4, 1)$

D. $(2, 4, 1)$

Answer: C

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101. Let P be the plane, which contains the line of intersection of the planes, $x + y + z - 6 = 0$ and $2x + 3y + z + 5 = 0$ and it is perpendicular to the XY-plane. Then, the distance of the point (0, 0, 256) from P is equal to

A. $63\sqrt{5}$

B. $205\sqrt{5}$

C. $\frac{17}{\sqrt{5}}$

D. $\frac{11}{\sqrt{5}}$

Answer: D

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102. if the length of the perpendicular from the point $(\beta, 0, \beta)(\beta \neq 0)$ to the line , $\frac{x}{y} = \frac{y-1}{0} = \frac{z+1}{-1}$ is $\sqrt{\frac{3}{2}}$, then β is equal to

A. -1

B. -2

C. 1

D. 2

Answer: A

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103. If $Q(0, -1, -3)$ is the image of the point P in the plane $3x - y + 4z = 2$ and R is the point (3, -1, -2), then the area (in sq units) of ΔPQR is

A. $\frac{1}{4}\sqrt{91}$

B. $\frac{1}{2}\sqrt{91}$

C. $2\sqrt{13}$

D. $\frac{1}{2}\sqrt{65}$

Answer: B

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104. The distance of the point having position vector $-\hat{i}+2\hat{j}+6\hat{k}$ from the straight line passing through the point $(2, 3, -4)$ and parallel to the vector, $6\hat{i}+3\hat{j}-4\hat{k}$ is :

A. $2\sqrt{13}$

B. 7

C. 6

D. $4\sqrt{3}$

Answer: B

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105. The length of the perpendicular drawn from the point $(2, 1, 4)$ to the plane containing the lines

$\vec{r}=\left(\hat{i}+\hat{j}\right)+\lambda\left(\hat{i}+2\hat{j}-\hat{k}\right)$ and

$\vec{r}=\left(\hat{i}+\hat{j}\right)+\mu\left(-\hat{i}+\hat{j}-2\hat{k}\right)$ is:

A. $\sqrt{3}$

B. 3

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

D. $\frac{1}{3}$

Answer: A

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QUESTIONS FROM PREVIOUS YEARS. B-ARCHITECTURE ENTRANCE EXAMINATION PAPERS

1. If centroid of the triangle with vertices $(3c+2, 2, 0), (2c, -1, -1)$ and $(c+2, 3c+1, c+3)$ coincides with the centre of the sphere $x^2+y^2+z^2+5ax-4by-2cz=13$ then (A) $c=1$ (B) $c=2$ (C) $c=3$ (D) $c=0$

A. $c=1$

B. $c = 2$

C. $c = 3$

D. $c = 0$

Answer: A

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2. The distance of the point $(-1, -5, -10)$ from the point of intersection of the line $\frac{x-2}{2} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane $x - y + z = 5$ is

A. 13

B. 15

C. 16

D. 12

Answer: A

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3. Let L_1 be a line with direction ratios $(-2, -1, 2)$ and L_2 be the line joining the points $(1, 2, 3)$ and $(3, 2, 1)$, If θ is the angle between the lines L_1 and L_2 then $|\sin\theta|$ equals:

A. $1/3$

B. $1/4$

C. $1/3\sqrt{2}$

D. $1/2$

Answer: A

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4. Let $(a, b, c) \neq (0, 0, 0)$. The pair of equations which does not represent a straight line is:

A. $ax - by + cz + d = 0, ax + b'y + cz + d = 0 (b \neq b')$

B. $ax - by + cz + d = 0, ax + by + c'z + d = 0 (c \neq c')$

C. $ax + by + cz + d = 0, ax + by + cz - d' = 0 (d \neq d')$

D. $ax + by + cz + d = 0, a'x + by + cz - d = 0 (a \neq a')$

Answer: C

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5. Let α, β and γ be the angles made by a line with the positive directions of the axes of reference in three dimensions. If θ is the acute angle given by $\cos\theta = \dfrac{\cos^2\alpha + \cos^2\beta + \cos^2\gamma}{\sin^2\alpha + \sin^2\beta + \sin^2\gamma}$, then θ equals.

A. $\pi/6$

B. $\pi/3$

C. $\pi/2$

D. $\pi/4$

Answer: B

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6. If a plane meets the coordinate axes at A, B, C, and ΔABC has centroid at the point $G(a/2, b/2, c/2)$, then the equation of the plane is

A. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=\frac{3}{2}$

B. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=\frac{2}{3}$

C. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=\frac{1}{2}$

D. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=\frac{1}{3}$

Answer: A

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7. Shortest distance between z-axis and the line $\frac{x-2}{3}=\frac{y-5}{2}=\frac{z+1}{-5}$ is

A. $1/\sqrt{13}$

B. $11/13$

C. $\sqrt{11}/13$

D. $11/\sqrt{13}$

Answer: D

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8. The reflection point of the point $(0, 3-2)$ in the line $\frac{1-x}{2} = 2-y = z+1$ is

A. $(1, 2, -1)$

B. $(2, 1, 4)$

C. $(2, 1, 0)$

D. $(0, 0, 1)$

Answer: C

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9. A variable plane passes through a fixed point $(1, -2, 3)$ and meets the coordinate axes at points A, B, C then the point of intersection of the planes through A, B, C parallel to the coordinate planes lies on:

A. $xy - (1/2)yz + (1/3)zx = 6$

B. $yz - 2zx + 3xy = xyz$

C. $xy - 2yz + 3zx = 3xyz$

D. $xy + (1/2)yz - (1/3)zx = 6$

Answer: B

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10. The angle between the lines => $2x = 3y = -z$ and $-6x = y = 4z$ is:

A. 30°

B. 45°

C. 90°

D. 0°

Answer: C

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11. If the lines $\frac{x-4}{1}=\frac{y-2}{1}=\frac{z-\lambda}{3}$ and $\frac{x}{1}=\frac{y+2}{2}=\frac{z}{4}$ intersect each other, then λ lies in the interval

A. $(-5, -3)$

B. $(13, 15)$

C. $(11, 13)$

D. $(9, 11)$

Answer: C

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12. A variable plane is at a distance p from the origin O and meets the set of rectangular axes $OX_i(i = 1, 2, 3)$ at points $A_i(i = 1, 2, 3)$ respectively. If planes are drawn through A_1, A_2, A_3 which are parallel to the coordinate planes, then the locus of theri point of intersection is

A. $\frac{1}{x_1} + \frac{1}{x_2} + \frac{1}{x_3} = p$

B. $\frac{1}{x_1^2} + \frac{1}{x_2^2} + \frac{1}{x_3^2} = \frac{1}{p^2}$

C. $\frac{1}{x_1^3} + \frac{1}{x_2^3} + \frac{1}{x_3^3} = \frac{1}{p^3}$

D. $x_1^2 + x_2^2 + x_3^2 = p^2$

Answer: B

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13. Find the image of the point $(0, 2, 3)$ in the line $\frac{x+3}{5} = \frac{y-1}{2} = \frac{z+4}{3}$.

A. 798

B. 418

C. 399

D. 378

Answer: C

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14. The set of all non-zero real values of k, for which the lines $\frac{x-4}{2}=\frac{y-6}{2}=\frac{z-8}{-2k^2}$ and $\frac{x-2}{2k^2}=\frac{y-8}{4}=\frac{z-10}{2}$ are coplanar:

A. is an empty set

B. is a singleton

C. contains two points

D. contains more than two points

Answer: A

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15. The plane through the intersection of the planes $x + y + z = 1$ and $2x + 3y - z + 4 = 0$ and parallel to Y-axis also passes through the point

A. $(3, 0, 1)$

B. $(-3, 0, 1)$

C. $(3, 0, -1)$

D. $(-3, 0, -1)$

Answer: A

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16. The perpendicular distance from the point $(3, 1, 1)$ on the plane passing through the point $(1, 2, 3)$ and containing the line

$r = i + j + \lambda(2i + j + 4k)$ is

A. $\frac{3}{\sqrt{11}}$

B. $\frac{1}{\sqrt{11}}$

C. $\frac{4}{\sqrt{41}}$

D. 0

Answer: D

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17. If the line $L: \frac{x-1}{4} = \frac{y+3}{-2} = \frac{z+5}{1}$ lies in the plane $2x + ly + mz = 16$ then $l^2 + m^2$ is equal to:

A. 16

B. 20

C. 98

D. 85

Answer: B

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18. The equation of the plane passing through the line of intersection of the planes $r.(2i-3j+4k)=1,$ and $r.(i-j)+4=0$ and perpendicular to $r.(2i-j-k)+4=0$ is

A. $r.(i-2j+4k)=3$

B. $r.(i-2j+4k)=5$

C. $r.(2i-j+5k)=3$

D. $r.(2i-j+5k)=5$

Answer: B

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19. The distance of the point $(1, 2, 3)$ from the plane $x + y + z = 2$ measured parallel to the $\frac{x+1}{-1} = \frac{y}{-2} = \frac{z-3}{1}$ is

A. $\sqrt{22}$

B. $\sqrt{24}$

C. $\sqrt{23}$

D. $\sqrt{21}$

Answer: B

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20. The length of perpendiculars from the point $P(1, 2, 6)$ on the line $L: \frac{x-3}{-2} = \frac{y+1}{1} = \frac{z-5}{2}$, is:

A. $\sqrt{2}$

B. $\sqrt{3}$

C. 2

D. $\sqrt{5}$

Answer: D

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21. A plane has intercepts $p-1, 1$ and $p+1$ on the coordinate axes x, y and z respectively. If the distance of plane from the origin is $1/\sqrt{3}$, then the largest value of p is:

A. 0

B. 2

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: D

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22. Let the planes $x - 2y + kz = 0$ and $x + 5y - z = 0$ be perpendicular. Then the plane through $(2, -2, -2)$ and perpendicular to the given planes also passes through the points

A. $(0, 5, 8)$

B. $(0, 5, -8)$

C. $(-1, 0, -7)$

D. $(1, 0, 7)$

Answer: D

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23. If two lines

$$\frac{x - 2m}{2m + 5} = \frac{y}{8m} = \frac{z - 4}{2}$$

and $\frac{x - m}{m - 2} = \frac{y}{-1} = \frac{z - 2m}{1 - 3m}$

are parallel for some $m \in R$, then distance between them is:

A. $\sqrt{10}$

B. $2\sqrt{5}$

C. $\sqrt{2a}$

D. $\sqrt{34}$

Answer: A

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24. A plane passes through the points $(\alpha, 1, 0), (\alpha, 2, 1), (-2, 2, -1)$ and $(1, 1, 0)$ for some $\alpha \in R$. Then the distance of the point $(1, 1, 1)$ from the plane is:

A. $\frac{1}{\sqrt{22}}$

B. $\frac{5}{\sqrt{11}}$

C. $\frac{3}{\sqrt{22}}$

D. $\frac{2}{\sqrt{11}}$

Answer: C

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25. The value of α for which the shortest distance between the lines represented by $y+z=0, z+x=0$ and $x+y=0, x+y+z=\alpha$ is 1, is:

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

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

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

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

Answer: A

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