MATHS

BOOKS - MARVEL MATHS (HINGLISH)

PLANE IN SPACE

Part A Building Up The Base

1. Equation of plane passing through A(0,-1,3) and perpendicular to the join of A and B(1,3,5) is

A. 2x+4y +z-2

B. x-4y +2z=2

C. 3x+z=0

D. x+4y+2z=2

Answer: D

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2. Equation of plane passing through (2,6,1) and perpendicular to the join of (-3,1,2) and (4,-3,6) is

A. $x+y+z=0$

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

C. $7x-4y+4z+6=0$

D. $2x+y-2z=8$

Answer: C

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3. Equations of plane which bisects the join of A(3,7,12) and B(-5,-3,-2) at right angles is

A. $4x+5y+7z=41$

B. $x=3, y=-3$

C. $x=y+z$

D. $4x-3y+2z=13$

Answer: A

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4. Equations of plane passing through P(a,a,0) and normal to OP is

A. $x-y=0$

B. $x+y=2a$

C. $2x+3y=5a$

D. x-y=a

Answer: B

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5. Equation of plane passing through A(a,b,c) and normal to OA is

A. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=3$

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

C. x+y+z=a+b+c

D. $x^2+y^2+z^2=a^2+b^2+c^2$

Answer: B

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6. If perpendicular from the point P(a,b,c) drawn to YZ- and ZX- plane meet tham in the points L and M respectively, then equation of plane OLM is

A. ax+by +cz=abc

B. bcx + cay = abc

C. bcx + cay= abc

D. ax+ by + cz=1

Answer: C

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7. Equation of plane passing through $(0, 0, a)$ and perpendicular to two planes $x - y - z = 0$ and $x - 2y = 0$ is

A. x+y+z=0

B. 2x+y+z=a

C. x+2y+z=a

D. x+y+z=2a

Answer: B

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8. Equation of plane passing through $(-1, -1, 2)$ and perpendicular to two planes x-2y+z=4 and x+2y-2z+4=0 is

A. x+y+z=0

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

C. x+2y+2z=1

D. 2x+3y+4z=3

Answer: D

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9. Obtain the equation of the plane passing through the point (1, -3, -2) and perpendicular to the planes $x + 2y + 2z = 5 \; and \; 3x + 3y + 2z = 8.$

A. 2x-4y +3z+8=0

B. x+y-z=0

C. x+y+z=4

D. x+y+z=8

Answer: A

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10. Equation of plane passing through two points (-1,2,0), (1,1,2) and perpendicular to the plane x+2y+2z=4 is

A. x+y+z=1

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

C. 6x+2y-5z+2=0

D. x+y-3z=3

Answer: C

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11. Find the equation of the plane passing through the points $(-1, 1, 1)$ and $(1, -1, 1)$ and perpendicular to the plane $x + 2y + 2z = 5$.

A. x+y+z=1

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

C. z=1

D. x+y-3z=3

Answer: B

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12. Equation of plane passing through (0,-2,3) and containing the X-axis is

A. $2y+3z=5$

B. $y+z=1$

C. $4y+3z=1$

D. $3y+2z=0$

Answer: D

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13. Equation of plane passing through (4,0,3) and containing the Y-axis, is

A. x+z=7

B. x-z=1

C. 3x-4z=0

D. 2x+3z=71

Answer: C

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14. Equation of plane passing through (2,-4,0) and containing Z-axis is

A. x+y+z=0

B. 2x+y=0

C. x-y=6

D. $x+2y=6$

Answer: B

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15. Equations of plane passing through two points (0,1,3), (2,4,5) and parallel to X-axis, is

A. $2y-3z+7=0$

B. $y+z=4$

C. $2y+3x=11$

D. $2z-3z=6$

Answer: A

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16. Equation of plane passing throgh two points (2,3,1), (4,-5,3) and parallel to Z-axis is

A. x+y=4

B. x+y+z=4

C. 4x+y=11

D. x-y+z=0

Answer: C

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17. Equation of plane passing through two points (2,2,0), (4,4,0), and parallel to Z-axis, is

A. x-y=0

B. x+y+z=4

C. x+y=0

D. x-y+z=0

Answer: A

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18. Equation of plane passing through the points $(2, 2, 1)(9, 3, 6)$ and perpendicular to the plane $2x + 6y + 6z - 1 = 0$ is

A. 3x+4y +5z=19

B. 3x+4y -5z=9

C. 3x-4y+5z=3

D. 4x-3y-2z=0

Answer: B

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

A. 5x-2y+3z=3

B. 5x+2y+3z=11

C. 5x+2y-3z=17

D. 2x+5y+3z=-13

Answer: C

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20. Find the cartesian equation of plane passing through the points $(1, 1, 1), (1, -1, 1)$ and $(-7, -3, -5)$.

A. 4x-3z=1

B. 4z-3x=1

C. $x+y+z=3$

D. $4y-3z=1$

Answer: B

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21. Equation of plane passing through $(5,2,-1),(2,2,3)$ and the origin is

A. $17x-8y+6z=0$

B. $8x-6y+17z=0$

C. $8x-17y+6z=0$

D. $8x+17y-6z=22$

Answer: C

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22. Equation of plane passing through $(x_1, y_1, z_1), (x_2, y_2, z_2)$ and the origin is

A. $\begin{vmatrix} 1 & x & x_1 - x_2 \\ 1 & y & y_1 - y_2 \\ 1 & z & x_1 - z_2 \end{vmatrix} = 0$

B. $\begin{vmatrix} x & y & z \\ x_1 & y_1 & z_1 \\ x_2 & y_2 & z_2 \end{vmatrix} = 0$

C. $\begin{vmatrix} x - x_1 & y - y_1 & z - z_1 \\ x_1 - x_2 & y_1 - y_2 & z_1 - z_2 \\ 1 & 1 & 1 \end{vmatrix} = 0$

D. $\begin{vmatrix} 1 & x & x_1 \\ 1 & y & y_1 \\ 1 & z & z_1 \end{vmatrix} = 0$

Answer: B

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23. Equation of plane passing through (1,2,3) and perpendicular to the vector $3\hat{i} - 4\hat{j} + \hat{k}$ is

A. 3x - 4y+z+2=0

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

C. $x+y+z=6$

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

Answer: A

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24. Equation of plane passing through (2,0,5) and parallel to the vectors $i-j+k$ and $3i+2j-k$ is

A. $x-4y+5z=27$

B. $x-4y-5z+23=0$

C. $4x-y+5z=33$

D. $4x+y-5z=33$

Answer: B

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25. Point P divides the join of A(4,-2,-1) and B(1,4,2) internally in the ratio 2:1. Equation of plane passing through P and perpendicular to line AB is

A. x-2y-z=9

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

C. x+2y-z=1

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

Answer: B

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26. Equation of plane passing through $(1, 0, 1), (3, 1, 2)$ and parallel to the vector $i - j + 2k$ is

A. x-z=0

B. x-2y-z=0

C. x-y-z=0

D. x-y+2z=3

Answer: C

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27. If $P(\bar{p}) = 3i + j + 2k$ and $Q(\bar{q}) = i - 2j - 4k$ the equation of plane passing through Q and perpendicular to line PQ is

A. 2x+3y + 6z+16=0

B. x+y+z+7=0

C. 2x+3y +6z+28=0

D. 2x-3y+6z=15

Answer: C

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28. Equation of plane passing through (2,1,0), and perpendicular to the unit vector $\hat{k}$ along the Z-axis is

A. x=2

B. y=1

C. x+y=3

D. z=0

Answer: D

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29. A non-zero vector parallel to the plane $3x + y - z = 2$ and perpendicular to the vector $\hat{i} + 2\hat{k}$ is

A. 2i - 7j + k

B. 2i - 7i - k

C. 2i + 7j - k

D. $-(2i+7j+k)$

Answer: B

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30. A non-zero vector perpendicular to the two planes $x+2y-z+1=0$ and $2x-y+z+9=0$ is

A. i-3j + 5k

B. i+3j - 5k

C. $-i+3j+5k$

D. $-(i+3j+5k)$

Answer: C

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31. Equation of plane passing through (x_1, y_1, z_1) and parallel to two lines with direction Ratios a_1, b_1, c_1 and a_2, b_2, c_2 is

A. $\begin{vmatrix} x-a_1 & y-b_1 & z-c_1 \\ a_1-a_2 & b_1-b_2 & c_1-c_2 \\ 1 & 1 & \end{vmatrix} = 0$

B. $\begin{vmatrix} x-x_1 & y-y_1 & z-c_1 \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix} = 0$

C. $\begin{vmatrix} x & y & z \\ x-x_1 & y-y_1 & z-z_1 \\ a_1-a_2 & b_1-b_2 & c_1-c_2 \end{vmatrix} = 0$

D. $a_1a_2(x-x_1)+b_1b_2(y-y_1)+c_1c_2(z-z_1)=0$

Answer: B

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32. If $E: x+2y-3z+4=0, E_1: 2x+5y+4z+1=0$ and $E_2: 4x+7y+6z+2=0$ are three planes,then

A. $E||E_1||E_2$

B. $E\ ||\ E_1 \perp E_2$

C. $E_2\ ||\ E \perp E_1$

D. $E_1 \perp E \perp E_2$

Answer: D

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33. Measure of angle between the planes 5x-2y + 3z-7=0 and 15x - 6y+9z+5=0 is

A. 0°

B. 30°

C. 45°

D. 90°

Answer: A

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34. Measure of angle between the planes $x + y + 2z = 3$ and $2x - y + 2z = 5$ is

A. 0°

B. $\cos^{-1}\left(\frac{5}{3\sqrt{6}}\right)$

C. 90°

D. 120°

Answer: B

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35. Equation of plane passing through (2,-1,3) and making equal intercepts on the co-ordinate axes, is

A. x-y-z=0

B. x+y+z=4

C. 2x+y-x=0

D. x+5y +z=0

Answer: B

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36. Equation of plane passing through (2,1,3) making equal intercepts on X-axes and Y-axes, and having Z-intercept 4, is

A. x+y-3z=12

B. x+y+z=4

C. x+y+3z=12

D. x+2y+2z=4

Answer: C

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37. Equation of a plane passing through (-4,0,4) and making intercepts 4 and 3 on X-axis and Y-axis respectively, is

A. 3x-4y + 6z=12

B. 3x + 4y+ 6z=12

C. x+z=0

D. 3x-4y - 6z=12

Answer: B

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38. Equation of a plane passing through (-4,0,4) and making intercepts 4 and 3 on X-axis and Y-axis respectively, is

A. 3x-4y+6z=12

B. 3x+4y+6z=12

C. x+z=0

D. 3x-4y-6z=12

Answer: B

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39. A plane meets the co-ordinate axes in A,B,C. If the centroid of $\triangle ABC$ is (a,b,c), then the equation of the plane is

A. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=3$

B. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=\frac{1}{3}$

C. ax+by + cz=3

D. $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=3$

Answer: A

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40. A plane bisects the join of (1,2,3) and (3,4,5) at right angles. Its intercepts on the co-ordinate axes are

A. 2,3,4

B. 9,9,9

C. $-2,\ -3, 4$

D. 2,-3,4

Answer: B

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41. Length of the normal from origin to the plane $2x - 2y - z + 3 = 0$ is

A. -1

B. 0

C. 1

D. 3

Answer: C

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42. Equation of planes at a distance of $\sqrt{3}$ units from the origin, and whose normal is equally inclined to the co-ordinate axes, is

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

B. $x + y + z = \pm 3$

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

D. $\sqrt{3}(x - y - z) = 1$

Answer: B

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Part B Mastering The Best On Line And Plane In Space

1. The sine of the angle between the straight line $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ and the plane $2x - 2y + z = 5$ is

A. $\frac{10}{6\sqrt{5}}$

B. $\frac{4}{5\sqrt{2}}$

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

D. $\frac{2\sqrt{3}}{5}$

Answer: C

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2. Perpenficular distance of the point (1, 2, 3) from the line $\frac{x-6}{3}=\frac{y-7}{2}=\frac{z-7}{-2}$ is

A. 7

B. 3

C. 0

D. 2

Answer: A

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3. Measure of angle between the lines 2x = 3y=-z and 6x=-y =-4z is

A. 0°

B. 30°

C. 45°

D. 90°

Answer: D

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4. Equation of plane passing through (2,3,4) and parallel to the plane x+2y+4z=5 is

A. x+2y+4z=10

B. x+2y+4z=3

C. x+2y+4z=2

D. x+2y+4z=24

Answer: D

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5. Measure of angle between the lines $\frac{x+1}{2}=\frac{y-2}{5}=\frac{z+3}{4}$ and $\frac{x-1}{1}=\frac{y+2}{2}=\frac{z-3}{-3}$ is

A. 45°

B. 30°

C. 60°

D. 90°

Answer: D

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6. Equation of the line passing through $(1,1,1)$ and parallel to the plane $2x+3y+z+5=0$ is

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

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

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

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

Answer: B

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7. If the points (5, 2, 4), (6, -1, 2) and (8, -7, k) are collinear, then k =

A. -1

B. 3

C. 2

D. -2

Answer: D

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8. Write the angle between the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z+3}{-2}$ and the plane $x + y + 4 = 0$.

A. 0°

B. 30°

C. 45°

D. 90°

Answer: C

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9. XOY-plane divides the join of (x , y , z) and (- y , - z , - x) in the ratio_

A. a:b

B. b:c

C. c:a

D. c:b

Answer: D

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10. Equation of plane passing through (2,-3,1) and perpendicular to the join of (3,4,-1) and (2,-1,5) is

A. x+5y - 6z+19=0

B. x+5y + 6z+19=0

C. x-5y +6z+19=0

D. x+y+z=0

Answer: A

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11. The equation of a plane through the point $(2, 3, 1)$ and $(4, -5, 3)$ and parallel to x-axis

A. x-z=1

B. 4x+y=11

C. y+4z=7

D. x+y+z=6

Answer: C

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12. Equation of plane perpendicular to the YZ- plane and passing through $(1, -2, 4)$ and $(3, -4, 5)$ is

A. y+2z=5

B. 2y+z=5

C. y+2z=6

D. 2y+z=6

Answer: C

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13. Equation of plane passing through $(1, 0, 1), (3, 1, 2)$ and parallel to the vector $i - j + 2k$ is

A. x+y+z=0

B. x+y-z=0

C. x-y+z=0

D. x-y-z=0

Answer: D

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14. Equation of plane passing through (1,1,1) and the line of intersection of planes x+2y-z+1=0 and 3x-y-4z+3=0 is

A. 8x+ 5y - 11z +8=0

B. 8x+5y + 11z +8=0

C. 8x-5y-11z+8=0

D. 8x+5y +11z =24

Answer: C

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15. Find the equation of the plane passing through the line of intersection of the planes $2x - y = 0$ and $3z - y = 0$, and perpendicular to the plane $4x + 5y - 3z = 9$.

A. 2x+17y + 9z=0

B. 28x - 17y + 9z=0

C. 2x+17y - 9z=0

D. 2x-17y - 9z=0

Answer: B

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16. Equation of plane passing through $(-1, 3, 2)$ and perpendicular to the two planes $x + 2y + 2z = 5$, and $3x + 3y + 2z = 8$, is

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

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

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

D. $x + y + z = 4$

Answer: A

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17. Equation of plane passing through (1,1,0), (-2,2,-1) and (1,2,1) is

A. 2x+3y + 3z=5

B. 2x-3y + 3z=5

C. 2x + 3y - 3z+5=0

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

Answer: D

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18. Co-ordiantes of the point of intersection of the line $\frac{x+1}{1} = \frac{y+3}{3} = \frac{z-2}{-2}$ with the plane 3x+4y +5z=25 are

A. (5,15,10)

B. (5,15,-10)

C. (5,-15,10)

D. (-5,-15,10)

Answer: B

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19. Distance from the point (3,4,5) to the point where the line $\frac{x-3}{1}=\frac{y-4}{2}=\frac{z-5}{2}$ meets the plane x+y+z=17 is

A. 1

B. 2

C. 3

D. 4

Answer: C

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

A. 1

B. 2

C. 4

D. 3

Answer: A

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21. Measure of angle between the planes $\bar{r}.(3i + j - k) = 1$ and $\bar{r}.(i + 4j - 2k) = 2$ is

A. $\cos^{-1}\left(\frac{9}{\sqrt{231}}\right)$

B. $\cos^{-1}\left(\frac{4}{\sqrt{231}}\right)$

C. $\cos^{-1}\left(\frac{11}{\sqrt{231}}\right)$

D. $\sin^{-1}\left(\frac{4}{\sqrt{231}}\right)$

Answer: A

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22. If the planes $\bar{r}.(2i+\lambda j-3k)=0$ and $\bar{r}.(\lambda i+3j+k)=5$ are mutually perpendicular, then λ=

A. 2

B. -2

C. 3

D. $3/5$

Answer: D

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23. If the planes $\bar{r}.(2i-\lambda j+k)=3$ and $\bar{r}.(4i+j-\mu k)=5$ are parallel, then the values of λ and μ are respectively

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

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

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

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

Answer: C

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24. 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. $-2i-7i+13k$

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

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

Answer: D

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25. The angle between the lines x=1, y=2 and y=-1, z=0 is

A. 30°

B. 60°

C. 90°

D. 0°

Answer: C

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26. 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. x+y-z=5

Answer: A

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27. The equation of the plane containing the line $\frac{x-x_1}{l}=\frac{y-y_1}{m}=\frac{z-z_1}{n}$ is

$a(x-x_1)+b(y-y_1)+c(z-z_1)=0$, where $ax_1+by_1+cz_1=0$

b. $al+bm+cn=0$ c. $\frac{a}{l}=\frac{b}{m}=\frac{c}{n}$ d. $lx_1+my_1+nz_1=0$

A. $ax_1 + by_1 + cz_1 = 0$

B. al + bm + cn =0

C. $\frac{a}{l} + \frac{b}{m} = \frac{c}{n}$

D. $lx_1 + my_1 + nz_1 = 0$

Answer: B

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28. If 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 then k can have (A) exactly two values (B) exactly thre values (C) any value (D) exactly one value

A. $0, -1$

B. $-1, 1$

C. $\in R$

D. $-3, 3$

Answer: C

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29. 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. $\frac{3}{5}$

B. $\frac{1}{5}$

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

D. $\frac{2}{5}$

Answer: A

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30. Equation of plane containing the two lines $\frac{x-1}{2}=\frac{y+1}{-1}=\frac{z}{3}$ and $\frac{x}{2}=\frac{y-2}{-1}=\frac{z+1}{3}$ is

A. 8x+y-5z=7

B. 9x-5y + 6z+2=0

C. 3x 4y + 7z=5

D. 9x+5y + 6z=38

Answer: A

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31. Show that the points $A(0,4,3), B(-1,-5,-3), C(-2,-2,1)$ and $D(1,1,1)$ are coplanar. Also find the equation of the plane in which these points lie.

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

B. 9x-5y + 6z+2=0

C. 3x + 4y + 7z=5

D. 9x+ 5y + 6z=38

Answer: B

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32. 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. x+2y-3z+4=0

B. 3x-4y +1=0

C. 5x + 2y - 3z+1=0

D. x-3y - 6z+8=0

Answer: D

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33. If the planes ax+by + cz=1 meets the co-ordinates axes in the points A,B,C, then the centroid of $\triangle ABC$is

A. (3a,3b,3c)

B. $\left(\frac{a}{3}, \frac{b}{3}, \frac{c}{3}\right)$

C. $\left(\frac{3}{a}, \frac{3}{b}, \frac{3}{c}\right)$

D. $\left(\frac{1}{3a}, \frac{1}{3b}, \frac{1}{3c}\right)$

Answer: D

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34. If l,m,n are the direction Cosines of a normal to a plane passing through the point (1,2,3) then the equation of the plane is

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

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

C. lx + my+ nz=1

D. lx + my + nz=l+2m+3n

Answer: D

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35. If a plane meets coordinate axes in points A,B,C such that the centroid of $\triangle ABC$ is $G(1, r, r^2)$, then the 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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36. Lines $\frac{x-1}{1}=\frac{y-1}{2}=\frac{z-3}{0}$ and $\frac{x-2}{0}=\frac{y-3}{0}=\frac{z-4}{1}$ are

A. parallel

B. coincident

C. skew

D. perpendicular

Answer: D

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37. The line $x=1, y=2, z=0$ is

A. || X-axis

B. || Y-axis

C. || Z-axis

D. lies on a plane || XY-plane

Answer: C

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38. A plane meets the co-ordinate axes in A,B,C, such that the centroid of $\triangle ABC$ is (3,3,3). Then the equation of the plane is

A. x+y+z=3

B. x+y+z=9

C. 3x+3y +3z=1

D. 9x+9y + 9z=1

Answer: B

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39. The locus represented by $xy + yz = 0$ is

A. a pair of lines

B. a pair of perpendicular planes

C. a pair of parallel planes

D. a pair of skew lines

Answer: B

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40. The acute angle between the plane $5x - 4y + 7z = 13$ and the y-axis is givne by (A) $\sin^{-1}\left(\frac{5}{\sqrt{90}}\right)$ (B) $\sin^{-1}\left(\frac{-4}{\sqrt{90}}\right)$ (C) $\sin^{-1}\left(\frac{7}{\sqrt{90}}\right)$ (D) $\sin^{-1}\left(\frac{4}{\sqrt{90}}\right)$

A. $\sin^{-1}\left(\frac{5}{\sqrt{90}}\right)$

B. $\sin^{-1}\left(-\frac{4}{\sqrt{90}}\right)$

C. $\sin^{-1}\left(\frac{7}{\sqrt{90}}\right)$

D. $\sin^{-1}\left(\frac{4}{\sqrt{90}}\right)$

Answer: D

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41. If $P \equiv (a, a,)$ and $Q = (-a, -a, -a)$, then the equation of the right bisecting plane of seg PQ is

A. x-y+z=a

B. x+y+z=3a

C. x+y+z=0

D. x+y+z+3a=0

Answer: C

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42. The three planes $x+y=0, y+z=0$ and $x+z=0$ (A) meet in the unique point (B) meet in a line (C) meet taken two at a time i parallel lines (D) none of these

A. meet in a unique point

B. meet in a line

C. taken two at a time, meet in parallel lines

D. are concurrent

Answer: A

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43. The angle between the plane $3x+4y=0$ and the line $x^2+y^2=0$ is (A) 0^0 (B) 30^0 (C) 60^0 (D) 90^0

A. 90°

B. 0°

C. 60°

D. 30°

Answer: B

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44. If $A(\bar{a}), B(\bar{b}), C(\bar{c})$ and $D(\bar{d})$ are the four points such that $3\bar{a} + 8\bar{b} = 6\bar{c} + 5\bar{d}$, then the lines AB and CD are

A. skew

B. intersecting

C. parallel

D. non-coplanar

Answer: B

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45. The direction ratios of a normal to the plane passing throuhg (0,0,1) ,(0,1,2) and (1,2,3) are proportional to

A. 0,1,-1

B. 1,0,-1

C. 0,0,-1

D. 1,0,0

Answer: A

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46. The direction ratios of the normal to the plane passing through the points $(1, -2, 3), (-1, 2, -1)$ and paralle to the line $\frac{x-2}{2} = \frac{y+1}{3} = \frac{z}{4}$ are proportional to

A. 2,3,4

B. 14,0,7

C. $-2, 0, -1$

D. 2,0,-1

Answer: D

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47. If the plane $7x + 11y + 3z = 3003$ meets the axes in A,B and C then the centorid of ΔABC is

A. (143, 91, 77)

B. (143, 77,91)

C. (91,143,77)

D. (143,66,91)

Answer: A

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48. If line $L: \frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and plane $E: x - 2y + z = 6$, then the line L

A. meets the plane E obliquely

B. lies in the plane E

C. meets the plane E at right angles

D. is parallel to the plane E

Answer: D

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49. If the plane $\frac{x}{2}+\frac{y}{3}+\frac{z}{4}=1$ cuts the coordinate axes in A, B, C, then the area of triangle ABC is

A. $\sqrt{29}$ sq.u

B. $\sqrt{41}$ sq.u

C. $\sqrt{61}$ sq.u

D. $\sqrt{39}$sq.u

Answer: C

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50. The angle between the lines $\frac{x-1}{1}=\frac{y-1}{1}=\frac{z-1}{2}$ and $\frac{x-1}{-\sqrt{3}-1}=\frac{y-1}{\sqrt{3}-1}=\frac{z-1}{4}$ is

A. $\cos^{-1}\left(\frac{1}{65}\right)$

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

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

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

Answer: C

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51. The directionratios of the line which is perpendicular to the lines $\frac{x-7}{2}=\frac{y+17}{-3}=z-6$ and $x+5=\frac{y+3}{2}=\frac{z-4}{-2}$ are (A) (4,5,7) (B) (4,-5,7) (C) (4,-5,-7) (D) (-4,5,7)

A. 4,5,7

B. 4,-5,7

C. 4,-5,-7

D. $-4, 5, 7$

Answer: A

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52. If the planes $x + 2y + kz = 0$ and $2x + y - 2z = 0$, are at right angles, then the value of k is

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

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

C. -2

D. 2

Answer: D

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53. Perpenficular distance of the point (1, 2, 3) from the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$ is

A. 4

B. 5

C. 6

D. 7

Answer: C

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54. The direction cosines of the normal to the plane

$x + 2y - 3z + 4 = 0$ are

A. $\frac{1}{14}, -\frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

B. $\frac{1}{14}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

C. $-\frac{1}{14}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

D. $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}$

Answer: D

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55. In ΔABC the mid points of the sides AB, BC and CA are $(l, 0, 0), (0, m, 0)$ and $(0, 0, n)$ respectively. Then, $\frac{AB^2 + BC^2 + CA^2}{l^2 + m^2 + n^2}$ is equal to

A. 2

B. 4

C. 8

D. 16

Answer: C

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56. If the direction cosines of two lines are connected by the equations l+m+n=0 and $l^2 + m^2 - n^2 = 0$, then the angle between these lines is of measure

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

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

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

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

Answer: B

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57. The dr's of two lines are given by $a+b+c=0, 2ab+2ac-bc=0$. Then the angle between the lines is

A. π

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

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

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

Answer: B

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58. 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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59. The direction cosines of the line $x - y + 2z = 5, 3x + y + z = 6$ are

A. $\frac{3}{5\sqrt{2}}, -\frac{5}{5\sqrt{2}}, \frac{4}{5\sqrt{2}}$

B. $-\frac{3}{5\sqrt{2}}, \frac{5}{5\sqrt{2}}, \frac{4}{5\sqrt{2}}$

C. $\frac{3}{5\sqrt{2}}, \frac{5}{5\sqrt{2}}, -\frac{4}{5\sqrt{2}}$

D. $\frac{3}{5}, 1, -\frac{4}{5}$

Answer: B

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

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

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

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

D. none of these

Answer: C

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61. If the lines

x=ay +b, z=cy+d and $x=a'y+b', z=c'y+d'$ are perpendicular, then

A. aa' + cc'=1

B. aa' + cc' =-1

C. ab + cd =a'b' + c'd'

D. aa' + bb' = cc' + dd'

Answer: B

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62. If the lines 6x-2 = 3y +1 = 2z-2 and $\frac{x-2}{l} = \frac{2y-5}{-3}, z = -2$ are mutually perpendicular, then: l=

A. 1

B. 2

C. -3

D. 3

Answer: D

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63. Measure of angle between the lines 2x = 3y=-z and 6x=-y =-4z is

A. 0°

B. 30°

C. 45°

D. 90°

Answer: D

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64. 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. $d_1 = 8d_2$

B. $d_1 + 8d_2 + d_3 = 0$

C. $d_1 + 16d_2 = 0$

D. $d_1 - 2d_2 + 3d_3 = \sqrt{29}$

Answer: A

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65. The line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{-1}$ intersects the curve $xy=c^2, z=0,$ if c is equal to

A. ± 1

B. ± 3

C. $\pm\sqrt{5}$

D. none of these

Answer: C

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66. Plane E_1 is determined by the vectors I and i+j and plane E_2 is determined by the vectors i-j and i+k. If $\bar{a}$ is a non-zero vector parallel to the line of intersection of E_1 and E_2, then the angle between $\bar{a}$ and $\bar{b}=i-2j+2k$ is

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

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

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

D. none of these

Answer: B

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67. The vectors $\bar{a}$ and $\bar{b}$ determine one plane and the vectors $\bar{c}$ and $\bar{d}$ determine another plane. If the planes are parallel, then

A. $(\bar{a} \times \bar{c}) \times (\bar{b} \times \bar{d}) = \bar{0}$

B. $(\bar{a} \times \bar{c}).(\bar{b} \times \bar{d}) = 0$

C. $(\bar{a} \times \bar{b}) \times (\bar{c} \times \bar{d}) = \bar{0}$

D. $(\bar{a} \times \bar{b}).(\bar{c} \times \bar{d}) = 0$

Answer: C

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68. Equation of the plane containing the lines $\bar{r} = \bar{a} + \lambda\bar{b}$ and $\bar{r} = \bar{b} + \mu\bar{d}$ is

A. $\left[\bar{r}\bar{a}\bar{b}\right] = 0$

B. $\left[\bar{r}\bar{a}\bar{b}\right] = \bar{a}.\,\bar{b}$

C. $\left[\bar{r}\bar{b}\bar{a}\right] = \bar{a}.\,\bar{b}$

D. none of these

Answer: A

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69. The equation of the plane which contains the origin and the line of intersectio of the plane $\vec{r}.\vec{a} = d_1$ and $\vec{r}.\vec{b} = d_2$ is

A. $\bar{r}.\left(p_1\bar{a} - p_2\bar{b}\right) = 0$

B. $\bar{r}.\left(p_1\bar{a} + p_2\bar{b}\right) = 0$

C. $\bar{r}.\left(p_2\bar{a} + p_1\bar{b}\right) = 0$

D. $\bar{r}.\left(p_2\bar{a} - p_1\bar{b}\right) = 0$

Answer: D

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70. If $P = (0, 1, 0)$ and $Q = (0, 0, 1)$ then the projection of PQ on the plane $x + y + z = 3$ is

A. 2

B. 3

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: C

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71. A plane II passes through the point (1,1,1).If b, c, a are the direction ratios of a normal to the plane where $a, b, c(a < b < c)$ are the prime factors of 2001, then the equation of the plane II is

A. 29x + 31y+ 3z=63

B. 23x + 29y -29z=23

C. 23x + 29y + 3z=55

D. 31x + 37y + 3z=71

Answer: C

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72. If the foot of the perpendicular from the origin to a plane E is the point N(1,2,2), then the equation of the plane is

A. $-x + 2y + 8z = 9$

B. $x + 2y + 2z = 9$

C. $x + y + z = 5$

D. $x + 2y - 3z + 1 = 0$

Answer: B

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73. 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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74. Find the equation of a plane which passes through the point (3, 2, 0) and contains the line $\frac{x-3}{1} = \frac{y-6}{5} = \frac{z-4}{4}$.

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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75. If the two lines

$\frac{x-1}{2}=\frac{y+2}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-b}{2}=\frac{z}{1}$ intersect each other, then: b=

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

B. $\frac{7}{2}$

C. $-\frac{2}{9}$

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

Answer: B

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76. Value of k such that the line

$\frac{x-4}{1}=\frac{y-2}{1}=\frac{z-k}{2}$ lies in the plane 2x-4y+z=7 is

A. 7

B. -7

C. 4

D. no real value

Answer: A

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77. 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. (2a, 3a,a), (2a,a,a)

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

C. (3a,2a,3a),(a,a,2a)

D. (3a,3a,3a),(a,a,a)

Answer: B

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78. 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. 0

B. -1

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

D. -2

Answer: D

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79. If $\bar{a}, \bar{b}, \bar{c}$ are any three coplanar unit vectors then

A. straight line

B. plane

C. plane through the origin

D. sphere

Answer: B

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80. 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. $-\frac{4}{3}$

B. $\frac{3}{4}$

C. $-\frac{3}{5}$

D. $\frac{5}{3}$

Answer: D

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81. 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

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

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

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

Answer: C

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82. If the line passing through the points (5,1,p) and (3,q,1) crosses the YZ plane at the point $\left(0, \frac{17}{2}, -\frac{13}{2}\right)$, then

A. a=6, b=4

B. a=8, b=2

C. a=2, b=8

D. a=4, b=6

Answer: A

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83. 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 integer k is equal to

A. 2

B. -2

C. -5

D. 5

Answer: C

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84. If 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: $(\alpha, \beta) \equiv$

A. (6,-17)

B. $(-6, 7)$

C. $(5, -15)$

D. $(-5, 5)$

Answer: B

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85. 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 $\overrightarrow{PQ}$ is parallel to the plane $x - 4y + 3z = 1$ is a. 1/4 b. -1/4 c. 1/8 d. -1/8

A. $\frac{1}{4}$

B. $-\frac{1}{4}$

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

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

Answer: A

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86. 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. $\frac{1}{9}$

D. $\frac{1}{3}$

Answer: A

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87. A unit vector a makes an angle $\frac{\pi}{4}$ with z-axis. If $a+i+j$ is a unit vector, then a can be equal to

A. $\frac{i}{2}+\frac{j}{2}+\frac{k}{\sqrt{2}}$

B. $\frac{i}{2}+\frac{j}{2}-\frac{k}{\sqrt{2}}$

C. $-\frac{i}{2}-\frac{j}{2}+\frac{k}{\sqrt{2}}$

D. none of these

Answer: C

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88. Let α, β, γ be distinct real numbers. The points with position vectors $\alpha\hat{i}+\beta\hat{j}+\gamma\hat{k}, \beta\hat{i}+\gamma\hat{j}+\alpha\hat{k}, \gamma\hat{i}+\alpha\hat{j}+\beta\hat{k}$

A. are collinear

B. form an equilateral triangle

C. form a scalene triangle

D. form a right angled triangle

Answer: B

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89. The projection of a vector on the three coordinate axes are $6, -3, 2$, respectively. The direction cosines of the vector are

A. 6,-3,2

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

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

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

Answer: C

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90. The plane

$\bar{r} = s(i + 2j - 4k) + t(3i + 4j - 4k) + (1 - t)(2i - 7j + 3k)$ is parallel to the line

A. $\bar{r} = (-i + j - k) + t(-i - 2j + 4k)$

B. $\bar{r} = (-i + j - k) + t(i - 2j + 4k)$

C. $\bar{r} = (i + j - k) + t(-i - 4j + 7k)$

D. $\bar{r} = (-i + j - k) + t(-2i + 2j + 4k)$

Answer: A

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91. 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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92. The 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 $\frac{x}{3}=\frac{y}{4}=\frac{z}{2}$ 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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93. If a plane meets coordinate axes in points A,B,C such that the centroid of $\triangle ABC$ is $G(1, r, r^2)$, then the 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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94. 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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95. 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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96. 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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97. If the two lines, whose d.C.s l,m,n are given by the equation al+bm+cn=0 and fmn + gnl + hlm=0, are mutually perpendicular, then

A. $\frac{f}{a}+\frac{g}{b}+\frac{h}{c}=0$

B. $\frac{a}{f}+\frac{b}{g}+\frac{c}{h}=0$

C. $\frac{f}{a^2}+\frac{g}{b^2}+\frac{h}{c^2}=0$

D. $\frac{a^2}{f}+\frac{b^2}{g}+\frac{c^2}{h}=0$

Answer: A

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98. The straight lines, whose direction cosines are l, m, n which are the roots of $al+bm+cn=0$ and $fl^2+gm^2+hn^2=0$ are parallel

A. $\frac{f}{a}+\frac{g}{b}+\frac{h}{c}=0$

B. $\frac{a}{f}+\frac{b}{g}+\frac{c}{h}=0$

C. $\frac{f}{a^2}+\frac{g}{b^2}+\frac{h}{c^2}=0$

D. $\frac{a^2}{f}+\frac{b^2}{g}+\frac{c^2}{h}=0$

Answer: D

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99. The perpendicular distance of a corner of uni cube from a diagonal not passing through it is

A. $\frac{\sqrt{6}}{3}$

B. $3\sqrt{3}$

C. $2\sqrt{3}$

D. none of these

Answer: A

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100. A line makes an angle $\alpha, \beta, \gamma, \delta$ with the four diagonals of a cube, then $\sin^2\alpha + \sin^2\beta + \sin^2\gamma + \sin^2\delta =$

A. 2

B. $\frac{4}{3}$

C. $\frac{8}{3}$

D. 1

Answer: C

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101. If the centroid of the tetrahedron O-ABC, where $A \equiv (\alpha, 5, 6), B \equiv (1, \beta, 4)$ and $C \equiv (3, 2, \gamma)$ is $G(1, -1, 2)$, then: $\alpha^2 + \beta^2 + \gamma^2 =$

A. $\alpha^2 + \beta^2$

B. $\beta^2 + \gamma^2$

C. $\gamma^2 + \alpha^2$

D. none of these

Answer: B

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

A. α

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

C. 2α

D. 3α

Answer: C

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103. The direction Cosines of two lines at right angles are l_1, m_1, n_1 and l_2, m_2, n_2 Then the direction cosines of a line which is perpendicular to both these lines are

A. $l_1 + l_2 . m_1 + m_2 . n_1 + n_2$

B. $l_1 - l_2 . m_1 - m_2, n_1 - n_2$

C. $\frac{l_1}{l_2}, \frac{m_1}{m_2}, \frac{n_1}{n_2}$

D. $m_1 n_2 - m_2 n_1, n_1 l_2 - n_2 l_1, l_1 m_2 - l_2 m_1$

Answer: D

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

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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105. If h, m_1, n_1 and $l_2, m_2, n_2 are D.C.s$ of the two lines inclined to each other at an angle θ, then the D.C.'s of the internal and external bisectors of the angle between these lines are-

A. $\frac{l_1+l_2}{2\frac{\sin\theta}{2}}, \frac{m_1+m_2}{2\frac{\sin\theta}{2}}, \frac{n_1+n_2}{2\frac{\sin\theta}{2}}$

B. $\frac{l_1+l_2}{2\frac{\cos\theta}{2}}, \frac{m_1+m_2}{2\frac{\cos\theta}{2}}, \frac{n_1-n_2}{2\frac{\sin\theta}{2}}$

C. $\frac{l_1-l_2}{2\frac{\sin\theta}{2}}, \frac{m_1-m_2}{2\frac{\sin\theta}{2}}, \frac{n_1-n_2}{2\frac{\sin\theta}{2}}$

D. $\frac{l_1l_2}{2\frac{\cos\theta}{2}}, \frac{m_1-m_2}{2\frac{\cos\theta}{2}}, \frac{n_1-n_2}{2\frac{\cos\theta}{2}}$

Answer: B

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106. Let vectors $\bar{a}$, $\bar{b}$, $\bar{c}$ and $\bar{d}$ be such that

$$(\bar{a} \times \bar{b}) \times (\bar{c} \times \bar{d}) = \bar{0}$$

Let P_1 and P_2 be the planes determined by the pairs of vectors $\bar{a}$, $\bar{b}$ and $\bar{c}$, $\bar{d}$ respectively.

Then the angle between P_1 and P_2 is

A. 0

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

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

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

Answer: A

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107. A non zero vector $\vec{a}$ is parallel to the kine of intersection of the plane determined by the vectors $veri, \vec{i} + \vec{j}$ and the plane determined by the vectors $\vec{i} - verj, \vec{i} + \vec{k}$ find the angle between $\vec{a}$ and the vector $\vec{i} - 2\vec{j} + 2\vec{k}$.

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

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

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

D. $\frac{3\pi}{8}$

Answer: B

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108. Value of k such that the line

$\frac{x-4}{1} = \frac{y-2}{1} = \frac{z-k}{2}$ lies in the plane 2x-4y+z=7 is

A. 7

B. -7

C. no real value

D. 4

Answer: A

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109. IF lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $x-3=\frac{y-k}{2}=z$ intersect then the value of k is

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

B. $\frac{9}{2}$

C. $-\frac{2}{9}$

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

Answer: B

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110. 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. 0

B. -1

C. $1/2$

D. -2

Answer: D

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111. 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 integer k is equal to

A. 2

B. -2

C. -5

D. 5

Answer: C

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112. 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. 3

B. 1

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

D. 9

Answer: D

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113. If the lines

x=ay +b, z=cy+d and $x = a'y + b', z = c'y + d'$ are perpendicular, then

A. aa'+cc'=1

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

C. ab+cd =a'b'+c'd'

D. aa'+bb'-cc'+dd'

Answer: B

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

A. 0°

B. 30°

C. 45°

D. 90°

Answer: D

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115. A plane which passes through the point (3,2,0), and the line $\frac{x-3}{1}=\frac{y-6}{5}=\frac{z-4}{4}$,is

A. x-y+z=1

B. x+y+z=5

C. x+2y-z=1

D. 2x-y+z=5

Answer: A

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116. 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

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

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

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

Answer: C

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117. 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=6, b=4

B. a=8, b=2

C. a=2, b=8

D. a=4, b=6

Answer: A

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

A. (6,-17)

B. (-6,7)

C. (5,-15)

D. (-5,5)

Answer: B

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119. 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. $\frac{1}{4}$

B. $-\frac{1}{4}$

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

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

Answer: A

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120. The 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 $\frac{x}{3}=\frac{y}{4}=\frac{z}{2}$ 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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121. Equation of the plane which passes through the Z-axis, and is perpendicular to the line

$\frac{x-a}{\cos\theta} = \frac{y-b}{\sin\theta} = \frac{z-c}{0}$ is

A. $x + y\tan\theta = 0$

B. $y + x\tan\theta = 0$

C. $x\cos\theta - y\sin\theta = 0$

D. $x\sin\theta - y\cos\theta = 0$

Answer: A

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122. For what value (s) of a will the two points $(1, a, 1) and (-3, 0, a)$ lie on opposite sides of the plane $3x + 4y - 12z + 13 = 0$? a. $a \succ 1$ or $a > 1/3$ b. $a = 0$ only c. `0

A. $a < -1$ or $a > \frac{1}{3}$

B. a=0 only

C. $0 < a < 1$

D. $-1 < a < 1$

Answer: A

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Previous Year Mht Cet Exam Questions

1. Equation of the plane through $(-2, 2, 2)$ and $(2, -2, -2)$ and perpendicular to the plane x+2y-3z=7 is

A. 5x-2y-3z=0

B. 5x+2y+3z=0

C. 5x+2y-3z=7

D. 5x+2y+3z=7

Answer: B

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2. The equation of the plane which passes through $(2, -3, 1)$ and is normal to the line joining the points $(3, 4, -1)$ and $(2, -1, 5)$ is given by

A. $x + 5y - 6z + 19 = 0$

B. $x - 5y + 6z - 19 = 0$

C. $x + 5y + 6z + 19 = 0$

D. $x - 5y - 6z - 19 = 0$

Answer: A

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3. The cosine of the angle between the planes $\bar{r}_1 . \bar{n}_1 = q_1$ and $\bar{r}_2 . \bar{n}_2 = q_2$ is

A. $\frac{q_1 \cdot q_2}{|\bar{n}_1||\bar{n}_2|}$

B. $\frac{\bar{n}_1 . \bar{n}_2}{|\bar{n}_1||\bar{n}_2|}$

C. $\frac{\bar{n}_1 . \bar{n}_2}{|\bar{n}_1 . \bar{n}_2|}$

D. $\frac{q_1 \cdot q_2}{|\bar{n}_1 . \bar{n}_2|}$

Answer: B

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Test Your Grasp Chapters 6 7 8

1. The projection of the line segment joining the points $A(-1, 0, 3)$ and $B(2, 5, 1)$ on the line whose direction ratios are proportional to 6,2,3 is

A. $\frac{11}{9}$

B. $\frac{22}{7}$

C. π

D. $\frac{11}{8}$

Answer: A::B::C::D

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2. If the d.R.s of two lines are $1, -2, -2$ and $2, -2, 1$, then the measures of the acute angle between them is

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

B. $\cos^{-1}\left(\frac{2}{9}\right)$

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

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

Answer: A::B::C::D

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3. Given $A \equiv (1, 2, 3), B \equiv (-1, 3, -2), C \equiv (a, b, 4)$ and $D \equiv (4, 1, 2)$. If the lines AB and CD are paralle, then the respective values of a and b are

A. $\frac{11}{3}, -\frac{4}{5}$

B. $\frac{5}{22}, \frac{5}{4}$

C. $\frac{24}{5}, \frac{3}{5}$

D. $-\frac{22}{5}, \frac{4}{5}$

Answer: C

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4. If the cosine of the angle between the lines having d.R.s $1, -1, 2$ and 0,1,a is $\frac{\sqrt{3}}{2}$, then: a=

A. 2,6

B. $-2. -6$

C. 1,7

D. $-1, -7$

Answer: A::B::C::D

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5. If the line joining the points $P(-2, 1, -8)$ and Q(a,b,c) is in the direction of the vector 6i + 2j + 3k, then the respective values of a,b,c are

A. $-1, 0, 9$

B. $4, 3, -5$

C. $2, -3, 4$

D. $1, 2, -3$

Answer: A::B::C::D

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6. The d.C.s of the line 3x-1=2y-3 = 4z-1 are

A. $-\frac{2}{\sqrt{61}}, \frac{3}{\sqrt{61}}, \frac{4}{\sqrt{61}}$

B. $\frac{1}{\sqrt{61}}, \frac{4}{\sqrt{61}}, \frac{3}{\sqrt{61}}$

C. $\frac{4}{\sqrt{61}}, \frac{6}{\sqrt{61}}, \frac{3}{\sqrt{61}}$

D. $\frac{1}{\sqrt{61}}, -\frac{2}{\sqrt{61}}, \frac{3}{\sqrt{61}}$

Answer: A::B::C::D

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7. If the lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-p}$ and $\frac{x-1}{p}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar, then: p=

A. ± 3

B. $0, -1$

C. ± 1

D. $0, -3$

Answer: A::B::C::D

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8. If the lines $\bar{r}=(i+j)+\lambda(3i+pj-6k)$ and $\bar{r}=(2i-j)+\mu(-i+j+2k)$ are parallel, then: p=

A. -3

B. 2

C. 3

D. -2

Answer: A::B::C::D

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9. If the lines $\bar{r} = (2i) + \lambda(i + 2j + mk)$ and $\bar{r} = (i + j) + \mu(2i + j + 2k)$ are mutually perpendicular, them: m=

A. 1

B. 2

C. 3

D. -2

Answer: A::B::C::D

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10. If the lines $\bar{r} = (i - j + k) + \lambda(\pi + j)$ and $\bar{r} = (2i - j) + \mu(i - j + 4k)$ are coplanar then: p=

A. $\frac{3}{7}$

B. $\frac{4}{7}$

C. $\frac{5}{7}$

D. $\frac{6}{7}$

Answer: A::B::C::D

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11. If the lines $x - 2 = ay - 3 = \frac{2 - z}{3}$ and $bx + 1 = y + 4 = z$ are mutually perpendicular, then

A. $\frac{1}{a} + \frac{1}{b} = 1$

B. $\frac{1}{a} + \frac{1}{b} = 3$

C. $\frac{1}{a}+\frac{1}{b}=4$

D. $\frac{1}{a}+\frac{1}{b}=0$

Answer: A::B::C::D

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12. Equation of the plane passing through the points (1,0,1), (-1,1,1) and (2,3,1) is

A. x=1

B. y=2

C. z=2

D. z=1

Answer: A::B::C::D

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13. Equation of the plane passing through the origin, and parallel to the vectors i+3j -k and j+k, is

A. 5x-y+z=9

B. 3x-y+z=0

C. 4x-y+z=0

D. 4x+y+z=9

Answer: A::B::C::D

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14. Equation of the plane passing through the point (3,1,0) and containing the line $x-2=\frac{y}{2}=\frac{z+1}{-2}$, is

A. 4x+3y-z=9

B. 4x-3y+z=9

C. $4x-3y-z=9$

D. $4x+3y+z=9$

Answer: A::B::C::D

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15. The plane $3x+y-2z=4$ meets the Y-axis in the point

A. (2,0,1)

B. (0,0,-2)

C. (0,4,0)

D. (3,1,-2)

Answer: A::B::C::D

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16. Equation of the plane containing the line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-5}{-1}$, and parallel to the plane $\bar{r}.(5i-2j+k)=5$, is

A. 5x-2y-z=17

B. 5x+2y-z=17

C. 5x-2y+z=17

D. 5x+2y-z=17

Answer: C

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Test Your Grasp Chapters 6 7 9

1. Equation of the plane containing the line $\frac{x+2}{5}=\frac{y-3}{-1}=\frac{z+1}{1}$, and perpendicular to the plane

$\bar{r}.(i+j-k) = -3$ is

A. y+z=2

B. y+z+2=0

C. x+y=3

D. x-y+3=0

Answer: A

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Test Your Grasp Chapters 6 7 10

1. Equation of the plane containing the lines $\frac{x-1}{2} = \frac{y}{-3} = \frac{z+1}{4}$ and $\frac{x+2}{2} = \frac{1-y}{3} = \frac{1-z}{-4}$ is

A. 10x + 16y - 7x+3=0

B. 10x + 16y + 7z=3

C. $10x - 16y - 7z=3$

D. $10x - 16y + 7z+3=0$

Answer: B

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Test Your Grasp Chapters 6 7 11

1. Equation of the plane passing through the points A(2,1,-1), B(3,1,2) and parallel to X-axis, is

A. $y=5$

B. $y=3$

C. $y=1$

D. $y=0$

Answer: A::B::C::D

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Test Your Grasp Chapters 6 7 12

1. If the points (3,9,x), (-4,4,4), (4,5,1) and (0,-1,-1) are coplanar, then x=

A. -3

B. 3

C. -4

D. 4

Answer: D

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Test Your Grasp Chapters 6 7 13

1. Point of intersection of the line

$\frac{x-1}{2}=\frac{y-2}{3}=\frac{z+3}{4}$ and the plane 2x+4y -z=1 is

A. $(-1,\ -1,\ -7)$

B. (1,-1,7)

C. (1,1,7)

D. (1,1,-7)

Answer: A::B::C::D

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Test Your Grasp Chapters 6 7 14

1. Measure of anlge betweenthe line

$\frac{x-1}{5}=\frac{y+2}{2}=\frac{z+5}{14}$

A. $\sin^{-1}\left(\frac{1}{15}\right)$

B. $\cos^{-1}\left(\frac{2}{15}\right)$

C. $\sin^{-1}\left(\frac{2}{15}\right)$

D. $\cos^{-1}\left(\frac{1}{15}\right)$

Answer: A::B::C::D

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Test Your Grasp Chapters 6 7 15

1. XY-plane divides the line joining the points (2, 4, 5)

and (-4, 3, -2) in the ratio

A. 0.086805555555556

B. 0.20972222222222

C. 0.12777777777778

D. $-4:3$

Answer: A::B::C::D

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Test Your Grasp Chapters 6 7 16

1. Equation of the plane which bisects the join of the points A(3,-1,4) and B(-3,5,2) at right angles is

A. 3x-3y+z+3=0

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

C. 3x+3y+z=3

D. 3x+3y-z=3

Answer: A

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Test Your Grasp Chapters 6 7 17

1. If the foot of the perpendicular from the origin to a plane is (2,-3,4), then the equation of the plane is

A. 2x+3y+4z=29

B. 2x+3y-4z=29

C. 2x-3y+4z+29

D. 2x-3y-4z=29

Answer: A::B::C::D

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Test Your Grasp Chapters 6 7 18

1. If the line $\frac{x-3}{3} = \frac{y-1}{-2} = \frac{z-c}{-8}$ lies in the plane 2x-y+z=10, then: c=

A. -3

B. 3

C. -5

D. 5

Answer: A::B::C::D

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Test Your Grasp Chapters 6 7 19

1. If the plane $\frac{x}{1} + \frac{y}{2} + \frac{z}{3} = 1$ meets the co-ordinate axes in the points A, B and C, then area of $\triangle ABC$ in sq. units is

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

B. $\frac{5}{2}$

C. $\frac{7}{2}$

D. $\frac{9}{2}$

Answer: A::B::C::D

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Test Your Grasp Chapters 6 7 20

1. If a plane makes intercepts 2,2,1 on X-,Y- and Z- axes respectively, then its perpendicular distance from the origin is

A. $\frac{1}{\sqrt{16}}$

B. $\frac{3}{\sqrt{16}}$

C. $\frac{2}{\sqrt{6}}$

D. $\frac{5}{\sqrt{6}}$

Answer: A::B::C::D

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Test Your Grasp Chapters 6 7 21

1. Equation of the plane passing through the two points A(1,2,-3), B(3,-4,-1), and parallel to the line $\frac{x+1}{2} = \frac{4-y}{3} = z-5$, is

A. y+3z+7=0

B. y-3z+7=0

C. x+3z+7=0

D. x-3z+7=0

Answer: A::B::C::D

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Test Your Grasp Chapters 6 7 22

1. Measure of angle between the planes

$\bar{r}.(2i-j-2k)=3$ and $\bar{r}.(8i-j-4k)=5$ is

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

B. $\cos^{-1}\left(\frac{2}{3}\right)$

C. $\cos^{-1}\left(\frac{4}{3}\right)$

D. $\cos^{-1}\left(\frac{5}{3}\right)$

Answer: A::B::C::D

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